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THE NEW INTERNATIONAL ENCYCLOPÆDIA

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KEY TO PRONUNCIATION.

ā	as in	ale, fate. Also see ǎ , below.	ð	as in the Spanish Almodovar, <i>pulgada</i> , where it is nearly like <i>th</i> in English <i>then</i> , this.
ā	" "	senate, chaotic. Also see ǎ , below.	g	" " go, get.
ā	" "	glare, care.	g	" " the German Landtag, and <i>ch</i> in Feuerbach, buch; where it is a guttural sound made with the back part of the tongue raised toward the soft palate, as in the sound made in clearing the throat.
ā	" "	am, at.		
ā	" "	arm, father.		
ā	" "	ant, and final <i>a</i> in America, armada, etc. In rapid speech this vowel readily becomes more or less obscured and like the neutral vowel or a short <i>u</i> (ū).	h	as <i>j</i> in the Spanish Jijona, <i>g</i> in the Spanish <i>gila</i> ; where it is a fricative somewhat resembling the sound of <i>h</i> in English <i>hue</i> or <i>y</i> in <i>yet</i> , but stronger.
ā	" "	final, regal, where it is of a neutral or obscure quality.	hw	" <i>wh</i> in which.
ā	" "	all, fall.	k	" <i>ch</i> in the German <i>ich</i> , Albrecht, and <i>g</i> in the German Arensburg, Mecklenburg; where it is a fricative sound made between the tongue and the hard palate toward which the tongue is raised. It resembles the sound of <i>h</i> in <i>hue</i> , or <i>y</i> in <i>yet</i> ; or the sound made by beginning to pronounce a <i>k</i> , but not completing the stoppage of the breath. The character k is also used to indicate the rough aspirates or fricatives of some of the Oriental languages, as of <i>kh</i> in the word <i>Khan</i> .
ā	" "	eve.		
ā	" "	elate, evade.		
ā	" "	end, pet. The characters ē , ā , and ā are used for ā in German, as in Gärtner, Gräfe, Hähnel, to the values of which they are the nearest English vowel sounds. The sound of Swedish ā is also indicated by ē .		
ē	" "	fern, her, and as <i>i</i> in sir. Also for ō , oe , in German, as in Göthe, Goethe, Ortel, Oertel, and for <i>eu</i> and <i>œu</i> in French, as in Neufchâtel, Crèveœur; to which it is the nearest English vowel sound.	n	as in sinker, longer.
e	" "	agency, judgment, where it is of a neutral or obscure quality.	ng	" " sing, long.
i	" "	ice, quiet.	n	" " the French bon, Bourbon, and <i>m</i> in the French Etampes; where it is equivalent to a nasalizing of the preceding vowel. This effect is approximately produced by attempting to pronounce 'onion' without touching the tip of the tongue to the roof of the mouth. The corresponding nasal of Portuguese is also indicated by n , as in the case of São Antão.
i	" "	quiescent.		
i	" "	ill, fit.		
ō	" "	old, sober.		
ō	" "	obey, sobriety.		
ō	" "	orb, nor.		
ō	" "	odd, forest, not.	sh	" " shine, shut.
o	" "	atom, carol, where it has a neutral or obscure quality.	th	" " thrust, thin.
oi	" "	oil, boil, and for <i>eu</i> in German, as in Feuerbach.	th	" " then, this.
oo	" "	food, fool, and as <i>u</i> in rude, rule.	zh	as <i>z</i> in azure, and <i>s</i> in pleasure.
ou	" "	house, mouse.		
ū	" "	use, mule.		
ū	" "	unite.		
ū	" "	cut, but.		
ū	" "	full, put, or as <i>oo</i> in foot, book. Also for ū in German, as in München, Müller, and <i>u</i> in French, as in Buchez, Budé; to which it is the nearest English vowel sound.		
ū	" "	urn, burn.		
y	" "	yet, yield.		
h	" "	the Spanish Habana, Cordoba, where it is like a <i>v</i> made with the lips alone, instead of with the teeth and lips.		
ch	" "	chair, cheese.		

An apostrophe [**'**] is sometimes used to denote a glide or neutral connecting vowel, as in *tā'b'l* (table), *kāz'm* (chasm).

Otherwise than as noted above, the letters used in the respellings for pronunciation are to receive their ordinary English sounds.

When the pronunciation is sufficiently shown by indicating the accented syllables, this is done without respelling; as in the case of very common English words, and words which are so spelled as to insure their correct pronunciation if they are correctly accented. See the article on PRONUNCIATION.

THE NEW INTERNATIONAL ENCYCLOPÆDIA

NEW KEN'SINGTON. A borough in Westmoreland County, Pa., 18 miles northeast of Pittsburg; on the Allegheny River, and on the Buffalo and Allegheny River division of the Pennsylvania Railroad (Map: Pennsylvania, B 3). It is known as a centre of large steel and iron industries, and for its brewing interests. There are also in the vicinity manufactories of glass and white lead. Population, in 1900, 4665.

NEW LEBANON. A town in Columbia County, N. Y., 24 miles southeast of Albany; on the Chatham and Lebanon Valley Railroad (Map: New York, G 3). It includes several villages, among which Lebanon Springs, a popular summer resort, noted for thermal springs, and Mount Lebanon, the site of a Shaker village, are best known. The town is engaged principally in agriculture, and in manufacturing patent medicines, thermometers, and barometers, glass, flour, lumber, chairs, brooms, and baskets. Population, in 1890, 1765; in 1900, 1556.

NEW LEINSTER. The former name of Stewart Island (q.v.).

NEW LEXINGTON. A village and the county-seat of Perry County, Ohio, 21 miles south by west of Zanesville; on the Toledo and Ohio Central, and the Cincinnati and Muskingum Valley railroads (Map: Ohio, F 6). It has Saint Aloysius Academy and a handsome court house. There are some manufactures, clay works being among the leading establishments, and in the vicinity are extensive coal fields. Population, in 1890, 1470; in 1900, 1701.

NEW LIGHT. A fish. See CRAPPIE.

NEW LONDON. A city, port of entry, and one of the county-seats of New London County, Conn., 14 miles south of Norwich, the other county-seat, and 51 miles east of New Haven; on the Thames River, about three miles above its entrance into Long Island Sound, and on the New York, New Haven and Hartford and the Central Vermont railroads (Map: Connecticut, G 4). It has direct communication with New York by steamboat, and an excellent harbor

defended by Forts Trumbull and Griswold. Just above the city, on the east side of the river, is a small United States naval station. New London is a delightful place of residence and popular resort in summer. Among its features of interest are a fine soldiers' and sailors' monument, a handsome public library, the New London County Historical Society and Library, the Hempstead House, one of the oldest houses in Connecticut, the Old Town Mill, erected in 1646 and still in operation, the little schoolhouse in which Nathan Hale was a teacher, Boulder Park on the Thames, White Beach, a popular and attractive bathing beach, Williams Park, Memorial Park, and the great railroad drawbridge completed in 1890. The annual Yale-Harvard boat race is rowed on the Thames. New London was formerly the seat of extensive whaling and sealing interests, which are still of some importance, though manufacturing is the leading industry. The principal establishments are silk mills, a woolen mill, ship yards, foundries and machine shops, cotton-gin factory, bed-quilt mills, and printing-press works. The government, under a charter of 1894, is administered by a mayor, chosen every three years, and a unicameral council that controls elections to subordinate departments, excepting that of the schools, which is chosen by popular vote. The water-works are owned and operated by the municipality. Population, in 1890, 13,757; in 1900, 17,548.

New London was founded in 1646 by John Winthrop, the younger, and until 1658, when it received its present name, was known as Nau-meag. During the 'Great Awakening' of 1741 there was a remarkable manifestation of religious enthusiasm here. On September 6, 1781, General Arnold, at the head of a large British force, and assisted by a fleet of thirty-two vessels, attacked New London, killed a number of its inhabitants, and burned nearly all of the wharves and stores. (See GROTON.) New London was incorporated in 1784. Consult: Caulkins, *History of New London* (New London, new ed. 1900); Starr, *A Centennial Historical Sketch of the Town of New London* (ib., 1876); and an article, "Historic New London," in *New England Magazine*, vol. v. (Boston, 1887).

NEW MADRID. A city and the county-seat of New Madrid County, Mo., 40 miles south by west of Cairo, Ill.; on the Mississippi River, and on the Saint Louis Southwestern Railroad (Map: Missouri, G 5). The centre of a productive region, it has a large river commerce in grain, lumber, cotton, live stock, etc. There are cotton gins, and manufactories of lumber, veneer, staves, and flour. Population, in 1890, 1193; in 1900, 1489. New Madrid was founded in 1788 as a Spanish settlement, by a few American frontiersmen. For a time during the Civil War it was an important Confederate military station, but on March 14, 1862, it was abandoned and fell into the hands of the Federal forces.

NEWMAN, nū'man, EDWARD (1801-76). An English entomologist and publisher, born at Hampstead. In 1833 he founded *The Entomological Magazine*; in 1840 *The Entomologist*; in 1843 *The Zoölogist*; in 1844 *The Phytologist*. His more important works are: *History of British Ferns* (1840); an enlarged edition of Montagu's *Dictionary of British Birds* (1866); *Illustrated Natural History of British Moths* (1869); and *British Butterflies* (1871).

NEWMAN, FRANCIS (?-1660). An English colonist in America, Governor of New Haven Colony in 1658-59. He was born in England, and emigrated to New Hampshire in 1838, but after a few months removed to the Connecticut Valley, and became prominent in the affairs of the colony at New Haven. There he served as an ensign and lieutenant in the colonial militia or trained bands (1642-45) as secretary of the colony under Governor Theophilus Eaton (1646-47), and as a magistrate and assistant in 1653. In the latter year he was one of the commissioners sent from the Connecticut River towns to Manhattan to demand satisfaction of Peter Stuyvesant, Governor of New Netherlands, for injuries sustained by the English colonists at the hands of the Dutch. In July, 1654, he became one of the commissioners of the United Colonies of New England, and in May, 1658, he succeeded Eaton as Governor of the New Haven Colony, retaining the office until September, 1659.

NEWMAN, FRANCIS WILLIAM (1805-97). An English scholar and writer, brother of John Henry Newman. He was born in London, June 27, 1805, and, with his brothers, attended the school at Ealing. Thence he passed to Worcester College, Oxford, and in 1826 obtained a fellowship in Balliol College. He withdrew from the university in 1830, declining the subscription to the Thirty-nine Articles. After a tour in the East he was appointed classical tutor in Bristol College (1834). In 1840 he accepted a similar professorship in Manchester New College, and in 1846 was appointed to the chair of Latin in University College, London, which he held till 1869. During all this time he was an active contributor to literary and scientific periodicals, and maintained a leading part in the controversies on religion, in which he took the line directly opposite to that chosen by his elder brother, being no less ardent as a disciple of the extreme rationalistic school than John Henry Newman of the dogmatical. These opinions, and the system founded upon them, form the subject of his work, *Phases of Faith, or Passages from the History of My Creed* (1850). Of his many publications, several regard the controversy re-

ferred to, as *Catholic Union: Essays Towards a Church of the Future* (1844); *A State Church Not Defensible* (1845); *The Soul, Its Sorrows and Aspirations* (1849). Others are on political or social topics, as: *Radical Reforms, Financial and Organic* (1848); *Lectures on Political Economy* (1851); *On the State Provision for Vice* (1871); *Remedies for the Great Social Evil* (1889); *Europe of the Near Future* (1871). A large number are devoted to historical, classical, and scientific subjects, the most important of which are: *Contrasts of Ancient and Modern History* (1847); translations into 'unrhymed metre' of the *Odes of Horace* (1853) and the *Iliad of Homer* (1856); a treatise on *Difficulties of Elementary Geometry* (1841); *Handbook of Modern Arabic* (1866); *Orthoepey* (1869); *Miscellanies* (1869-89); *Dictionary of Modern Arabic* (1871); *Early History of Cardinal Newman* (1891). He died at Weston super-Mare, October 4, 1897.

NEWMAN, HENRY RODERICK (1833-). An American water-color painter, born in New York City. He gave up the study of medicine, to become an artist, at the age of eighteen years. He went to France in 1870, and, after traveling through Switzerland, settled in Venice (1871), and later removed his studio to Florence. Ruskin has expressed admiration for his works, which consist mostly of architectural, landscape, and flower pieces. "Venice," "Tuscan Spring," "The Florence Cathedral," and "The Gulf of Spezia" are among his most elaborate paintings. His other works include: "A Study of Pink and White Oleanders," "Grapes and Olives," "Flowers," and "An Architectural Study."

NEWMAN, JOHN HENRY (1801-90). An English religious leader, first in the Church of England and later in the Roman Catholic Church. He was born in London, February 21, 1801, and educated first at a private school at Ealing, then at Trinity College, Oxford, which he entered when he was not quite sixteen. He won a scholarship two years later, and took his degree in 1820. In 1822 he was elected to a fellowship at Oriel, then the highest distinction of Oxford scholarship, which brought him into close relations with many of the most distinguished men of the time; among them was a brother fellow, Edward Bouverie Pusey (q.v.), with whom he was to be most closely associated in the work of the Oxford Movement. He was ordained deacon in 1824, and combined with his college position the curacy of Saint Clement's Church. A year later, his friend Whately having become principal of Saint Alban's Hall, Newman was made vice-principal, but resigned the appointment on being named tutor in his own college (1826). In 1828, on the election of Hawkins as provost of Oriel (partly through Newman's influence, though Keble was also a candidate), Newman succeeded him as vicar of Saint Mary's, the university church, and the position which he thus gained gave him a commanding power, by the wonderful sermons which he preached in this pulpit, over a whole generation. He resigned his tutorship in 1832, owing to differences with Hawkins as to college arrangements. He made his first visit to the Continent soon after and returned just in time to hear Keble's famous assize sermon on National Apostasy (July 14, 1833), which he always considered as the actual origin of the

Movement. (For the complete history of its development, see OXFORD MOVEMENT.) Here it is enough to say that from the first Newman was its acknowledged head; the charm of his personality, the ascetic fervor of his life, and the fame of his preaching gave him a tremendous power. He was one of the chief contributors to the *Tracts for the Times*, twenty-nine of which, including the famous No. 90, which proved the end of the series, are from his pen. The same year that witnessed their beginning (1833) saw the publication of his book on *The Arians*, which was followed in 1837 by *The Prophetic Office of the Church*; in 1838 by works on Justification, on the Canon of Scripture, and on Anti-christ. In this year also Newman became editor of the *British Critic*, holding the position until 1841, and began in conjunction with Keble and Pusey to publish a Library of Translations from the Greek and Latin Fathers. On a formal request from the Bishop of Oxford, he discontinued the publication of the *Tracts* in 1841, after the storm of opposition which No. 90, "Remarks on Certain Passages in the XXXIX. Articles," had aroused.

Already in 1839 in the course of his study of the history of the Monophysite controversy a doubt had come to him whether, after all, the Anglican position was tenable; and the condemnation of his position by bishops and heads of colleges showed him that his place in the Movement was gone. Parallel reasoning on the history of the Arian controversy, and the curious compromise of the Jerusalem bishopric (see JERUSALEM), still further shook his allegiance to the Church of England.

In 1842 he retired from Oxford to the neighboring village of Littlemore, where he passed three years in seclusion, with a number of young men who had attached themselves to him, wrestling in silence with the problem thus presented to him. In the early part of 1842 he published a formal retraction of his adverse criticisms of the Roman Catholic Church, and in the following autumn, while he had not yet made up his mind, it seemed to him more honest to resign his living. The train of reasoning which occupied him throughout 1845, when he was engaged in the composition of his *Essay on the Development of Christian Doctrine*, finally brought him to the point, and on October 9th he became a Roman Catholic.

As his influence in Oxford and among thoughtful Anglicans had been tremendous, so the effect of this step was correspondingly great. A year after his reception he went to Rome and was there ordained priest. Soon afterwards he returned to England and introduced the Congregation of the Oratory (q.v.), which he thought specially adapted to the needs of the large towns. The greater part of his later life was spent in the house of the Oratory at Birmingham; from 1854 to 1858, however, he was in Dublin, as rector of the unsuccessful Catholic University there. Always deeply interested in education, he had planned to establish a house of the Oratory at Oxford, which might have allowed the young men of his Church to gain the advantages of the university; the project, opposed by Manning, fell through, but since his death his ideas have been vindicated by the establishment of a Catholic hall there. Constant literary activity marked all these years, of which the most remarkable fruits

were his *Letter to the Duke of Norfolk* (1875), in which he explained and defended the position of Catholics as affected by the Vatican decrees in their bearing on civil allegiance, in reply to Gladstone; and his memorable *Apologia pro Vita Sua* (1864), which contained a most striking account of the inner workings of his mind during his whole manhood, and increased the veneration felt for him by all his countrymen, of whatever shade of theological opinion. It grew out of a memorable controversy with Charles Kingsley, who, by general consent, had much the worse of the argument. In 1877 Newman was elected an honorary fellow of Trinity College, Oxford, and revisited his loved *alma mater* for the first time in twenty-two years. Leo XIII. created him a cardinal in 1879, allowing him still to reside in England. He died at Birmingham, August 11, 1890.

Both as a great spiritual force and as a master of literary expression, Newman will always deserve a large space in any history of nineteenth century England. His literary style, always pure, melodious, and elevated, and owing much to years of familiarity with the Authorized Version of the Bible, is full of undecaying beauty. But it was only an expression of his mental habit. The dialectical skill which marks all his controversial work was governed by the conscience whose supremacy he was never tired of enforcing; and the chaste beauty of his style was but the outcome of that intense realization of the spiritual world which is the most characteristic feature of all his teaching.

A complete list of his writings would occupy too much space. A uniform edition of the more important of them was published under his own supervision (London, 1868-81). Besides those already named, mention should be made of his: *Essay in Aid of a Grammar of Assent* (1870); two works of fiction, *Callista*, a *Sketch of the Third Century* (1856), and *Loss and Gain*, a story of Oxford life in his own day (1848); numerous volumes of sermons, all characterized by his qualities; and some extremely beautiful verse, of which the best, with "The Dream of Gerontius," is included in *Verses on Various Occasions* (1868). Consult, besides most of the books referred to under OXFORD MOVEMENT: *Letters and Correspondence of J. H. Newman During His Life in the English Church* (London, 1891); and sketches by R. H. Hutton (ib., 1891), Walters and Barrow (ib., 1901), and Whyte (New York, 1903); also an admirably thoughtful study of his writings in Shairp, *Studies in Poetry and Philosophy* (Edinburgh, 1866). His earlier life is also told by his brother Francis (London, 1891), and in *The Anglican Career of Cardinal Newman* (ib., 1892); his later, partly in Fitzgerald, *Fifty Years of Catholic Life and Progress* (ib., 1898).

NEWMAN, JOHN PHILIP (1826-99). An American clergyman, Bishop of the Methodist Episcopal Church. He was born in New York City, and educated at Cazenovia (N. Y.) Seminary, which he quitted in 1848 to enter the ministry. He followed the itinerant life of a Methodist clergyman until 1860, when he went abroad for travel and study, visiting Egypt and Palestine, subsequently embodying the results of this trip in *From Dan to Beersheba, or the Land of Promise as It Now Appears* (1864). After

New Orleans was taken by the Federal army in 1864 he was sent there to organize the Methodist Episcopal Church, and remained until 1869, meanwhile editing, in addition to his other labors, the *New Orleans Advocate*. Leaving New Orleans, he became pastor of the Metropolitan Church at Washington, D. C. His personality was a combination of clergyman and man of the world; his pulpit eloquence, which inclined rather to the grandiose, nevertheless won for him a large popularity both within and outside his denomination. At the end of his first pastorate in Washington in 1872, President Grant appointed him inspector of consulates in Asia, and in this capacity he made a tour of the world, which resulted in another work of travel, *The Thrones and Palaces of Babylon and Nineveh from the Persian Gulf to the Mediterranean* (1876). In 1878 he assumed a pastorate in New York City, and in 1881 was a delegate to the first Ecumenical Methodist Conference in London, where he read the invited essay on *Scriptural Holiness*, said to mark his highest achievement as a writer. From 1882 to 1884 he was acting pastor at the Madison Avenue Congregational Church, New York. In 1885 he returned to the pastorate of the Metropolitan Church, Washington, and in 1888 was elected bishop of the Methodist Episcopal Church, with his official residence at Omaha, Neb. In addition to the works mentioned, he published: *Christianity Triumphant* (1884); *Evenings with the Prophets on the Lost Empires* (1887); *The Supremacy of Law* (1890); *Conversations with Christ* (1901).

NEWMARKET. A market-town on the border of Suffolk and Cambridgeshire, England, 15 miles northeast of Cambridge (Map: England, G 4). The market-house and the celebrated Jockey Club are the chief edifices. The town owes its prosperity to the horse-races. The race-course of Newmarket, upward of four miles in length, is said to be the finest in the world, and the training ground bears a similar reputation for excellence. There are eight race-meetings held here annually. Population, in 1891, 8631; in 1901, 10,686. Consult Hore, *History of Newmarket and Annals of the Turf* (3 vols., London, 1886).

NEWMARKET. A town of York County, Ontario, Canada, 34 miles north of Toronto on the Northern Railway (Map: Ontario, D 3). It has busy trading interests and some manufactures. Population, in 1891, 2143; in 1901, 2125.

NEW MECKLENBURG (formerly **NEW IRELAND**). The second largest of the Bismarck Archipelago (q.v.), situated in the Pacific Ocean, 350 miles northeast of New Guinea, and separated from New Pomerania, the largest of the group, by Saint George Channel (Map: Australasia, H 3). It is elongated, has an area of 4920 square miles, and consists for the most part of mountains covered with forests of large trees. Little is known of the interior of the island, but the coast lands are very fertile. Colonization of the island has been unsuccessful; there is a trading station on the north coast, but in 1897 there were only nine European inhabitants, the bulk of the population, whose number is unknown, being savage Melanesians.

NEW MEXICO. A southwestern Territory of the United States. It lies between latitudes

31° 20' and 37° north, longitudes 103° 2' and 109° 2' west, and is bounded on the north by Colorado, on the east by Oklahoma and Texas, on the south by Texas and Mexico, and on the west by Arizona. It forms almost a perfect square, the line being somewhat broken on the southern boundary. The length along the western boundary is 400 miles; the greatest width, 358 miles. Area, 122,580 square miles. New Mexico exceeds in size every State in the Union except Texas, California, and Montana.

TOPOGRAPHY. The whole Territory is very elevated, only a small portion in the south lying below 4000 feet. The topography may be divided into several more or less well marked regions, running north and south. The eastern third of the Territory belongs to the Great Plains, which skirt the whole eastern base of the Rocky Mountains. In the northeastern part of the Territory this plain is watered by the Canadian River, south of which it slopes gradually into the level and arid plateau known as the Llano Estacado. West of this is the valley of the Pecos River, the lowest part of the Territory, falling near the southern boundary below 3000 feet. From the Pecos Valley the land rises westward into the Front Range of the Rocky Mountains, which issues from Colorado in a continuous line of lofty peaks, several of which are over 12,000 feet high. Toward the centre of the Territory the range becomes broken into isolated groups and mesas inclosing in the north park-like grassy plains, but toward the south arid and desolate valleys filled with lava beds and salt marshes. West of the Front Range is the narrow valley of the Rio Grande, traversing the whole length of the Territory. Finally, through the western part of the Territory stretches the great, broad plateau, the Continental Divide, which extends into Mexico as the Sierra Madre. Its average height is 7000 feet, though it sinks to 5000 feet in the south, and it is diversified by a number of mesas and isolated ranges from 8000 to 11,000 feet high.

CLIMATE AND VEGETATION. The climate is remarkably dry and healthful, and the air pure and clear. In the lower regions of the south the climate is mild throughout the year, but in the north the temperature sometimes falls below zero. At Santa Fé the mean temperature for the year is about 50°, for the warmest month 70°, and for the coldest 30°. The average rainfall for the whole Territory is about 15 inches, being nowhere sufficient for the needs of agriculture. Many of the mountain basins and river valleys are covered with nutritious grasses, one of the most common genera being the grama-grass (*Bouteloua*). The salt-grass (*Distichlis spicata*) often forms a dense sod over the alkali flats which abound especially on the western plateau. Bunch grasses cover many of the mesas and mountain slopes, but the sage brush is predominant in many of the plains, and the plateau toward the west becomes arid and desolate. Sycamore, cottonwood, oak, and other deciduous trees grow in the river-valleys, and some of the foothills carry growths of piñon and dwarf cedar, while extensive forests of pine, spruce, and cedar cover the higher mountains. With the possible exception of the alkali flats, the soil, wherever there is any, is said to be fertile and capable of becoming productive when irrigated.

For flora and fauna, see these sections in the article UNITED STATES.

AREA AND POPULATION OF ARIZONA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Apache.....	D 2	Saint Johns.....	10,736	4,281	8,297
Cochise.....	D 4	Tombstone.....	6,147	6,038	9,251
Coconino.....	B 2	Flagstaff.....	19,322		5,514
Gila.....	C 3	Globe.....	4,542	2,021	4,973
Graham.....	D 3	Solomonville.....	6,500	5,970	14,162
Maricopa.....	B 3	Phoenix.....	8,816	10,086	20,457
Mohave.....	A 2	Kingman.....	13,421	1,444	3,486
Navajo.....	C 2	Holbrook.....	9,826		8,829
Pima.....	A 4	Tucson.....	9,424	12,673	14,680
Pinal.....	C 3	Florence.....	5,324	4,251	7,779
Santa Cruz.....	C 4	Nogales.....	1,212		4,545
Yavapai.....	B 1	Prescott.....	7,863	8,685	13,790
Yuma.....	A 8	Yuma.....	9,787	2,671	4,143
San Carlos Indian reservation.....	C 1				3,065



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AREA AND POPULATION OF NEW MEXICO BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Bernalillo.....	E 2	Albuquerque.....	8,842	20,913	28,630
Chaves.....	F 3	Roswell.....	11,520	.....	4,773
Colfax.....	F 1	Raton.....	3,784	7,974	10,150
Donna Ana.....	E 3	Las Cruces.....	5,001	9,191	10,187
Eddy.....	G 3	Carlsbad.....	6,618	.....	3,229
Grant.....	D 4	Silver City.....	9,327	9,657	12,883
Guadalupe.....	G 2	Puerto de Luna.....	6,987	.....	5,429
*Leonard Wood.....	F 2	Santa Rosa.....	.....	.....	.....
Lincoln.....	F 3	Lincoln.....	4,984	7,081	4,963
*Luna.....	E 3	.....	.....	.....	.....
*McKinley.....	D 2	.....	.....	.....	.....
Mora.....	F 2	Mora.....	2,533	10,618	10,304
Otero.....	E 3	Alamogordo.....	6,874	.....	4,791
*Quay.....	G 2	Tecumcari.....	.....	.....	.....
Rio Arriba.....	F 1	Tierra Amarilla.....	6,655	11,534	13,777
*Roosevelt.....	G 2	Portales.....	.....	.....	.....
*Sandoval.....	E 2	Sandoval.....	.....	.....	.....
San Juan.....	D 1	Aztec.....	5,742	1,800	4,828
San Miguel.....	F 2	Las Vegas.....	4,833	24,304	22,053
Santa Fé.....	E 2	Santa Fé.....	2,212	13,562	14,658
Sierra.....	E 3	Hillaboro.....	3,129	3,630	3,158
Socorro.....	E 3	Socorro.....	15,386	9,595	12,195
Taos.....	F 1	Taos.....	2,265	9,808	10,889
†Torrance.....	F 2	Progreso.....	.....	.....	.....
Union.....	G 1	Clayton.....	6,802	.....	4,528
Valencia.....	E 2	Los Lunas.....	9,472	13,876	13,895

* Established since the last census was taken.

† The organization of Torrance County is to be completed January 1, 1905.

GEOLOGY. The mountain ranges are generally upheavals of a nucleus of granite and syenite which has broken through the Paleozoic sandstones and Carboniferous limestone, these strata being upturned and exposed along their bases and slopes. The eastern plains are almost wholly Cretaceous, and the same formation occurs in the northern part of the western plateau. Intrusions of eruptive rocks are found in profusion in many parts of the Territory; these range from ancient volcanic rocks and dikes of porphyry to more recent lava flows which cover considerable areas both on the plateaus and in the valleys.

Mining. This industry is but little developed in comparison with its great possibilities. The mineral region is almost co-extensive with the mountain region. Coal and gold are the minerals most mined. The output of the former increased from 157,092 short tons in 1882 to 1,086,546 short tons in 1901. The output of the latter shows an increase from 26,074 fine ounces in 1898 to 33,302 in 1901. The output of silver and copper, which had decreased for a number of years, has grown extraordinarily, the output of the former in 1901 being 563,400 fine ounces, as against 425,300 in 1898, and that of the latter having increased from 31,884 pounds in 1894 to 9,629,884 in 1901. Emeralds, turquoise, and other precious stones are being mined in increasing quantities. Other minerals produced are lead, iron, gypsum, kaolin, and fire clays.

FORESTS. The wooded area is given as 23,700 square miles. The United States has reserved tracts amounting to 4299 square miles, mostly about the head of the Gila River. The merchantable timber is found only in the mountainous regions, and is mainly yellow pine and spruce.

AGRICULTURE. Irrigation is practicable and in practice along the water-courses. However, the possibilities of irrigation in New Mexico are not as vast as in some other Western commonwealths, owing to the comparative lack of large rivers and lakes. The irrigated areas are scattered throughout the Territory and are not large in any particular region. The Rio Grande River supplies water for a greater area than any other stream. Owing to evaporation and the use of the water in irrigation, this stream becomes dry in the southern part of the Territory during the irrigation season. Much water is wasted by the primitive system of irrigation employed by the Indians and Mexicans. There is a considerable irrigated area on the San Juan River in the northwest. Irrigation has not been introduced until recently in the eastern plain region. In 1899 there were 975 irrigation ditches with an aggregate length of 2382 miles. Their construction cost \$4,140,319. There were under ditch 646,784 acres, of which 203,893 acres were irrigated, and 182,804 acres were in crops. The total area included in farms (both agricultural and stock) in 1900 was 5,130,878 acres, more than six times as great as the corresponding area in 1890.

Alfalfa is the most important crop. Wheat, corn, and other cereals are grown in fair quantities. The Rio Grande Valley produces a superior quality of grapes. Most of the temperate zone fruits are grown. New Mexico can produce sugar beets of the highest grade. The following table of acreages explains itself:

	1900	1890
Corn.....	41,845	28,589
Wheat.....	37,907	21,858
Oats.....	15,848	9,314
Beans.....	3,349	
Peas.....	2,220	
Hay and forage.....	87,358	26,375

STOCK-RAISING. New Mexico claims the possession of a combination of favorable conditions—mild climate, etc.—unrivalled for purposes of sheep-raising. This industry, ever since the advent of the Spaniards, has been of first importance. The number of sheep decreased between 1880 and 1890, but increased enormously in the following decade. There has also been a marked gain in the number of cattle and of horses. The grazing region is chiefly in the eastern part, where there is an abundance of 'mesquite' and other varieties of native grasses. Very little grazing is afforded in the arid tablelands west of the Rio Grande Valley. The following table shows the leading stock holdings:

	1900	1890
Dairy cows.....	16,775	18,607
Other cattle.....	978,084	659,004
Horses.....	131,163	38,130
Mules and asses.....	21,213	8,367
Sheep.....	3,333,743	1,248,970
Swine.....	20,426	10,471

MANUFACTURES. The manufacturing interests are small, but had a marked growth between 1890 and 1900. In 1890 there were 127 establishments with \$965,938 capital, as against 420 with \$2,698,786 capital in 1900. Railroad repair shops were the most important establishments. The large sheep-raising interests explain the introduction of wool-scouring establishments, of which four were erected during the decade.

TRANSPORTATION. The Atchison, Topeka and Santa Fe Railroad traverses the Territory from north to south, following the course of the Rio Grande. The Santa Fe Pacific branch of the above railroad connects the Territory with the Pacific Coast. The Southern Pacific crosses the southern portion of the Territory, and the Pecos Valley and the El Paso and Northeastern railroads have recently been constructed through the eastern part. In 1900 the total number of miles was 1779. There are no navigable streams.

BANKS. The first bank in the Territory was a national bank organized in 1871. In 1888 some banks were organized under the Territorial laws. The Territorial banking law provides for yearly reports and examinations. In 1902 there were 15 national banks, with a capital of \$1,012,000; surplus, \$171,000; cash, etc., \$430,000; deposits, \$5,033,000; and loans, \$3,688,000; and 12 Territorial banks, with capital of \$417,000; surplus, \$52,000; cash, etc., \$148,000; deposits, \$1,783,000; and loans, \$1,354,000.

GOVERNMENT. New Mexico has the usual Territorial form of government. See TERRITORIES.

FINANCES. A public debt of \$200,000 was created in 1884 to construct the Capitol. Later more bonds were issued for the erection of a penitentiary and other public buildings. There was also a constant deficit due to high expenditures, and also to the difficulty of collecting taxes, of which about 25 per cent. usually remain unpaid. In 1889 a movement for financial reform gained headway, and the expenditures

were decreased by about 50 per cent. Since then the public debt has been somewhat diminished. At the end of 1901 it was \$1,180,000. The receipts for 1901 were \$540,795, and disbursements \$465,815, leaving a surplus of \$74,920.

MILITIA. In 1900 the men of militia age numbered 41,464. The number of militia in 1901 was 612.

POPULATION. The population increased from 61,547 in 1850 to 91,874 in 1870, 153,953 in 1890, and 195,310 in 1900. The foreign-born in the last year numbered 13,625, of whom 6649 were Mexicans. The Indian population numbered 13,144, and the negroes 1610. A large part of the population are descendants from the original inhabitants, who were of Spanish or of mixed blood. Albuquerque, the largest town, had in 1900 a population of 6238; Santa Fé, the capital, 5603; and Las Vegas, 3552.

RELIGION AND EDUCATION. The bulk of the population belong to the Roman Catholic Church. According to the census of 1900 the percentage of illiteracy was greater than that of any other State or Territory. With a compulsory school law, and greatly increased expenditures for school purposes, and the lengthening of the school year, illiteracy is diminishing. The percentage decreased from 44.5 in 1890 to 33.2 in 1900. In 1890 61 per cent. of the population could not speak English. This figure for 1900 became also greatly reduced. In 1898-99 there was raised \$414,653 for Territorial schools and institutions, as against \$85,129 in 1891; the number of teachers increased from 407 to 706; and the school term lengthened from three months in 1891 to four months in 1899. The Territorial institutions for advanced learning are: University of New Mexico, at Albuquerque; New Mexico College of Agriculture and Mechanic Arts, at Mesilla Park; School of Mines, at Socorro; Normal School of Silver City, at Silver City; New Mexico Military Institute, at Roswell; New Mexico Normal University, at Las Vegas. The Catholic Church supports eighteen schools; the Methodist Church, eleven; the New West Educational Commission, five; and the Presbyterian Church, twenty-five. Furthermore, the United States has schools for Indians, including the Indian Industrial School at Santa Fé.

CHARITABLE AND PENAL INSTITUTIONS. There are a school for deaf, dumb, and blind, and a penitentiary at Santa Fé, and an insane asylum at East Las Vegas.

HISTORY. The first explorers of the region were Spanish. Cabeça de Vaca visited it in 1536, and Coronado (q.v.) in 1540-42. Espejo wandered over much of it in 1582-83. In 1598 Juan de Oñate conquered the inhabitants, who were Pueblo Indians, and not Aztecs, as often erroneously stated. Santa Fé was founded between 1605 and 1616. The Indians revolted about 1680, and kept their independence for ten years. The mines were worked and towns and missions were founded. This region became a province of Mexico when that country gained its independence of Spain in 1821. In June, 1846, Col. Stephen W. Kearny marched from Fort Leavenworth with a force composed of United States dragoons and Missouri volunteers, and occupied Santa Fé on August 18th. The whole Territory was declared a part of the United States. (See PRICE, STEBLING.) The Territory of New

Mexico formed a part of the Mexican cession by the Treaty of Guadalupe Hidalgo, February 2, 1848. The act of organization was passed September 9, 1850, and went into effect in March, 1851. The original boundaries included that part of the territory of the United States north of the Mexican line, west of Texas, east of California, and south of 37°, including, however, the territory north of 37° and south of the Arkansas River. In 1853 the Gadsden Purchase (q.v.) was added and Arizona was set off in 1863. The portion north of 37° was added to Colorado in 1867. In 1850 a convention was held and a State constitution adopted, but the dread on the part of the North of another slave State prevented the admission of New Mexico. Frequent efforts to secure admission have been made since. In 1894 Congress passed an enabling act, and in the Fifty-seventh Congress (1901-03) an act of admission passed the House, but did not reach a vote in the Senate. During the Civil War New Mexico was invaded in December, 1861, by Texas Rangers, who took possession of the Territory, but were forced to retire in April, 1862, by regular troops under Colonel Canby and a regiment of Colorado volunteers. Since that time there have been Indian outbreaks, which have been suppressed with difficulty. The following have been Governors of the Territory of New Mexico:

GOVERNORS

James S. Colhoun.....	1851-52
Edwin V. Sumner, U. S. A., Commandant.....	1852
John Greiner, Secretary (acting).....	1852
William C. Lane.....	1852-53
William S. Messery (acting).....	1853-54
David Merriwether.....	1853-57
W. H. H. Davis (acting).....	1854-57
Abraham Rencher.....	1857-61
Henry Connelly.....	1861-65
W. F. M. Army (acting).....	1865-66
Robert B. Mitchell.....	1866-69
William A. Pile.....	1869-71
Marsh Giddings.....	1871-75
William G. Ritch (acting).....	1875
Samuel B. Axtell.....	1875-78
Lewis Wallace.....	1878-81
Idonel A. Sheldon.....	1881-85
Edmund O. Ross.....	1885-89
L. Bradford Prince.....	1889-93
W. L. Thornton.....	1893-97
Miguel A. Otero.....	1897 —

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NEW MEXICO, UNIVERSITY OF. A coeducational institution of higher learning at Albuquerque, New Mexico, incorporated by an act of the Territorial Legislature in 1889, and indicated by statute as the future State university. The collegiate, normal, and preparatory departments were opened in 1892. Science, music, art,

and commercial schools were afterwards added. The degrees of bachelor of arts and pedagogy, of master of arts and sciences, and of doctor of philosophy are conferred. The Hadley Climatological Laboratory is an organization for research especially with reference to the influence of the climate of the arid and plateau region of the United States upon disease. The students in 1902 numbered 150 and the faculty twelve. The library contained about 5000 volumes. The campus contains the Administration Hall, Hadley Science Hall, the gymnasium, and the Ladies' Cottage. The total value of property under control of the college in 1902 was \$75,000. Its endowment consisted of 243,000 acres of public land and 150,000 acres of saline land, and the income was \$15,000.

NEW MEXICO COLLEGE OF AGRICULTURE AND MECHANIC ARTS. A coeducational State institution at Mesilla Park, N. M., established in 1889. It is supported mainly by a Territorial tax and by the Morrill and Hatch funds. The moneys received from the Federal Government amount to \$40,000 annually. In 1902 its income from all sources was \$48,147, its grounds and buildings were valued at \$45,000 and the whole amount of college property at \$100,500. The library contained 10,000 volumes. The instructors, of whom six were women, numbered twenty-five, and there were 163 collegiate and special students, and 144 in the preparatory department.

NEW MILFORD. A town, including several villages, and a county-seat of Litchfield County, Conn., 15 miles north of Danbury; on the Housatonic River, and on the New York, New Haven and Hartford Railroad (Map: Connecticut, B 3). It has a public library with about 3400 volumes, and Rectory and Ingleside schools, both Protestant Episcopal. There are several large tobacco warehouses, and manufactories of hats, carbonized stone and sewer pipe, lime, pottery, and paints. Population, in 1890, 3917; in 1900, 4804.

NEW MODEL, THE. The name of the Parliamentary Army in the great English Civil War, after its reorganization under the ordinance of February 15, 1645. The pattern was provided by Cromwell's Ironsides. There was no longer to be a division of responsibility, but all authority was concentrated in the hands of the new commander-in-chief, Lord Thomas Fairfax (q.v.). Cromwell became the lieutenant-general. Parliament had freed the army from Essex and Manchester by the Self-Denying Ordinance (q.v.). Consult Gardiner, *History of the Great Civil War*, vol. I. (London, 1886). See CROMWELL, OLIVER.

NEWMAN, nū'nān. A city and the county-seat of Coweta County, Ga., 39 miles south by west of Atlanta; on the Atlanta and West Point and the Central of Georgia railroads (Map: Georgia, B 2). It is the centre of a productive fruit-growing and farming region, and has a large trade in cotton. The chief industrial establishments include canning and cigar factories, cotton and cottonseed-oil mills, foundries and machine shops, and manufactories of phosphates, fertilizers, etc. The water-works are owned by the municipality. Population, in 1890, 2859; in 1900, 3654.

NEW NETHERLAND. The original name of the Dutch colony afterwards called New York.

NEWMHAM COLLEGE. An institution for the higher education of women, situated at Cambridge, England. It had its inception in the amalgamation in 1880 of the Association for Promoting the Higher Education of Women in Cambridge, organized in 1873, with the Newnham Hall Company, opened in 1875. As early as 1871 five women students came to Cambridge to study under the direction of Miss Clough, subsequently principal of Newnham College. This number increased to twenty-five by 1874. The growth of the college has continued steadily, and in 1902 it included North Hall, established in 1880; Clough Hall, 1888; and the Pfeiffer Building, 1893. The library contains about 8000 volumes. The attendance in 1902 was 174. The faculty included 15 resident and 37 non-resident tutors. With certain restrictions the students have since 1881 enjoyed all the scholastic privileges offered at the University of Cambridge. Their names appear in the tripos or honor list in the university calendar. They do not, however, receive degrees, but are granted certificates instead.

NEW ORLEANS, ōr'le-anz. The largest city in Louisiana, and, with the exception of Natchitoches, the oldest. It is situated on both banks of the Mississippi, 107 miles from its mouth, in latitude 29° 58' N., and longitude 90° 04' W. (Map: Louisiana, F 4). Its distance from Washington in direct line is 960 miles; from Saint Louis by rail, 639; and from Chicago by rail, 923. The city proper occupies a strip of land between the river and Lakes Maurepas and Pontchartrain, with the latter of which it is connected by two canals. The corporate limits of the city embrace the whole parish of Orleans and a portion of Jefferson on the right bank (the town of Algiers, or Fifth District). The official boundaries thus inclose an area of 191 square miles, though the inhabited portion covers only about 37 square miles. The city lies about ten feet below the level of the Gulf, and is so far below the level of high water in the Mississippi that it is protected from overflows by levees twenty feet high in places. Its sobriquet, the 'Crescent City,' is derived from the fact that the original city followed the curve of the river in front of the old Place D'Armes; but as the inhabited portion has been gradually extended, its shape more nearly resembles the letter S. It has a frontage of more than twelve miles on the river, which is about half a mile wide in front of Canal Street and from 40 to 200 feet deep.

Canal Street, 200 feet broad, is the great business thoroughfare, and cuts the city in two, the portion below being known as the French Quarter, or *Vieux Carré*, and the portion above as the American Quarter. The French portion, with its narrow streets, its occasional tiled roofs, its old cathedral, its Spanish city hall or Cabildo, and its porte-cochères, is far more picturesque than the American Quarter, which contains the great business houses, the banks, and also the handsomest private dwellings. In the French Quarter, however, many beautiful residences, surrounded by flowers and semi-tropical plants, are to be seen on Esplanade Avenue. Here dwell the old Creole families, descendants of the early French or Spanish settlers; here French is still spoken

as a mother tongue, and though there has been much intermarrying and social intercourse with Americans, French customs are still observed, and visitors feel as if they had happened upon an aristocratic faubourg of Paris. Traces, also, of the Spanish régime are to be found in many interesting specimens of the Hispano-Moresque style of architecture, which, with the red-tiled Spanish houses and the exquisite wrought-iron of the balconies, make this portion of the city unique. Above Canal Street the principal residence streets are Saint Charles Avenue and Prytania Street. These stretch for miles through the prettiest section of the city. Here are the most beautiful gardens. The palm, the palmetto, the fig, the orange, and the magnolia grow in tropical abundance, and even in winter the atmosphere is often perfumed with the odor of roses, violets, and sweet olive. Owing to the curve of the river, the streets do not run at right angles; they follow what is sometimes called 'the line of beauty.' Between the main thoroughfares of this portion of the city are interpolated a number of small streets, which, seeming to begin nowhere and end nowhere, cause great perplexity to strangers. The total extent of streets is 700 miles, of which only 204 miles are paved at all. The lack of paving, resulting in the disuse of the unpaved streets, which in bad weather become almost impassable, has a tendency to congest traffic on the few streets that are paved. The street railways cover a total mileage of 176. Recently they have been consolidated under one company. A belt line, twelve miles long, extends around the most attractive portion of the city. There is also an electric line connecting with West End, a suburban resort, nearly seven miles from the head of Canal Street.

CLIMATE. The Weather Bureau reports have been carefully kept for the last thirty-two years. They show that the average rainfall is 58.01 inches. In winter there is generally some ice and occasionally snow. The summers are long, but the heat is seldom excessive, and prostrations are rare. The average annual relative humidity is 74 per cent. The large surrounding bodies of water render the climate more equable than in the interior. The annual mean temperature is 69°. In thirty-two years the temperature has never reached 100°, except in 1901.

BUILDINGS. Among the secular buildings of New Orleans, the most interesting is the Cabildo (now the Supreme Court building). It was built at the expense of the Government near the close of the eighteenth century, during the Spanish régime. In it the formal transfer of the Province of Louisiana from Spain to France and from France to the United States took place with elaborate ceremonies in 1803. Other notable structures are the Custom House and Post Office building (cost \$5,000,000), which is of massive granite, but not beautiful as to architecture; the City Hall, of Ionic order, and modeled after a Greek temple; the new Court House; the New Saint Charles Hotel, one of the most famous hosteleries in the South; the Howard Memorial Library; Gibson Hall (a part of Tulane University); the Charity Hospital; the Medical College; the Milliken Memorial Hospital; the Harmony Club (an aristocratic Jewish association); the Cotton Exchange; the Sugar Exchange; the Athenæum; the Jewish Orphans' Home; and the new Tilton Memorial Library

(also a portion of Tulane University). Among the splendid office buildings that are rapidly rising in the business centre of the city may be mentioned the Hennen building, the Liverpool and London and Globe, the Morris, the Masonic Temple, and the Tulane-Newcomb. Of the ecclesiastical edifices the most prominent are the Saint Louis Cathedral (Catholic), in which General Jackson attended services after his great victory at Chalmette in 1815; the Archiepiscopal Palace (1730), the oldest building in the Mississippi Valley; the Church of the Immaculate Conception, Saint Joseph's Church, the First Presbyterian, Christ Church Cathedral (Episcopal), Trinity Church, Saint Paul's, Temple Sinai and Touro synagogues, the Prytania Street (Presbyterian) Church, and the Coliseum Place (Baptist) Church.

PARKS. The total park area of the city is 742.66 acres. The two largest and most interesting parks are the City Park and Audubon Park, which are both being rapidly improved. City Park, which is situated on Metairie road, between the city and the lake, contains 160 acres. It was formerly a plantation, and beneath its ancestral oaks, draped with festoons of Spanish moss, occurred nearly all the famous duels which were a marked feature of Creole life before the Civil War. Dueling has now passed away. In this park young men find amusement in golf and polo. Portions of it are still wild. Audubon Park, in the upper portion of the city, contains 240 acres, and was also a plantation in days gone by. It was here that in 1796 the first successful attempt was made to granulate sugar—marking an epoch in the industrial history of the State. Its superb live oaks, its miniature lakes, and its great greenhouse, 300 feet long, and full of rare tropical plants, make this park a favorite resort. It also contains an interesting sugar experiment station, supported by the State. Besides these parks, there are two squares that attract attention on account of historical associations. These are Congo Square (now Beauregard Square) and Jackson Square. The former was in old times the resort of the slaves, and here they assembled for their wild dances to the sound of bones and drums. Jackson Square was not only associated with the exciting events that occurred in connection with the two transfers of the province in 1803, but was also the scene of the triumphal entry into the city of General Jackson after the Battle of New Orleans. The square contains a fine equestrian statue of General Jackson, by Clark Mills. Flanked by the old cathedral and the court buildings on one side and by the fine Pontalba rows on the other two sides, this square is regarded as one of the most symmetrical and beautiful public places in the United States. Near the square is the French market, which is one of the 'sights' of New Orleans. Visitors crowd to it early Sunday mornings to listen to the babel of tongues—French, Spanish, Italian, Creole patois, and English—to drink 'café noir,' and to buy *gombo filé* (pounded sassafras) and baskets of the Choctaw Indians, who still frequent it.

CEMETERIES. There are a number of cemeteries in various portions of the city. The most interesting are the Catholic cemeteries, of which the oldest is Saint Louis No. 1, and the most curious is Saint Roch's Campo Santo. The handsomest cemetery is the Metairie, which contains, among



its fine monuments, the tomb of the Army of Tennessee, surmounted by the splendid equestrian statue of Gen. Albert Sidney Johnston. As it is not possible in New Orleans to dig much below the surface without finding water, the curious custom prevails of burying in vaults, or 'ovens,' rising in tiers sometimes eight feet above the ground line. Jews, however, bury beneath the ground, as do some of the poorer classes. On All Saints' Day (November 1st), which is a general holiday in the city, the Catholics visit the cemeteries and decorate the tombs of the dead.

PUBLIC INSTITUTIONS. While New Orleans has no such enormous libraries as are found in some of the Northern cities, it is fortunate in possessing several of importance. Among the smaller ones of a quasi-public character should be mentioned those owned by the Jesuits' College, the Tulane Medical College, the Parish Medical Society, the New Orleans Bar Association, and the H. Sophie Newcomb Memorial College. The larger libraries are the State Library, with about 25,000 volumes; the Tilton Memorial Library of Tulane University, with 20,000 volumes and 2000 pamphlets; the Howard Memorial, with 45,000 volumes and 12,000 pamphlets; and the New Orleans Public Library, with 52,000 catalogued and 10,000 uncatalogued books. The Howard Memorial, which is privately endowed, is a reference library, and has perhaps the best collection in the world of books concerning the history of the Mississippi Valley. The Public Library, embracing the former Fisk and Lyceum libraries, has an increasing circulation, amounting in 1902 to 110,000 volumes. There are also in the city three private libraries containing valuable collections of original documents on American history. In the Howard Memorial Hall are a number of interesting relics of the Civil War. Andrew Carnegie offered the city \$250,000 to erect a new library building with branches, and the offer has been accepted.

CHARITABLE INSTITUTIONS. The city is rich in such institutions. The principal one is the Charity Hospital, built in 1832. It treats about 5000 patients every year, without charge. It receives from the State \$95,000 annually, with additional sums for improvement of buildings, etc., and is controlled by a board appointed by the Governor. The city supports a home for aged and infirm, a house of refuge for boys, and an insane asylum. There is also an eye, ear, nose, and throat hospital, maintained by private contributions. The Jews have several well-organized charitable institutions, among which the principal are the Jewish Orphans' Home and the Home for Aged and Infirm Jews. The Touro Infirmary, endowed by a wealthy Hebrew philanthropist, has a free clinic, where the poor of all sects are treated. The Catholics have the most numerous charitable institutions under their control. The most prominent are the Poydras Asylum, the New Orleans Female Orphan Asylum, Saint Vincent's Infant Asylum, and the House of the Good Shepherd. There are also for colored people a Boys' Home and a Home for the Aged, founded by a colored philanthropist. Of recent foundation is the Kingsley House, modeled after the famous Hull House of Chicago. It is supported by private subscriptions. Finally, the Charity Organization Society has undertaken to organize the many charities of the city, and by the careful investigation of its agents to prevent pauperization.

EDUCATIONAL INSTITUTIONS. The organization of the public school system is thorough and complete. A large number of the handsome school-houses of the city were built from the income of a fund given by a former citizen, John McDonogh, which now amounts to about \$800,000. The city makes such appropriations for the public schools as it thinks proper, but it cannot appropriate less than eight-tenths of a mill for any one year. Besides this appropriation it receives its share of the current school fund collected by the State. There are no 'mixed' schools. The number of public schools for whites is 61, and for negroes 12. The number of teachers is 800 white and colored. The total enrollment for 1902 was 31,205, of which 26,133 were white and 5072 were colored. The public school system consists of one normal, three high, 68 grammar and primary, 18 kindergarten, one teachers' practice school, and one teachers' kindergarten training school. These schools occupy 69 buildings, 32 of which were erected by the city, 28 by the commissioners of the McDonogh fund, and two donated. The total cost of maintaining the schools per annum is \$510,573. The estimated expenditure for each pupil is \$16.36. Free instruction is also given to young children by six kindergartens, supported partly by churches and partly by private funds. The number of private schools in the city is 145 for whites and 14 for negroes. Among the most prominent colleges may be mentioned the College of the Immaculate Conception (established by the Jesuit Fathers in 1847); the Soulé Commercial and Literary Institute (established 1856); Spencer's Business College and Institute of Shorthand (established 1897); the Blake Institute; and the Home Institute (established in 1883). The last-named institution, besides its regular work, conducts a free night school, in which instruction is given to nearly 1300 men and boys. For the education of the colored youth there are four universities, or more properly colleges: Leland University (1870), Straight University (1870), New Orleans University (1873), and the Southern University (1881). Only the last of these is supported by the funds of the State. For the whites there is only one university, the Tulane University of Louisiana (q.v.), with the H. Sophie Newcomb Memorial College for Women.

AMUSEMENTS. New Orleans is famous for its French opera. For forty years before the Civil War troupes were brought over from France to furnish this entertainment, and with brief intervals the custom has prevailed ever since. Such is the passion for music and singing, especially among the Creoles, that even in times of great financial depression the city has managed by private subscription to support these foreign companies. No other city in the Union has shown equal enthusiasm. Thousands of visitors are attracted to the city during the winter season by the opera; but a still greater attraction for many years has been the Carnival celebration. As early as 1840 tableaux on floats were drawn through the streets, and, except during the Civil War, the custom has continued to the present day. These superb pageants are now given by four secret organizations—Momus, Proteus, Rex, and Comus—and each is followed at night by a gorgeous ball. Other secret organizations have sprung into being of late years, and the series of masked balls now extends with brief intervals from Twelfth Night

to Mardi Gras, or Shrove Tuesday. When the morning of Ash Wednesday dawns every vestige of this prolonged revelry has vanished. The subjects represented in the parades are drawn from mythology, romance, and history. The floats are designed by artists of established reputation, who, with their assistants, spend many months in elaborating them. The expense of these parades is about \$200,000 a year. Nowhere else in the world are similar pageants to be seen.

CLUBS. The principal social clubs of New Orleans are the Boston, the Pickwick, the Chess, Checkers and Whist, the Harmony, the Louisiana, the Era (a women's club), the Round Table, the Variété, and the Southern Yacht Club. The Louisiana Historical Society devotes itself to the investigation and preservation of the history of the State, while the *Athénée Louisianais* was founded for the study and preservation of the French language.

DRAINAGE AND SEWERAGE. The surface of the city being entirely flat, with the exception of Metairie Ridge, which has an elevation of about two feet, the problem of drainage and sewerage has been a perplexing one ever since the founding of New Orleans. The average rainfall being 58 inches, tropical downpours are not infrequent, and they sometimes flood the principal streets to the depth of several feet. To this inconvenience is added the fact that strong winds often force the waters of Lake Pontchartrain over the rear of the city, and keep it submerged for several days. Various plans for draining the city were tried, but they all failed. Finally the city appropriated for this purpose a large amount of money derived from the sale of street railway franchises, and under a drainage board appointed in 1896 the immense work of digging canals and establishing pumping stations was begun. Much yet remains to be done, but the system as far as completed was put into practical operation in March, 1900. Meanwhile (1899), the property owners of the city voted a special tax of two mills to run forty-two years to provide the necessary funds for "sewerage, drainage, and municipal water-works." A new board was then appointed, but a troublesome litigation in the courts tied its hands for many months. Recent decisions of the courts, however, in favor of the city give promise of speedy and successful execution of this great work. At present New Orleans is insufficiently supplied with river water, and a large majority of the inhabitants depend upon rain water, collected in great wooden vats or cisterns, which, rising nearly as high as the houses, form a unique feature of the city.

HEALTH. New Orleans has always been subject, at intervals, to visitations of yellow fever, and its sanitary reputation has been thereby seriously impaired. Before the Civil War the worst epidemics were those of 1832, when more than 8000, out of a population of about 55,000, died of yellow fever and cholera; of 1847, when nearly 2500 died of yellow fever alone; and of 1853—the 'Great Epidemic'—when fully 16,000 died from yellow fever and other causes. In 1878 there was one which carried off 4000 persons in Louisiana. In 1882, however, a thorough system of disinfecting vessels was established at the mouth of the Mississippi, and for fifteen years the fever was kept outside the boundaries of the State. In 1897 it was again introduced from a town in a neighboring State, where the disease had pre-

vailed for some time without being recognized. In that year, according to the official report, there were in Louisiana 1935 cases, most of them in New Orleans, but the total number of deaths was only 306. In the two subsequent years the disease appeared again, but still in a very mild form and with a low rate of mortality. In 1853 the death rate per 1000 of the population from yellow fever alone was 50.9; in 1854 it was 15.4; in 1878, 19.20; in 1897, 1.90; in 1898, .20; and in 1899, only .07. Hence the city board of health has declared that "this once dreaded disease is no longer worthy of a place of dignity in our statistics as a life destroyer." It may be added that the general cleaning up that has been given by the United States to the city of Havana is regarded as an important protective measure for New Orleans. Finally, the mildness of the climate of New Orleans, and the outdoor life which such a climate renders possible, preserve the inhabitants to a large extent from many of the terrible diseases common in other cities. The mortality among the colored population, which is generally improvident and careless of sanitation, is much higher than among the whites.

INDUSTRY AND COMMERCE. As a manufacturing centre New Orleans has many advantages, among which may be mentioned the following: The climate is moist enough for cotton manufacture and favorable for continuous labor throughout the year; the raw materials need but short transportation; the laboring class is numerous and contented; fuel is brought cheaply by water; and the exporting facilities are excellent. It is estimated that in the last twenty-five years the value of the products of factories in the city has increased six fold. The chief industries are rice cleaning and sugar refining, and the manufacturing of boots and shoes, furniture, men's clothing, cotton goods, tobacco, cigars, and cigarettes, cottonseed oil, and planing-mill products. The last census (1900) gives the number of wage-earners in all industries as 19,435; the total wages paid as \$7,645,167; and the value of the total output as \$63,514,505. The value of all products in 1890 was only \$48,234,924. There are in the city 1624 manufacturing enterprises, devoted to 150 different industries, with a total capital of \$52,000,000. The United States Government recently constructed at New Orleans one of the largest floating dry docks in the world. This has shown its ability to lift and sustain the largest ship in the American Navy. New Orleans is the second export city in the Union, being excelled only by New York. Six great railroad lines, with a total mileage of 26,881, have their terminus here. These are the Southern Pacific, Illinois Central, Louisville and Nashville, Texas and Pacific, Southern, and the Queen and Crescent. The last two enter New Orleans over the tracks of another line. There are six great grain elevators along the docks. The docks, which are for the most part uncovered, extend for six miles along the left bank. As the gateway of the Mississippi Valley the city is well situated for foreign commerce. The jetties at the mouth of the river give a channel of about thirty feet, and the depth of the river in front of the city is ample for the largest vessels. Direct lines of steamships connect with New York, the West Indies, Central America, and Europe, and there is even a direct line via the Suez Canal to Japanese ports,

carrying raw cotton for manufacture. At present there are thirty steamship lines connecting New Orleans with the principal ports of the world. As soon as the Isthmian Canal is built a great impetus will be given to the commerce of the city. The foreign trade consists very largely of exports, the annual value of which is about \$150,000,000. The imports, however, are increasing, being over \$23,000,000 for the ten months ending April, 1903.

GOVERNMENT. In 1806 the present charter of the city was granted by the Legislature. It is largely in accord with the suggestions of the Municipal Reform League of America, and is in many respects a radical departure from the previous charters. The executive powers are vested in a mayor, a controller, a treasurer, a commissioner of police and public works, and a city engineer. The first three are elected for four years, while the rest are appointed by the mayor with the consent of the council. As has been the custom in other great cities of late years, large appointive power is vested in the mayor, who is held responsible for his appointees. The only exception made is in the case of the keepers of the people's money. The council, which is unicameral, is elected for four years. By an unusual provision, each member receives a salary of \$20 a month if he has attended all meetings. The granting of franchises, the usual pitfall of councils, is carefully safeguarded. Connected with the city government proper, but in some respects largely independent of it, are a number of boards, with various functions, such as the civil service commission, the board of liquidation of the city debt, the police board, the board of fire commissioners, the school board, the board of health, the New Orleans levee board, the port commission, the drainage commission, and the water and sewerage board. Besides the numerous city courts, the State Supreme Court, the United States District, the Circuit Court, and the Circuit Court of Appeals hold sessions in New Orleans.

FINANCE. The report of the city controller for 1902 gives the bonded debt of the city as \$17,286,490, and the valuation of real and personal property as \$147,201,984. The rate of taxation was 22 mills, consisting of: city expense tax, 10 mills; interest and redemption city bonds, 10 mills; special tax for water, sewerage, and drainage, 2 mills. To this tax of 22 mills should be added the State tax of 6 mills and the tax of 1 mill for the maintenance of levees, making the total rate 29 mills. There is also a poll tax of \$1, which is devoted to the support of public schools.

POPULATION. The census of 1900 gave New Orleans a population of 287,104, making it the twelfth largest city in the United States. This total included 30,325 persons of foreign birth and 77,714 of negro descent. The increase in population, according to the censuses of former years, is shown as follows: in 1870, 191,418; 1880, 216,090; 1890, 242,039.

HISTORY. New Orleans was laid out in 1718 by Jean Baptiste Le Moyne, Sieur de Bienville, then Governor of Louisiana, and it was named in honor of the Duke of Orleans, Regent of France. The centre of the new settlement was the old Place d'Armes, now called Jackson Square. In 1722, when New Orleans became the capital of the French territory in this vicinity,

its low, marshy site was visited by Père Charlevoix, who records in his journal that he found only a hundred barrack-like buildings, with a large wooden storehouse, and "two or three residences that would be no ornament to a village in France." With prophetic eye, however, he added: "I have a well-grounded hope that this wild and desert place, which the reeds and trees do yet almost wholly cover, will be one day—and perhaps that day is not far distant—an opulent city and the metropolis of a great and rich colony." In November, 1762, France ceded the whole of Louisiana to Spain, but the people in New Orleans, who first heard of the transaction in 1764, strenuously objected to the change and forcibly expelled the first Spanish Governor, who came in 1766. In 1769 Alexander O'Reilly (q.v.), who had just been appointed Governor of Louisiana, punished with unsparing severity those who had been prominent in the uprising. In the same year the census taken by Governor O'Reilly shows that the city possessed only 468 houses, with a population of 3191. Of these the free persons numbered 1901, the slaves 1230, and the domesticated Indians 60. During the rest of the Spanish period there was but slow growth, perhaps on account of the burdensome commercial restrictions of the Spanish régime. During the American Revolution New Orleans was the headquarters of the Spanish forces on the North American continent, and the place from which a number of expeditions were sent out by Governor Bernardo Galvez (q.v.) against the British. In 1800, by the secret Treaty of San Ildefonso (q.v.), Louisiana was retroceded to France, but the French Government did not take formal possession until November 30, 1803, just twenty days before American deputies came to take possession for the United States in pursuance of the Louisiana Purchase. By this year the population had increased to a little over 8000. In 1802 the products shipped from New Orleans consisted of flour, 50,000 pounds; tobacco, 2000 hogsheads; cotton, 34,000 bales. Some 5000 casks of rum were produced in the distilleries around the city, but the manufactures were mostly confined to cordage, hair-powder, vermicelli, and shot.

As for the government during the French and Spanish régime, the whole province was nominally in the hands of a Superior Council, which was a judicial body and theoretically a legislative one. In truth, however, this body, which was appointive, not elective, had very little power. All laws for Louisiana were made in France. There was no self-government either under the French or the Spanish. Under the Spanish a *Cabildo* (assembly) was substituted for the Superior Council. It was composed of six perpetual regidores, two ordinary alcaldes, an attorney-general syndic, and a clerk. The Governor presided. By a curious provision, the offices of regidor and clerk were obtained by purchase, and in the first instance at auction. The ordinary alcaldes and the attorney were elected annually by the *Cabildo*. The ordinary alcaldes were judges within the city for criminal and civil cases. The regidores were the standard-bearer, the high sheriff, the receiver of fines, etc. There was an appeal from this tribunal to the Captain-General of Cuba, and from him to the Royal Audience in Santo Domingo, and thence to the Council of the Indies in Madrid. As under the French, the laws were issued by the

Governor in the name of the King. Even the police regulations were issued by the same official.

In 1804, the year after the United States obtained possession, President Jefferson said that "the position of New Orleans certainly destines it to be the greatest city the world has ever seen;" but the growth for many years, though rapid, did not come up to the general expectations. In 1805 New Orleans was regularly incorporated, and the inhabitants elected a city council. This was the first occasion on which the right of public suffrage was ever exercised in Louisiana. Americans now crowded into the newly acquired city. In the winter of 1806-07 wild rumors were abroad that Burr intended to make New Orleans the capital of a new empire. The city was placed under martial law by General Wilkinson, and it was some time before the excitement subsided.

A great impetus to the prosperity of the city was given in 1812, when the first steamboat arrived from Pittsburg. The Mississippi was now to become a great highway of commerce, and New Orleans was to flourish accordingly. Growth was checked for a time by the war with Great Britain, which followed soon. When, however, General Jackson won his great victory at Chalmette in 1815 (see NEW ORLEANS, BATTLE OF), attention was speedily directed to the city that he had saved, and its population increased more rapidly than ever before. By 1830 it had risen to 46,000, and in 1840 to 102,000. The city was extended beyond its old boundaries, gas and other improvements were introduced, and a more cosmopolitan spirit began to appear. In 1837 the city became involved in the speculative mania of the day and suffered severely from the ensuing panic. Nothing, however, could permanently check the prosperity of New Orleans, not even the terrible ravages of the yellow fever, which in the decade before the Civil War were more fatal than ever before. In 1836 the Creoles were so little in accord with the Americans that a novel form of government was tried. The city was divided into three municipalities, each with a recorder and a council of aldermen. There were a mayor and a general council (embracing the councils of the different municipalities) to control the affairs of general interest, but each municipality could tax itself and manage its local affairs. This anomalous state of things continued until 1852. In 1849 the State capital was transferred to Baton Rouge, but later New Orleans was again for a time the capital (1868-80).

In the Civil War New Orleans was an important centre of Confederate military and commercial operations until captured by a Federal fleet under Admiral Farragut in April, 1862. (See FORT JACKSON.) Thereafter it proved an important strategic point for attacks upon other parts of the Confederacy. Under the administration of Gen. B. F. Butler (q.v.), which lasted from May to December, 1862, the city suffered the extreme rigor of martial law. Butler's successor, Gen. N. P. Banks, was far more conciliatory. During the period of reconstruction New Orleans was the headquarters of the politicians and of the 'carpetbaggers' who, with their freedmen allies, governed the State during this stormy period. In 1866 there was a serious riot at Mechanics' Institute (now Tulane Hall), in which a constitutional convention was broken up by

the Democrats and a number of persons killed. In 1874 the Republican Governor, William Pitt Kellogg, fearing an uprising of the people, denied the inhabitants the right to bear arms, and whenever arms were found on any person they were seized by the police. 'The White League,' a Democratic organization, determined to procure arms at all hazards. Arms were ordered by steamer from the North, and when the steamer arrived at the levee, the League, arming itself as best it could, marched down to the dock on Canal Street to receive them. Here a conflict was precipitated with the metropolitan police of the Governor. The police were scattered, and the artillery which they had placed upon the levee was turned against themselves. The White Leaguers lost sixteen men. Seventeen years later a monument was erected to their memory on the spot where they fell. While an appeal to the President once more restored the Governor to power, this affair of September 14, 1874, is generally regarded as the beginning of the end of reconstruction in Louisiana. In 1877 the United States troops were withdrawn, and with them the 'carpetbag' rule disappeared. With a free government restored, the city turned its attention to the development of its great opportunities, and steady progress has marked its subsequent history. In 1884 a Cotton Centennial Exposition was held here—the first bale of cotton exported from this country having been shipped from Charleston in 1784. In 1880 the capital of the State was removed from New Orleans. In 1891 nine Italians, members of the Mafia (q.v.), who had been arrested for the murder of the chief of police, David C. Hennessy, were lynched by a mob, after being acquitted by the courts. This gave rise to considerable controversy between the United States and the Italian governments.

Consult: *Standard History of New Orleans* (Chicago, 1900); King, *New Orleans, the Place and the People* (New York, 1896); Martin, *History of Louisiana* (New Orleans, 1882); Gayarré, *History of Louisiana* (ib., 1903); King and Ficklen, *History of Louisiana* (ib., 1893); War-ing and Cable, "Social Statistics of Cities, History and Present Condition," in *Tenth United States Census* (Washington, 1881); Howe, "Municipal History of New Orleans," in *Johns Hopkins University Studies*, ser. vii., No. 4 (Baltimore, 1889); *Commercial, Industrial, and Financial Outlook for New Orleans* (Cedar Rapids, Iowa, 1894).

NEW ORLEANS, BATTLE OF. The last battle of the War of 1812 between the United States and Great Britain, fought at Chalmette, near New Orleans, La., January 8, 1815. On December 10, 1814, a British fleet of more than fifty sail with about 7000 troops on board arrived off the eastern coast of Louisiana and came to anchor near the entrance to Lake Borgne. Twelve days later a division of the troops, by the aid of treacherous Spanish fishermen, made its way up Bayou Bienvenue, and on the afternoon of the 23d reached the right bank of the Mississippi, some miles below New Orleans. A few hours later the Americans, who for some weeks had, under the leadership of Major-Gen. Andrew Jackson, been preparing to resist the invasion, made a night attack upon the division and inflicted considerable loss, but did not succeed in overwhelming it. Next morning Gen-

eral Jackson fell back behind an old disused mill-race that stretched across the strip of solid ground from the river to a cypress swamp, and there threw up a breastwork. This breastwork was composed chiefly of earth, and not of cotton bales, as was once believed; as a matter of fact, 277 bales were originally used in the embrasures of some of the batteries and in building a magazine. On New Year's Day Major-Gen. Sir Edward Pakenham, who had now arrived with reinforcements and taken command of the English, attempted to batter down the American lines by a cannonade; but this attempt failed, and he then decided to try an assault. The plan he adopted was for Lieutenant-Colonel Thornton to cross the river and storm an American battery on the right bank; while on the left bank two columns were to assault the American main position. The assault was made on the morning of January 8, 1815. On the left bank the British attacked with spirit, but were met with such a heavy cannonade and with such a storm of bullets from the rifles of the American troops, mainly backwoodsmen from Tennessee and Kentucky, that in less than half an hour about 2500 men, including Major-Generals Pakenham, Gibbs, and Keane, were shot down, and the assault failed. The American loss in this main engagement was but eight killed and thirteen wounded. On the right bank Thornton was successful, but, owing to the defeat of the main army, was unable to follow up his advantage. Ten days later the British retreated to their ships. Although the battle was fought after the Treaty of Ghent (q.v.) had been signed, it had results of importance. It was, says the historian Schouler, the only battle of the war that made an impression on Europe, and it served also to help quicken the yet feeble sense of American nationality. By giving a sunset glow of success to an otherwise somewhat inglorious war, it greatly strengthened the position of the Administration and hastened the "death-bed scene of the Federalist Party." Most important of all, it made General Jackson, who had displayed military talents of a high order, the idol of the American people and was an important factor in causing his subsequent elevation to the Presidency. Consult: Latour, *Historical Memoir of the War in West Florida and Louisiana in 1814-15* (Philadelphia, 1816); Walker, *Jackson and New Orleans* (New York, 1856); Parton, *Life of Andrew Jackson* (ib., 1860); James, *Military Occurrences* (London, 1818); Cook, *Narrative of Events in the South of France and of the Attack on New Orleans in 1814-15* (ib., 1834); and Gleig, *Campaigns of the British Army at Washington and New Orleans* (Am. ed., Philadelphia, 1821 and 1833).

NEW PHILADELPHIA. A city and the county-seat of Tuscarawas County, Ohio, 100 miles south of Cleveland; on the Tuscarawas River, the Ohio Canal, and the Cleveland, Lorain and Wheeling and the Pennsylvania railroads (Map: Ohio, H 4). There are mining interests, and manufactures of steel, canned goods, roofing tile, woolen goods, carriages, flour, brooms, and pressed, stamped, and enameled goods. The principal attractions of the city are Springer's Park and Shorenbraun Springs. Settled in 1805, New Philadelphia was first incorporated three years later. The government is vested in a mayor, who holds office for two years, and a unicameral coun-

cil. Town meetings are held when required by matters of general interest. Population, in 1890, 4456; in 1900, 6213.

NEW PHILIPPINES. Another name for the Caroline Islands (q.v.).

NEW PLYMOUTH. The capital and seaport of Taranaki County, North Island, New Zealand, on the west coast, 160 miles southwest of Auckland (Map: New Zealand, D 3). It has an extensive harbor and is a terminal of railway lines to Wellington and Napier. Population, in 1901, 4405. Consult Wells, *History of Taranaki* (New Plymouth, 1878).

NEW POMERANIA (Ger. *Neu Pommern*), formerly **NEW BRITAIN**. The largest island of the Bismarck Archipelago, in Melanesia. It lies 50 miles from the northeast coast of New Guinea, and stretches east and northward in a narrow crescent, 300 miles long and 90 miles in greatest breadth, but in several places contracted to a strip only a few miles wide (Map: Australasia, H 3). Its area is about 9500 square miles. The interior is still but little known; it is mountainous, with several active or half-extinct volcanoes in the northeastern part, one of which has an altitude of 3600 feet, while in the western extremity Hunstein Mountain reaches a height of 6000 feet. The rainfall on the island is abundant, and the vegetation is luxuriant, the interior being covered with immense forests reaching to the summits of the mountains, while the coastal districts are very fertile. The natives, whose numbers are unknown, are Melanesian savages. The European inhabitants number less than 100, and reside in a missionary and a trading station on the northeastern coast. For statistics and history, see **BISMARCK ARCHIPELAGO**.

NEWPORT. A market-town and river-port in Monmouthshire, England, 20 miles southwest of Monmouth, on the Usk, four miles from the Bristol Channel, and 12 miles northeast of Cardiff (Map: England, C 5). It has brass and iron foundries, breweries and pottery works, and manufactures of telegraph and railway supplies and wagons, india-rubber, and gutta percha. Iron ships are also built here. The dock accommodation covers 80 acres, and it has an important shipping trade in coal and iron. The town has fine buildings. Prominent among them are the town hall and Saint Woollos, one of the most curious churches in England. The municipality owns much real estate, the water-works, electric lighting plant, tramways, baths, slaughter houses, markets, cemeteries, provides technical instruction and cottage allotments, and maintains a free library, museum, parks, isolation hospital, and a fire brigade. The town is first mentioned at the beginning of the tenth century, and received its first charter from Edward II. The towers and the central mass remain of the castle, built about 1130 by Robert, Earl of Gloucester. Population, in 1891, 54,707; in 1901, 67,290.

NEWPORT. The chief town of the Isle of Wight, England, situated near the centre of the island, on the Medina (Map: England, E 6). It is the commercial centre of supply for the island, has breweries, cement factories, and trade in malt, wheat, and flour. Saint Thomas's Church, founded in 1854, is a handsome edifice, and contains a monument erected by Queen Victoria to

the Princess Elizabeth, daughter of Charles I. Its grammar school, founded in 1612, was the scene of negotiations between Charles I. and the Parliament. The town, already favored with charters and privileges, was incorporated by James I. It owns the water supply and markets. Population, in 1891, 10,216; in 1901, 10,911.

NEWPORT. A city in Campbell County, Ky., at the junction of the Ohio and Licking rivers, which separate it from Cincinnati, Ohio, and Covington, Ky.; and on the Chesapeake and Ohio and the Louisville and Nashville railroads (Map: Kentucky, G 1). There are bridges across both rivers, and the cities of Cincinnati, Newport, and Covington are connected by electric railroad, the Kentucky cities being popular as places of residence for Cincinnati business men. A few miles distant, in the hills back of Newport, is the United States military post, Fort Thomas. Newport has a city park, and a public library, the library building ranking with other prominent edifices of the city—the court house, municipal building, and in addition the post office, Masonic Temple, and Newport and German national banks. The chief manufactured products are watch-cases, cast iron pipes, sheet iron, rails, carriage supplies, and cigar-box material. Settled about 1791, Newport was incorporated in 1795 as a town, and in 1850 received a city charter. The government, under a charter of 1894, is administered by a bicameral council and by a mayor, elected every four years. The executive appoints fire, police, and water-works commissioners, and, with the consent of the board of aldermen, the city auditor and superintendent of public works. The council is selected from the wards, but elected at large, and appoints bridge commissioners. Other municipal officials and the board of education are chosen by popular vote. Members of the municipal council and board of education hold office for two years, all other officers for four years. The city owns and operates the water-works. Population, in 1890, 24,918; in 1900, 28,301.

NEWPORT. A town and the county-seat of Sullivan County, N. H., 42 miles west-northwest of Concord; on the Sugar River, and on the Boston and Maine Railroad (Map: New Hampshire, F 8). The beautiful surroundings of the town make it of considerable importance as a summer resort. There is a public library of 7000 volumes. Newport has extensive manufactures of flannels, cotton underwear, shoes, agricultural implements, and lumber products. The water-works are owned by the municipality. Population, in 1890, 2623; in 1900, 3126. Consult Wheeler, *The History of Newport, N. H.* (Concord, 1879).

NEWPORT. A port of entry and the county-seat of Newport County, R. I., and until 1900 one of the capitals of the State, 17 miles south by west of Fall River, Mass., and 30 miles south of Providence; on Rhode Island in Narragansett Bay, and on the New York, New Haven and Hartford Railroad (Map: Rhode Island, C 4). It has also regular steamboat communication with New York, Providence, and other cities, with increased transportation facilities in summer. Newport is an important United States naval station, but has far greater reputation as a summer resort. Its splendid harbor, defended by Fort Adams and Fort Greble, admits the

largest vessels and usually presents a scene of great animation, while its varied scenery, its points of historic interest, equable climate, and excellent facilities for boating, bathing, and driving have combined to establish Newport as the most exclusive and fashionable watering place in the United States. The narrow streets and quaint houses of the old town adjoin the harbor; the 'society' quarters with their new and more elaborate architecture reach over to the ocean side of the island. Among the popular objects of interest are First or Easton's Beach, and Bailey's Beach, the bathing resorts; Cliff Walk and the ten-mile Ocean Drive; the Hanging Rocks; the rocky fissure, fifty feet deep, locally known as Purgatory; and Spouting Rock, where the water, when disturbed by a storm, is forced through an opening in the rock, sometimes to a height of fifty feet. On Coaster Harbor Island is the United States Naval Training Station and War College, and on Goat Island, a United States torpedo station. The naval hospital on the mainland was opened in 1897. On Canonicut Island, opposite Newport, is the town of Jamestown, which has an individual reputation as a summer resort. There are numerous public fountains, statues and monuments, and public parks, notably Touro and Morton parks; several libraries—Redwood and People's together containing more than 60,000 volumes, and the Newport Historical Society, which has an interesting collection of relics; Saint George's and Cloyne House schools. Other attractive features of Newport are its historic buildings: the State House, erected in 1742; the old city hall, in 1763; the synagogue (1763), said to be the oldest in the United States; Redwood Library, in 1748; Trinity Church (Protestant Episcopal), in 1725; the Sayer House, headquarters of the British army in 1777; and the Vernon House, Rochambeau's headquarters in 1780. In commerce and industry Newport is comparatively of small importance; there is, however, a large trade in fish. The government is administered under a charter of 1853, which provides for a mayor, annually elected, and a bicameral city council that has important elective powers in municipal offices. Population, in 1890, 19,457; in 1900, 22,034.

Newport was settled in 1639 by William Codrington and a few followers, who in the previous year had been driven from Boston for sympathizing with Antinomianism. In 1647 it was united for governmental purposes with Providence, Portsmouth, and Warwick, under the charter of 1643, but there was much dissatisfaction until a second charter was issued in 1663. Here, in 1640, one of the first public schools in America was begun; and here, in 1656, came some of the first Quakers who emigrated to this country. In 1729 Bishop Berkeley came to Newport, and remained in the vicinity for nearly three years, the house, Whitehall, occupied by him, being still in fairly good condition. Here he wrote much of his *Alciphron* and his ode on Western progress. In the latter half of the eighteenth century Newport was a great trading centre, and by 1769 its commerce exceeded that of New York. On May 17, 1769, the British sloop *Liberty*, engaged in enforcing the smuggling laws, was destroyed here—this being one of the earliest acts of American resistance to England. From December, 1776, to November, 1779, Newport was occupied by British troops, by whom 480 of its houses were de-

stroyed and its shipping so crippled that the town never recovered its commercial prestige. Rochambeau with his French troops was stationed here in 1780. First incorporated in 1784, Newport surrendered its charter two years later, and was not re-incorporated until 1853. It was the birthplace of Commodore M. C. Perry and of William Ellery Channing. In Touro Park stands the famous 'Old Stone Mill,' formerly supposed to have been built by the Northmen in the eleventh century, but now very generally believed to have been erected by Gov. Benedict Arnold about 1675. The *Newport Mercury*, founded in 1758 by James Franklin, is still published. Consult: Greene, *The Providence Plantation* (Providence, 1886); "Newport in the Revolution," an article in the *New England Magazine*, n. s., vol. ii. (Boston, 1890); Brooks, *The Controversy Touching the Stone Mill* (Newport, 1851).

NEWPORT. A village and the county-seat of Orleans County, Vt., 49 miles north by east of Montpelier; on Lake Memphremagog, and on the Canadian Pacific and the Boston and Maine railroads (Map: Vermont, F 2). It has the Goodrich Memorial Library (public), with 6500 volumes, and is a well-known summer resort. The village is surrounded by a farming region. There are some manufactures. Population, in 1890, 1730; in 1900, 1874.

NEWPORT, CHRISTOPHER (c.1565-1617). An English navigator. In 1591 he sailed from London as captain of the *Golden Dragon* with three other ships, on an expedition to the West Indies. After sacking four Spanish towns and capturing and sinking twenty Spanish merchantmen, the expedition turned back across the Atlantic laden with spoil. At Flores they joined Sir John Burgh and took part with him in an attack on Madre di Dios, August 3, 1592. In 1606 Newport commanded the fleet of three ships which conveyed John Smith and his fellow colonists to Virginia. He spent some time in Virginia, and took part in an exploring expedition up the James River with Smith. In 1607-08 he made another voyage to Virginia, and in 1609 commanded the first expedition sent out under the second charter, which conveyed Sir Thomas Gates and Lord Somers to Virginia. Newport's ship, the *Sea Venture*, was cast ashore on the Bermudas, whence the colonists proceeded to Virginia in two small pinnaces, which they constructed from the wrecked ship. In 1611 he made a last voyage to Virginia. In the year following he entered the service of the East India Company. Between 1613 and 1617 he made four voyages to India for the company, finally dying at Bantam of a fever. An account of his voyages to America, entitled *Newport's Discoveries in Virginia*, and purporting to have been written by "a gentleman of the colony," was published in the *Archæologia Americana*, vol. iv. (Boston, 1860).

NEWPORT, GEORGE (1803-54). An English naturalist and physician, born at Canterbury, and educated at London University and at the College of Surgeons. He was one of the most skilled anatomists of his time, and his researches on the structure of insects and other arthropods are very important. His publications include: *On the Respiration of Insects* (1836); article on "Insecta" in Todd's *Cyclopedia of Anatomy and Physiology* (1839); *On the Use of Antennæ of Insects*

(1840); *List of Specimens of Myriopoda in the British Museum* (1844); *Monograph of the Class Myriopoda, Order Chilopoda* (1845); and *On the Impregnation of the Ovum in the Amphibia* (1851).

NEWPORT NEWS. A city and port of entry in Warwick County, Va., 12 miles north by west of Norfolk, and 75 miles southeast of Richmond; on the James River and Hampton Roads, and the terminus of the Chesapeake and Ohio Railroad (Map: Virginia, H 5). It has also several coastwise and foreign steamship lines. A fine harbor and excellent shipping facilities have made Newport News the centre of large commercial interests, its foreign trade in 1901 being valued at \$36,658,000, including exports to the amount of \$32,568,000. Its industrial interests, too, are well developed. There is a shipyard employing 6000 men, with two dry docks, 600 and 900 feet in length; also grain elevators, lumber mills, iron works, and coal wharves. Casino Park, in the heart of the city and on the James River, is a popular place of resort. The government, under the original charter of incorporation, is vested in a mayor, elected every two years, and a city council, which confirms the executive's appointment of the police commissioners and elects all other municipal officials, excepting those chosen by the people. Settled in 1882, Newport News was incorporated first in 1896. Its growth during the decade 1890-1900 was exceedingly rapid, a population in 1890 of 4449 having increased to 19,635 in 1900.

NEW PROVIDENCE. The most important, although one of the smallest, of the Bahama Islands. It is situated between Eleuthera and Andros islands, 170 miles from the southeast coast of Florida (Map: West Indies, J 2), and has an area of 85 square miles. In physical features it resembles the other Bahamas (q.v.), but it alone has a good harbor, and on it is the town of Nassau (q.v.), the capital of the islands. The first English settlement in the Bahamas was founded on New Providence in 1629.

NEW RED SANDSTONE. A large series of reddish-colored loams, shales, and sandstones, occurring between the Carboniferous and the Middle Triassic formations, were grouped together under this name, in contradistinction to the Old Red Sandstone group, which lies below the coal measures, and has a similar mineral structure. It has been found, however, that two very distinct periods were included under this name; and the contained fossils of each group were found to be so remarkably different that the one period was referred to the Paleozoic system, under the name of Permian (q.v.), while the other was determined to belong to the Triassic system (q.v.). The name is no longer used in the United States.

NEW RIVER. A river of West Virginia. See GREAT KANAWHA.

NEW ROCHELLE, rô-shôl'. A city in Westchester County, N. Y., 16½ miles from the Grand Central Station, New York City; on an arm of Long Island Sound, and on the New York, New Haven and Hartford Railroad (Map: New York, G 5). It is mainly a residential suburb of New York, and has some reputation as a summer resort. There are many handsome residences, and several spacious colonial mansions

dating from the Dutch and English periods. An Ursuline seminary now occupies 'Leland Castle,' which is known for its fine interior decorations. The city has a public library with over 8500 volumes. New Rochelle was settled in 1687 by Huguenots, some of whom were natives of La Rochelle. It was the home for several years of Thomas Paine, to whose memory a monument has been erected. Population, in 1890, 9057; in 1900, 14,720.

NEW ROSS. A town lying mainly in County Wexford and partly in Kilkenny, Ireland, on the Barrow River, 29 miles by rail northwest of Wexford (Map: Ireland, E 4). An iron bridge with a draw connects the suburb of Rosbercon on the Kilkenny side. Ships of 600 tons can unload at its quays at all stages of the tide. Its favorable situation is deserving of much greater industrial prosperity than the town possesses. There is, however, some trade in agricultural products, and there are salmon fisheries. Although believed to date from the sixth century, its history begins with the erection of the old monastery in the thirteenth century. Cromwell captured the town in 1649 and destroyed its walls and fortresses, of which there are fragmentary remains. Population, in 1901, 5867.

NEWRY, nŭ'ri. A seaport and market-town, partly in County Armagh, but principally in County Down, Ulster, Ireland, 63 miles north of Dublin and 38 miles south-southwest of Belfast (Map: Ireland, E 2). It is traversed by the Newry River, which is crossed by five bridges and falls into Carlingford Lough, and by a canal, by which the navigation is prolonged to Lough Neagh, a distance of 32 miles. Newry is also connected by the Newry Canal with Victoria Lock. The town is handsomely and compactly built. The quays are lined with spacious warehouses, and there are several tanyards, coach and car manufactories, iron foundries, grain, flour, and spinning mills. Extensive water-works have been constructed. Steam vessels ply to Liverpool and Glasgow from Warrenpoint, a port five miles distant on Carlingford Lough. The Newry and Greenore Railway connects the Newry and Armagh line with the deep water harbor of Greenore. The town is nearly coeval with the English invasion, having grown up around a monastery founded in 1183 and a castle subsequently erected by De Courcey. This castle was the scene of several struggles, and in most of the civil wars of Ulster Newry suffered severely. It was incorporated as a borough by James I., and sent two members to Parliament. The corporation was abolished by the Irish Municipal Reform Act and the affairs of the town are now administered by twenty-one commissioners. Population, in 1891, 12,961; in 1901, 12,587.

NEW SALLEE, sà-là'. A seaport of Morocco. See **RABAT**.

NEW SCHOOL PRESBYTERIANS. See **PRESBYTERIANISM**.

NEW SIBE'RIA, or **LIAKHOV, ISLANDS.** A group of islands in the Arctic Ocean, situated north of Eastern Siberia, between latitudes 73° 9' and 77° 30' N., and between longitudes 136° 16' and 159° 6' E. (Map: Asia, P 1). The principal islands of the group are Kotelnoi, New Siberia, and Liakhov, with areas of from 1000 to 3000

square miles, the combined area of the whole group being 9500 square miles. The islands consist mainly of rocky, ice-bound cliffs, and are quite treeless and uninhabited, save for the temporary sojourn of hunters. Game, especially fur-bearing animals, is abundant. The islands are noted for the great quantities of bones of extinct animals found there, notably those of the mammoth. The group was discovered in 1770 by the Russian merchant Liakhoff, and the islands have since been visited by several other explorers.

NEW SOUTH SHETLAND ISLANDS. See **SOUTH SHETLAND ISLANDS**.

NEW SOUTH WALES. A State of Australia, situated in the southeastern part of the continent, and bounded on the north by Queensland, on the east by the Pacific Ocean, on the south by Victoria, and on the west by South Australia (Map: Australia, H 5). Its area, 310,367 square miles, is more than five times that of England and Wales, much larger than that of any of the United States, and more than twice that of the State of California.

PHYSICAL FEATURES. The Great Dividing Range runs along the coast in an irregular system of broken minor ranges, whose main axis extends about 100 miles inland. It is known as the Australian Alps in the south, the Blue Mountains near the centre, and the New England Range in the north. These mountains are broken by deep ravines and cañons. The Blue Mountains are especially rugged and abrupt and long formed an impassable barrier. The highest point is Mount Kosciusko, near the southern boundary, with an altitude of 7308 feet. The mountains are flanked on the west by a broad, undulating plateau, which sinks gradually toward the Great Plains of the west, but rises again in the north-western corner of the State to a height of 2000 feet in the Stanley and Grey Ranges. The coast is bold and rocky, and indented by a number of small inlets, among which Port Jackson, the harbor of Sydney, forms one of the finest harbors in the world. The rivers on the eastern slope of the Dividing Range are small, the largest being the Hawkesbury, with a length of 330 miles. The Murray River forms the southern boundary of the State, and its two great tributaries, the Darling and the Lachlan, course through the western plains. Several streams flow from the northwestern mountains toward the Darling, but are lost in the arid plains before they reach it. Nearly all the rivers of the plains dry up or are reduced to strings of ponds during the dry season, while in the wet season large areas of the plains are inundated.

CLIMATE. The climate is in general mild, becoming subtropical toward the north. The mean temperature on the coast is 76°, with an average maximum of 100° for January, and 55° for July. On the interior plains the range is much greater. Here the temperature may reach 130°, and there are hot dust winds. The rainfall is greatest in the southeastern extremity, where it registers 73 inches, the average on the coast being 50 inches. On the interior plains it is generally less than 20 inches, falling below 10 inches in the northwest. The uplands and the eastern portion of the great plains are covered with open forests of eucalyptus trees. Denser forests grow in the valleys of the very fertile coastal districts. The arid western plains are covered only with stunted scrub.



The flora and fauna partake of the general character of Eastern Australia. See AUSTRALIA.

GEOLOGY AND MINERALS. The mountain and plateau regions consist mainly of Paleozoic rocks, Silurian in the south, Carboniferous in the central portion, and Devonian in the north, while the northeastern and southeastern coast districts are overlaid with lower Mesozoic strata. There are considerable outcrops of granites and metamorphic rocks in the higher regions, with dikes of volcanic trap, basalt, and greenstone. The great plains are formed by horizontal strata of Cretaceous and Tertiary sandstone, sands, and gravel. Rich and extensive coal beds cover large areas in the State. Gold exists in quartz veins in the Silurian rocks, and silver, tin, copper, iron, and precious stones are also found.

MINING. Mining rivals grazing in importance, and has been gaining, while the latter has declined. The first Australian gold was mined in New South Wales, and the total value of this product mined to date exceeds that of any other mineral in the State. The annual output in recent years, however, has been exceeded in value by silver and silver-lead and by coal, although nearly half the men employed in the mining industry, or 19,350 (1899), are engaged in gold-mining. The average yield of gold between 1890 and 1900 was twice that of the preceding decade. The output in 1900 was valued at £1,194,521. The production of silver and silver-lead ore was insignificant prior to 1884, when it increased rapidly until 1891, the record for that year not having been subsequently surpassed. In 1900 the value was £2,604,117. The production of coal in 1900 was valued at £1,668,911, an amount exceeded in only one previous year. The decline in copper production from 1890 to 1895 was wholly regained in the latter part of the decade, the output in 1900 being valued at £425,301. The production of tin in 1900 was valued at £142,724—the highest figure attained since 1892. Several kinds of iron ore are mined, and a number of other minerals are obtained in small quantities.

AGRICULTURE. Agriculture is increasing in importance, but is still subsidiary to stock-raising. The soil is generally of great fertility, but the scantiness and uncertainty of the rainfall prevent it from being tilled in the great regions west of the mountain ranges. The unfavorable climatic conditions are most severe on the far western plains. In the coast district, and on the tablelands and the western slope of the tablelands, a considerable area is cultivated. The climate on the coast admits of the growth of a wide range of products, both temperate and tropical, being not unlike that of California in this respect. Although the possibilities of fruit culture are great, the industry in general has not made any considerable progress. Oranges and grapes, however, receive no little attention. The remoteness from the world's markets has tended to limit the production of all agricultural products. The total area under tillage, excluding lands grassed, increased almost steadily from 629,180 acres in 1881 to 852,704 acres in 1891, and 2,446,767 acres in 1901. The principal crop and the one that represents the largest percentage of increase is wheat, to which 1,530,609 acres were devoted in the latter year. The other principal crops, with their acreages, were: hay, 66,236; corn, 206,051;

oats, 29,383; sugar-cane, 22,114; and grapevines, 8441.

STOCK-RAISING. The extensive area of grassed lands and the mildness of the winters are greatly favorable to grazing, which is the most characteristic industry of the State. The greatest attention is paid to sheep, about four-sevenths of the sheep of Australia being in New South Wales. The maximum number, nearly 62,000,000, was reached in 1891. This was reduced in 1900 to about 40,000,000. The decrease was attributed to the droughts, which were very severe during this period. The insufficient water supply is a serious disadvantage to the industry. The number of cattle in 1900 was 1,983,116; horses, 481,417; and swine, 256,577. Much of the pastoral land is owned by the State and leased to the stockmen.

MANUFACTURES. Prior to the establishment of the federation of Australian States, New South Wales differed from the other Australian colonies in that it did not have a tariff for the protection of its manufactures. However, the majority of the 60,779 hands employed in these industries in 1900 were engaged in domestic manufactures which were not subject to foreign competition—the preparation of food, drink, etc. The manufactures centre largely about Sydney.

TRANSPORTATION AND COMMERCE. A railroad traverses the eastern part of the State from north to south and a branch line penetrates northwestward to the Darling River. In 1900 nearly the whole of the 2896 miles of line in operation were in the hands of the Government. The net earnings are almost equal to the annual cost of the debt incurred in the construction. The State has a large foreign trade. It is almost evenly divided between imports and exports. The value of the total trade in 1900 was £55,725,587, being in excess of that reached in any previous year. Considerably over three-fifths of the imports were for home consumption, and a like amount of the exports were of domestic origin. Wool is by far the greatest item of the State's exports. It is followed in order of importance by silver, silver-lead, and ore, coal, copper, tallow, and tin. The great bulk of the commerce is with the United Kingdom, but the trade with the United States, France, Germany, and Belgium is rapidly growing. The largest export to the United States is wool and the State's imports from the United States are mainly manufactured products. In 1900, 3406 vessels, with 3,920,801 tonnage, cleared the ports of New South Wales.

GOVERNMENT AND FINANCE. New South Wales is governed by a Governor, appointed by the Crown, a responsible Ministry, a Legislative Council appointed by the Crown for life, and a Legislative Assembly elected by the resident voters of the colony. Down to 1893 there was a property qualification by law. In that year it was abolished. The suffrage is exercised by every male subject twenty-one years of age who has lived three years in the colony and three months in his electoral district. New South Wales has six representatives in the Australian Senate and 26 in the Australian House of Representatives. In the fiscal year ending in 1900, out of a total net revenue of £9,970,677, the Government received £2,618,066 from taxation, £2,116,076 from land-sales and leases, and £4,992,521 from service—railroads, etc. The greater part of the tax receipts are from import and excise duties.

There is an income tax. The bulk of the income is expended upon the maintenance of the public works and public service and the charges of the public debt. For a further discussion of New South Wales and its government, particularly in comparison with other Australian States, see AUSTRALIA.

POPULATION. In 1901 there was a population of 1,359,133—males, 712,456; females, 646,677—or 4.38 per square mile. In 1860 the population was only 348,546, the gain since that time having been much greater than for any other Australian State. At the end of the century the State had passed Victoria, and had become the most populous Australian State. From 1881 to 1891 there were 164,205 more arrivals than departures, but the excess had fallen in the following decade to only 16,167. The Chinese number 10,974, and the aborigines and half castes 7434. In 1901 Sydney, the capital, had a population of 111,801, and with suburbs, 488,968; Newcastle, 14,250; and Broken Hill, 27,518.

RELIGION. About 45 per cent. of the church population are adherents of the Church of England and about 25 per cent. Roman Catholic. The Presbyterians and the Wesleyans and other Methodists are the strongest of the smaller denominations. State aid to religion is abolished.

EDUCATION. There is a compulsory school attendance law for children between the ages of six and fourteen. Small fees are charged those able to pay. In 1900 there were 238,382 scholars enrolled in the State schools and colleges, and 60,327 in private institutions. Over half of the latter number were in Catholic schools. In 1900 the gross State expenditure for schools was £780,216, and the receipts from school fees amounted to £82,404. The State maintains a university at Sydney.

HISTORY. See AUSTRALIA and article on AUSTRALIAN FEDERATION.

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NEWSPAPER. A public print issued at periodical intervals, sold at a fixed price per copy, and for a definite period to regular readers known as subscribers, and giving three classes of information: (a) relating to events, or 'news'; (b) opinions, or 'editorials'; and (c) wares on sale, or 'advertisements.' A newspaper is distinguished on one side from the magazine or monthly by the absence in the latter of any concerted effort to present a new record of recent current events. It is separated from the pamphlet or newsletter by its periodic appearance

and stated publication. Special postal privileges in the United States—a rate of one cent a pound, paid in bulk, or one-eighth that for books and merchandise, and one-thirty-second that for letters—and in other countries press laws have led to many judicial and administrative decisions which unite in defining a periodical as earmarked by recurrent publication and a subscription list made in good faith, and the newspaper as published not less often than once a week. The term newspaper, while legally applied to a weekly, usually indicates a daily publication issued either early in the morning or in the afternoon. When the size of a sheet of paper and of a press bed-plate was limited by conditions of manufacture to the sweep of a man's arm in paper-making or in working a hand-press, the newspaper consisted of one large folio sheet doubled, giving four pages. When the changes in paper manufacture at the close of the eighteenth century and in the bed-plate of a press at the beginning of the nineteenth century through the application of power to printing enlarged the sheets and altered their limit, the newspaper began to be folded for the weekly to a square octavo, and enlarged for the daily to a large 'blanket' sheet. The introduction of the cylinder press after the middle of the nineteenth century and the manufacture of paper from wood-pulp of any size desired, fed to a press from a spool, changed the daily newspaper to its present form, containing a variable number of pages—from 4 pages to above 100, but usually 12 to 16 pages in English-speaking cities of over 500,000; 8 to 12 in cities of 250,000; and 4 in cities of less than 20,000; in Europe, usually from 4 to 8 in cities of 100,000; and 4 in smaller places, printed on both sides at a single impression. Newspapers, by periodic appearance, divide sharply into weekly (usually devoted to a special field, social, political, literary, the general weekly being the exception) and daily. The special daily is the exception, the world's four largest capitals and some American lesser cities having dailies devoted exclusively to the stock market or sports. American universities of over 1000 students usually support a daily. The city daily necessarily covers four fields: (a) the events of the place in which it is published; (b) events without; (c) opinion, usually given on a separate page, known as the editorial page; (d) the quotation of stock, cereal, and other exchanges, and advertisements. To these are added combined criticism and record, in special articles and correspondence on special fields, as politics, sports, theatre, letters, education, etc. Usually the earlier pages of a newspaper open with news from without and pass to local news. The markets and the larger share of the advertisements are usually on later pages. The editorial page, or expression of opinion, is generally between. When the two sides of a 4 or 8-page sheet had to be printed successively (until the invention of the web-perfecting press), this division was necessary. Still preserved from custom, an arrangement is now growing up in the United States in which important news, likely to attract buyers, gravitates to the front, and other fields to the rear pages, an arrangement long prevalent in the French boulevard press. As politics is the one subject of universal interest for men, newspapers in all countries tend to ally themselves with one of two political parties, where

a bi-partisan organization for the control of an elective government exists. Where, as in European countries, parties are replaced by groups, each has its newspaper. In both cases some papers are known as independent. In all, newspapers exert a double influence. Those who read are directly affected by what is printed as with any printed utterance, but the periodic issue and the consequent array of subscribers or regular readers give newspapers in politics and in other fields a representative character, their influence depending on the fact that what is said expresses the opinion of a great multitude of readers. The skillful editor succeeds in combining leadership in new exigencies and problems with the capacity of expressing the opinion or sentiment that great masses of his readers will feel as new events call for the application of old principles.

Two empires, the Roman and the Chinese, had from an early period issues similar to the newspaper. The *Acta Diurna* (Daily Occurrences) of ancient Rome contained reports of great military achievements and of interesting events at Rome, as reports of elections, trials, games, fires, sacrifices, and miracles. They were written out by officers called *actuarii*, and deposited among other public archives. Copies were sometimes posted in public places, and sent at irregular intervals to the generals in the provinces, that the army might be informed of what was taking place in other parts of the Empire. They continued to be issued until the downfall of the Western Empire.

The Peking Gazette, *Tching-pao*, "News of the Capital," has appeared since 713 to 741 in the Tang dynasty at the Chinese capital, and has for many centuries been issued daily. It is printed in a Government edition sent to officials, and in a popular edition with regular subscribers, reprints also appearing in the provinces, both having been furnished from an early period. It consists exclusively of Imperial rescripts, council decrees, and official news. It is undoubtedly the earliest daily in existence.

Neither of these official issues has any relation with the modern newspaper by example, still less by direct descent. The newspaper, as known to-day, is of composite origin. In the sixteenth century it was represented by news sheets, single folio pages sold by peddlers and criers giving news of a single occurrence. The first dated examples of these appeared in 1498, and some 800 examples are preserved which appeared before 1510.

These small news sheets appeared in Augsburg, Vienna, Ratisbon, Nuremberg, Antwerp, and many other places, generally in the form of letters. The extant numbers contain, among other matters, accounts of the discovery of America, of the conquests of the Turks, of the French and Austrian War in Italy, with such local occurrences as executions, inundations, earthquakes, burnings of witches, and child-murders, supposed to be committed by the Jews. Of equal interest are the official *Notizie Scritte*, established by the Venetian Government in 1566, containing accounts of the wars carried on by the Republic, and of other events of general interest. At first they were not printed, but might be read in various public places on payment of a small coin, called a *gazetta*, whence the name *Gazette* (q.v.).

These represented the issue of floating rumor or a private letter by the presses of the day. As the press ceased to be a personal, and became a

business venture, and regular communication was established by various posts over European countries, these broad sheets of news and opinion developed into the journal regularly issued—of which the *Frankfurter Journal*, published by Egenolph Emmel in 1615, suspended in 1902, was the first—the 'news-letter,' furnished to the correspondent by men usually in official life at the different capitals, the prototype of the later despatch and correspondent, and the pamphlet, discussing opinion, which began treating public affairs all over Europe from the standpoint of the editorial in the seventeenth century. By the opening of the eighteenth century these became united in daily journals which combined the report of the broad sheet, the correspondence of the news-letter, and the polemics of the pamphlet, adding the advertisement in 1648, and the regular market report at the close of the eighteenth century.

ENGLAND. The founder of the English press was a London printer named Nathaniel Butter (died 1664). As early as 1605 he was issuing news pamphlets; and in 1622 he began *The News of the Present Week*, which under varying titles was continued till 1639. His slips were mostly compiled from similar foreign sheets, and contained very little home news. But they bore the distinguishing mark of the newspaper: they were published regularly. During the Civil Wars there circulated a large number of sheets, with such names as *England's Memorable Accidents*; *The Kingdom's Intelligence*; *Mercurius Aulicus*; *Mercurius Politicus*; *The Scots Intelligencer*; *The Parliament's Scout*; *The Scots Dove*; *The Parliament Kite*; *The Secret Owl*; *Mercurius Mastix*; *Mercurius Democritus*; and *Mercurius Acheronticus, or News from Hell*. The arrangement of the news was poor in the extreme, and the comment most virulent. The first English newspaper which aimed at general information was the *Public Intelligencer*, established by Sir Roger L'Estrange in 1663; it was dropped soon after the appearance of the *London Gazette*, the first number of which was published at Oxford, November 7, 1665. A second paper, called *The Observer*, was started by L'Estrange in 1681. In the reign of Charles II. the development of the newspaper was checked by the rigid enforcement of the licensing act of 1662. Under that régime nothing but an official organ could long survive. The repeal of the licensing act in 1695 opened a new era in English journalism. Newspapers at once sprang up in London and in other cities. Besides news-letters, flying posts, and mercuries, appeared the *Edinburgh Gazette*, a semi-weekly (1699); the *Daily Courant*, the first English daily (1702); the *Review*, established by Defoe for the discussion of political questions (1703); and the *Orange Postman*, the first penny paper (1709).

Though the licensing act was of the past, the newspaper writer was held to strict account for what he printed. During the reign of George III. prosecutions were especially common. The usual result was to give increased currency to the doctrines assailed, and to confer a fictitious importance on traders in politics, by whom many of the journals were conducted. The first attempt at Parliamentary reporting was also resented by the House of Commons as a breach of privilege, but the imprisonments of 1771 ended in the tacit concession of publicity of discussion, which has

ever since prevailed. The Speaker in 1893 excluded the representative of the *London Chronicle* from the Commons gallery, and it was generally accepted as within his power. A greater obstacle encountered by the press was the stamp tax. In 1712 a duty of a halfpenny per sheet was placed on every paper of a sheet and a half. It put an end to Defoe's *Review*, Addison's *Spectator*, and 'all the little penny papers.' The tax was raised in 1757 to a penny a copy; in 1776 to a penny and a half; in 1789, to twopence; in 1794, to twopence-halfpenny; in 1797, to threepence-halfpenny; and in 1815 to fourpence. At this time the usual price per copy was sevenpence. In 1836 the tax was reduced to a penny, and in 1855 abolished altogether. And in 1861 the duty on paper was repealed. As a result, newspapers increased enormously in number, and the price per copy was reduced to the present level, from threepence to a halfpenny.

Notwithstanding these exorbitant imposts, which were at first intended to be as deadly as the old licensing act, many newspapers were established, and as their scope widened they became more and more important. The *Saint James's Post* and the *Saint James's Evening Post*, each started in 1715, were fused in the *Saint James's Chronicle* (1724), the liveliest paper of the period. The *London Daily Post and General Advertiser*, founded in 1726, changed its name in 1752 to the *Public Advertiser*, and was afterwards famous for the contributions of 'Junius.' In 1762 John Wilks issued the first number of the *North Briton*. The *Morning Chronicle*, established in 1769, was the first newspaper to give adequate reports of Parliamentary debates; it invented the leading article; and in its columns first appeared Hazlitt's dramatic criticisms. It was soon rivaled by the *Morning Post* (1772) and the *Morning Herald* (1781). The *London Daily Universal Register*, begun in 1785, was turned into the *Times* in 1788. From the first, the *Times*, under the direction of John Walter (q.v.), devoted itself mainly to a discussion of public affairs, governmental, educational, and commercial. Its Parliamentary reports and 'leaders' soon became the best, and in course of time it was recognized as 'the leading journal of Europe.' It was the first to discard the hand-press and to substitute steam (1814). In 1846 appeared the *Daily News* with Dickens as editor; and in 1855 the *Daily Telegraph*, the first penny paper of the nineteenth century, which gained an immense audience under the régime of G. A. Sala. The *Standard*, now the chief Conservative newspaper, was started in 1827, as an evening edition of the *Morning Herald*. It made a stout fight against Catholic emancipation. Its cause lost, it lived a lingering life until revived in 1876 by its able editor, W. H. Mudford. Other popular London dailies are the *Globe* (1803); the *Echo* (1868), the first London halfpenny newspaper; the *Pall Mall Gazette* (1865), which John Morley turned from its conservative ways into a powerful Radical organ; *Saint James's Gazette* (1880); the *Evening News* (1881); the *Star* (1888); *Westminster Gazette* (1892); the *Sun* (1893); and the *Daily Mail* (1896), founded by A. C. Harmsworth, who is a striking figure in recent journalism.

The London literary and society papers have a line of connection with Addison. The numerous imitations of the *Spectator* (1711-12) were

essays on manners and literature. The nineteenth century type of the weekly review was set by Leigh Hunt in the *Examiner* (1808), which combined literature and politics. Under its first editor and Albany Fonblanque (q.v.), it had a brilliant career, as an exponent of current radicalism. The *Athenæum* (1828) confines itself to literature, art, and music. Though it has had many rivals, it is to-day one of the most trustworthy reviews in the world. The *Academy* (1869) is similar in design, but runs more to literary gossip. The *Saturday Review* (1855), once the most solid, is now the 'smartest' of English weeklies. The *Spectator* (1828), under R. S. Rintoul, exerted for thirty years a mighty influence for reform. After R. H. Hutton assumed the editorship (1860), it became less radical in tone; and its sane discussions of politics and literature were among the best that journalism has ever offered. It still holds its high position. As the champion of radicalism, the *Speaker* was established in 1890 by T. Wemyss Reid. Other weekly reviews of literature, society, and politics (one or all), are the *Literary World* (1868); the *National Observer* (1887); the *Outlook* (1898); *Literature* (1897); the *Pall Mall Budget* (1868); the *Saint James's Budget* (1880); the *Weekly Sun* (1891); the *Guardian* (1846); the *Weekly Register* (1849); *Pearson's Weekly* (1890); *Vanity Fair* (1868); *Society* (1878); the *Pelican* (1887); the *Critic* (1895); *Lloyd's Newspaper* (1842); *Reynolds's Newspaper* (1850); the *Referee* (1877); the brilliant *World* (1874), founded by Edmund Yates; and *Truth* (1877), edited by Henry Labouchere. Exceedingly popular are several light journals approaching the magazine, such as *Tit-Bits* (1881) and *Answers* (1888). At the head of illustrated weeklies stand the *Illustrated London News* (1842); the *Graphic* (1869); the *Lady's Pictorial* (1880); the *Gentlewoman* (1890); and *Black and White* (1891). There are also reviews for distinct trades, professions, and pastimes; the *Illustrated Sporting and Dramatic News* (1874); the *Cycle* (1893); the *Musician* (1897); the *Economist* (1841); the *Statist* (1878), for the markets of finance; *Engineering* (1866); and so on through many phases of contemporary life. Among comic journals *Punch* (q.v.) is still supreme.

The press of London, taken collectively, has passed through three broadly marked stages. It began on a mere transcript of the city's rumor, gossip, and abuse. Repressed by the licensing act for a generation, it took two forms on its repeal, 1695, one literary, of which Addison's *Spectator* was the highest type, and the other bitterly polemic (L'Estrange and Defoe). In these journals, which appeared in quick succession for a century, the personality of the editor was decisive. With the Napoleonic wars English journalism entered on a third stage, led and molded by John Walter, the founder of the *London Times*, in which the personality of the editor became only one factor, though still of importance, in a compact organ of public opinion and vehicle of public news, whose articles were anonymous and whose editor was by a transparent fiction unknown. The weight and influence of journals in this period turned on the success with which editorials expressed the opinions of the ruling forces of the nation, of a party, a class, or an interest, and the accuracy and impartiality with which its

news columns recorded facts. While this type was most completely developed in the *Times*, it was apparent in all English periodicals, daily, weekly, and monthly, from the Napoleonic wars until the defeat of Gladstone's Irish Home Rule Bill recast party relations and based the Conservative-Imperialist majority on a mass vote. With this period, now nearly twenty years distant, English dailies began developing circulation independent of influence, signed articles and the personal journalist became conspicuous, and the publisher with an avowed commercial aim had an increasing control and influence. The earlier newspaper, like the *Times*, waned in weight, and the type of the new is not yet developed.

The earliest provincial English newspaper was the *Worcester Postman* (1690), which, under the name *Berrow's Worcester Journal*, still circulates freely through the West Midlands. Five years later was founded the *Mercury*, now called the *Lincoln, Rutland, and Stamford Mercury*. In 1706 appeared the *Norwich Postman* at a penny, with the announcement that a halfpenny would not be refused. It was followed by the *Norwich Mercury* (1714), which still exists. Among other early successes were the *Nottingham Courant* (1710), which with changed name continued till 1886, when it was incorporated with the illustrated *Weekly Express*; the *Newcastle Courant* (1710), with a present large circulation in the north; the still prosperous *Hereford Journal* (1713); the *Leeds Mercury* (1718), one of the best of provincial papers; the *Salisbury and Winchester Journal* (1729), now an influential paper; and the *Birmingham Gazette* (1741), to-day one of the leading Midland dailies. These examples, without the catalogue of numerous failures, show how the newspaper spread through England early in the seventeenth century. They were, however, small sheets, and continued to be such till about 1860. Still other well-known English papers are the *Leeds-Yorkshire Post* (1754), with a daily since 1866 and an evening issue since 1890; the *Newcastle Chronicle* (1764), now issuing two daily editions; the *Liverpool Courier* (1808), two daily issues and a weekly; the *Leicester Daily Post* (1872); the *Sheffield Weekly Telegraph*, with a circulation of 215,000; and the *Manchester Guardian* (1821), which has a reputation far beyond England for its independence and able comment. Wales depends largely upon the newspapers of the border counties. She has, however, several English journals of her own; as the *North Wales Chronicle* (Bangor, 1807); the *South Wales Daily* (Cardiff, 1872), in the Liberal interest; and the *Western Mail* (1869), in the Conservative interest. A few newspapers are printed in the Welsh language. Among them are *Y Genedl Gymreig* (The Welsh Nation) and *Baner ac Amaerau Cymru* (Banner and Times of Wales).

SCOTLAND very naturally had a hand in the numerous sheets employed to circulate information during the civil wars. The first to be printed in Scotland was the *Mercurius Politicus* (Leith, 1653; Edinburgh, 1654-60). Under the title *Mercurius Publicus*, it continued till 1663. The *Mercurius Caledonius* (Edinburgh, 1660) failed after ten issues. The establishment of the newspaper in Scotland was due to James Watson, who was both editor and printer. He started the *Edinburgh Gazette* (1700); the *Edinburgh Courant* (1705), a tri-

weekly, which suspended after fifty-five numbers; and the *Scots Courant* (1706), continued till 1718. In 1718 appeared the *Edinburgh Evening Courant*, and two years later the *Caledonian Mercury*, which continued for nearly a century and a half. The *Scotsman* (Edinburgh, 1817), a daily since 1855, the most substantial journal in Scotland, is also most favorably known in the United States. Among the numerous other good Scotch journals are the *Glasgow Herald* (1782), an independent daily with a weekly issue; the *Glasgow Weekly Mail* (1862); the *Dundee Advertiser* (1801), daily; the *Dundee Weekly News* (1855), having a circulation above 250,000; the *Aberdeen Journal* (1748), daily and weekly; and the *North British Daily Mail* (Glasgow, 1847).

IRELAND. During the civil wars there were printed in London several sheets containing news from Ireland, as *Warrented Tidings from Ireland* (1641) and *Mercurius Hibernicus* (1644). The first real Irish newspaper was the *Dublin News-Letter* (1685). Fifteen years later came the first Dublin daily, *Pue's Occurrences*, which was continued for a half century. In 1728 appeared another daily, *Falkener's Journal*. *Esdaile's News-Letter* (1744), changed to *Saunders's News-Letter* (1754), a Dublin tri-weekly and then a daily, lasted till 1879. The official *Dublin Gazette* (1710?) still continues. The oldest provincial Irish newspapers still existing are the daily *Belfast News Letter* (1737), the semi-weekly *Waterford Chronicle* (1766), and the *Limerick Chronicle* (1766). Among the most flourishing Dublin newspapers are the famous *Freeman's Journal* (1763); the *Weekly Nation* (1847); the *Evening Telegraph* (1877); and *Sport* (1881). The *Belfast Northern Whig* (1824), with a large circulation in Ulster, is also well known outside of Ireland.

THE BRITISH COLONIES. In British North America the chief places from which newspapers (daily and weekly) are diffused are Toronto, Montreal, Ottawa, Quebec, and Halifax. Among the earliest journals were the *Halifax Gazette* (1751), which lasted hardly twenty years, and the *Montreal Gazette* (1765), now a daily and weekly. Toronto, though later in the field, takes the lead to-day with its five dailies and many weeklies, among which are the *Globe* (morning, evening, and weekly), the *Daily Mail*, and *Evening News*. Quebec and Ottawa support several dailies and weeklies in French.

INDIA. The deportation clause in the early libel act, censorship, and a rigid license act restricted journalism in India, and a press law still leaves all newspapers published in the vernacular subject to administrative suppression. Anglo-Indian journalism began with the *Indian World*, Calcutta, edited by William Duane in 1794, deported by the East India Company. He was afterwards editor of the *Aurora*, Philadelphia, Pa. About thirty years later J. S. Buckingham was deported for a like reason. In 1800 nine newspapers were started and soon suspended. Early in the nineteenth century the English papers were the *Englishman*, started in 1821 as *John Bull in the East*, *Hurakarn*, *Calcutta Star*, and *Friend of India*. Much of Rudyard Kipling's early work appeared in the *Lahore Civil and Military Gazette*. In Calcutta nine dailies are published in English and seven in the vernacular. The *Indian Daily Mirror* (1863) is the first daily in English edited by natives. The *Hindu* of

Madras is the oldest daily in that city. In all, five dailies in English are conducted by natives. There are in the Empire about 140 English and about 300 native newspapers. The largest circulation of the latter is 25,000, and most circulate a few hundreds. The vernacular press is for the most part bitterly opposed to the Government, and is generally edited by Bengalis.

AUSTRALASIA AND SOUTH AFRICA. Journalism in Australia began with the *Sydney Gazette* and *New South Wales Advertiser* (1803-04), of which but one complete file is in existence at the Sydney Government House. The history of journalism in Australia is scattered with failures from 1810 to 1860. But to-day the dailies and weeklies of large circulation are numerous. Though the press has been established in the small towns, the great journalistic centres are Melbourne and Sydney; and next to them, Adelaide and Brisbane. We may cite for Melbourne, the *Argus*, the *Age*, and the numerous journals devoted to building, mining, stock-raising, and shipping; for New South Wales, the *Sydney Morning Herald*, the *Australian Star*, and the *Daily Telegraph*; for South Australia, the *Register*; for Queensland, the *Brisbane Courier*. The Australian papers are remarkable for the large number of pages in an issue, larger in proportion to population and circulation than in any other country, particularly in the case of weeklies.

New Zealand's first paper was the *New Zealand Herald* (1841), now consolidated with the *Auckland News*. It was published for a year, revived (1863) by W. C. Wilson, and merged in its present ownership (1864). It is one of two dailies in Auckland. The *Times*, Wellington, is a typical and leading daily. A Maori paper, *Te Pakio Matiriki*, is published by a former chief, Tawhiao. The newspaper has followed the colonist to Cape Colony, Natal, and to other British possessions in Africa, and throughout the world. Cape Colony has several weeklies and three dailies, of which may be mentioned the *Cape Argus* and the *Cape Times*, both daily and weekly.

FRANCE. The now flourishing *Gazette de France* (daily) is the oldest of all French newspapers. As the *Gazette* it was established at Paris in 1631 under the patronage of Richelieu by Théophraste Renaudot (1584-1653). It first appeared weekly with a monthly supplement, and afterwards as a semi-weekly. Being thus a continuous record (except for a slight suspension) of foreign and domestic events for toward three centuries, it possesses very great historical value. In its arrangement of foreign news first and home news last, it also set an example which has generally prevailed in French journalism. Before the close of the seventeenth century it began to give space to commerce, theatrical announcements, and advertisements. The *Gazette Burlesque* (1650-65), the first journal of the kind, aimed to be the *chronique scandaleuse* of Paris. The two types thus established were continued in the *Mercure Galant* (1672), which, under different names, commonly the *Mercure de France*, was continued, with short interruptions, down to 1853. The rather insipid *Journal de Paris* (1777-1819) is said to have been the first Parisian daily. During the Revolution journals sprang up rapidly as organs of the various

parties, but they soon expired. Two, however, have lived till the present time: the *Journal des Débats* (1789) and the *Moniteur Universel* (1789), the official organ under the first Napoleon. The *Constitutionnel*, in which Sainte-Beuve began the *Causeries du Lundi*, dates from 1815. In 1836 were established two cheaper papers, the *Presse* and the *Siècle*, now popular dailies. The *Figaro*, the modern *journal de scandale*, established in 1854, became a daily in 1866. It has had considerable influence on the lighter newspaper in England and elsewhere. The *Charivari* (1832), a *journal satirique*, has likewise been imitated in many countries. The *Patrie*, political, commercial, and literary, was a daily from the first (1841). Of all Parisian newspapers, perhaps the *Temps* (a daily, 1861) has the most solid reputation abroad. The Parisian political press is further represented by the *Soir* (1870), the *Matin* (1884), and many others. The *Petit Journal* (1863), the first French paper selling at five centimes (half the usual price), at once gained a circulation of 100,000. After arrangements were made whereby it could be furnished throughout France at the same price, its daily issue rapidly increased till it reached a million. French newspapers contain less news than the English or the American. Space is thus found for the *feuilleton*, a literary essay, sketch, or short story, an indispensable feature of the French journal. Paris is famous for her weeklies devoted to art, fashion, literature, and the professions. Outside of Paris, the larger towns support several dailies.

BELGIUM. Antwerp has already been mentioned as one of the places from which were issued the news-letters of the sixteenth century. They were succeeded by the *Nieuwe Tijdinghen* of Antwerp (1605?), on which were founded the *Posttijdingen* (1637-44) and the *Gazette van Antwerpen* (down to 1827). To the period 1640-50 belong the *Nieuwe Tijdinghen* of Bruges, the *Brusselsche Gazette*, and *Le Courier Véritable des Pays-Bas* (Brussels), which, as the official *Gazette de Bruxelles* and the *Gazette des Pays-Bas*, continued till 1791. At that time the most outspoken political journal was the *Annales Politiques* of Linguet (often suppressed). The Belgian press, held in firm restraint during the Spanish, Austrian, and French rule, became practically free on the independence of Belgium (1830). Antwerp with its seven dailies has been far outstripped by Brussels, which has now about twenty dailies. The chief are the *Indépendance Belge*, the *Etoile Belge*, and the *Journal de Bruxelles*. At Antwerp and at Ghent dailies are published in Flemish.

HOLLAND. The papers of Holland were long noted for the accuracy of their commercial news. Since 1830 they have given more attention to politics. At present the principal Dutch dailies are the *Allgemeene Handelsblad* and *Nieuws van den Dag*, both of Amsterdam; the *Amsterdamsche Courant*; the *Journal de la Haye*; the *Haagsche Courant*; and the *Staats Courant*—published at The Hague. Other places of active journalism are Haarlem and Rotterdam. Weeklies, several of which are illustrated, are also common.

SWITZERLAND. The Swiss papers are devoted mostly to local interests. They are, however, well managed, especially the dailies at Geneva, Berne, and Lausanne. For tourists there is published at Geneva the *Swiss and Nice Times*, in both French and English.

GERMANY. The news sheets of the sixteenth century led to the newspapers that began to appear just after 1600. Frankfort-on-Main was among the first with the *Frankfurter Journal* (1615) and the *Frankfurter Oberpostamtszeitung* (1616), which, as the *Frankfurter Postzeitung*, lived till 1866. Periodical papers were soon established in other towns, as Strassburg, Nuremberg, Hildesheim, Augsburg, Munich, Hamburg, and Leipzig (1660). The *Hamburgischer Correspondent* (1714), still existing, is famed as being the first to have a regular foreign correspondent, a French refugee living in England (1725-35). The *Allgemeine Zeitung*, started at Augsburg in 1798 and published since 1883 at Munich, from the first a 'weighty political organ, now ranks among the foremost papers of Germany. The press in Germany was long under severe restrictions. The press laws of Germany are in theory liberal. In practice, however, by a rigid application of the law in regard to lèse-majesté, the courts have come to construe almost any criticism of current administration as an insult to the constituted authorities. Even a comment on the frequency of railroad accidents has been visited with court proceedings, and the editor of *Kladderadatsch* was imprisoned for two months for a cartoon which represented a group of great soldiers of the past reading the Emperor's speech to his guard, declaring that it was necessary to be a good Christian in order to be a good soldier. Berlin has over twenty-five dailies, among which are the *Vossische Zeitung*; the *Norddeutsche Allgemeine Zeitung*; the *Neue Preussische Zeitung*; *National-Zeitung*; the *Tägliche Rundschau*; *Germania*; and the *Volkszeitung*. The *Cologne Gazette* is noted for its foreign news. From all the great cities of Germany issue many weeklies, some of which are illustrated. The leading comic periodicals are *Fliegende Blätter* and *Jugend*, Munich, and *Kladderadatsch*, Berlin.

AUSTRIA-HUNGARY took an active part in the early history of journalism and has kept abreast with modern methods. Of the Vienna dailies, numbering about fifteen, the most important are the *Neue Freie Presse*; *Neues Wiener Tagblatt*; *Wiener Allgemeine Zeitung*; *Deutsche Zeitung*; the semi-official *Fremdenblatt*; and the official *Wiener Zeitung*, with its semi-official evening edition, *Wiener Abendpost*. Budapest has twenty-seven dailies, of which *Pesti Napló* (Pest Daily), *Egyetértés* (Union), and *Pesti Hírlap* (Pest Gazette) are the most prominent in Hungarian, and the *Pester Lloyd* and *Neuer Pester Journal* in German. Among the provincial papers the foremost in German are the *Bohemia*, in Prague; the *Grazer Tagespost*, the *Triester Zeitung*; in Czech, the *Národní Listy* (National News), in Prague; in Polish, the *Czas* (Times), in Cracow; and in Italian, the *Indipendente*, in Triest. As in France, considerable space is given by the press of Germany and Austria to literary reviews and short stories.

SCANDINAVIA. The earliest Swedish paper seems to have been the *Ordinarie Post-Tidende* of Stockholm (1643-80). A little later came the *Stenak Mercurius* (1675-83) and the *Relationes Curiosæ* in Latin (1682-1701). In the eighteenth century were established two French papers: the *Gazette Française* (1742) and the *Mercur de Suède* (1772). The first political paper of importance in Sweden was the *Argus*, founded by

Johannsen (1820). Ten years later were established the *Fäderneslandet*, the organ of the Royalists, and the *Aftonbladet*, the organ of the Reformers, now the leading dailies of Stockholm. The first Norwegian newspapers were the *Christiania Intelligentssedler* (1763) and the *Adressecontors Efterretninger* (Bergen, 1765). Christiania now has five and Bergen three dailies. In both Norway and Sweden semi-weeklies and tri-weeklies are common. The press of Denmark dates from the *Danske Mercurius* (1666). Down to 1830 the papers of Denmark were made up mostly of extracts from foreign journals; and those outside of Copenhagen are still very poor. Copenhagen now has thirteen dailies, morning and evening, of which the oldest is the *Berlingske Tidende* (1749). The *Aftenposten* enjoys the largest circulation. At Reikjavik in Iceland are published two small journals.

ITALY. As has already been mentioned, Italy with her ancient *Acta Diurna*, and the Venetian gazettes of the sixteenth century, was the original home of the newspaper. The succeeding sheets fell into disfavor with the popes and were denounced in a bull issued by Gregory XIII. The *Diario di Roma* (1716) was the leading Italian newspaper for more than a century. Next followed the existing *Gazzetta di Napoli*. Up to 1848 the newspapers of Italy, subject to strict censorship, were small and politically insignificant. Press laws then became liberal, and as a result newspapers sprang up rapidly. Among the ten Roman dailies may be cited the *Opinione* (established at Turin in 1847 and afterwards removed to Rome); *Diritto*; *Riforma* *Fanfulla*; and the *Voce della Verità* (in the interest of the Pope). Florence issues the *Corriere Italiano* and two other dailies; Genoa, the *Caffaro* and the *Corriere Mercantile*; Milan, six dailies, among them the influential *Perseveranza*; Turin, five; Venice, four; and Naples, six. There are also several illustrated and humorous weeklies.

THE SPANISH PENINSULA. Though there were earlier sheets published at irregular intervals, the first Spanish newspaper seems to date only from the eighteenth century. Even for some time after 1800 Madrid had only its *Diario*. Indeed, the press in Spain had a hard career till the Revolution of 1854. Dailies in all the chief cities are now numerous. Madrid has about twenty, among which are the *Imparcial* and the *Correspondencia de España*. Among the Madrid illustrated weeklies are the *Correspondencia Ilustrada* and the *Ilustración Española Americana*. From the American standpoint, the news in Spanish papers is meagre. This is also true of the numerous dailies of Lisbon.

RUSSIA. The earliest newspapers of Russia were issued under the direction of Peter the Great, first at Moscow and then at Saint Petersburg, to report the progress of the war with Sweden. The first gazette, the *Vedomosti*, appeared in Moscow in 1702. The issue of 1703, preserved in the Imperial Library at Saint Petersburg, was reprinted in 1855. Political journalism, however, has never been permitted in Russia except in defense of the Government policy. The flourishing period of the press has been at the time of national crises, as the French invasion of 1812, the Polish insurrection of 1830, and the Crimean War. The official organ is the *Journal de Saint Pétersbourg*. The *Novoe Vremya* (New Times), the *Norosti* (a news and

stock gazette), and the *Severnaya* (Northern Bee) circulate widely from Saint Petersburg. The oldest Moscow daily is the *Moskovskia Vedomosti* (Moscow News), dating from 1766. Russian papers, necessarily occupying themselves mainly with scientific and literary subjects, make much of the feuilleton. The weekly *Niva* (Harvestfield) issues two large monthly supplements.

TURKEY. The newspaper was introduced into Turkey by the French, the first being started in Pera in 1795 by Verninhac, French Ambassador. The *Djeridei Havadis*, established in 1843 by Alfred Churchill, an Englishman born in Turkey, is now the leading daily of Constantinople. Beirut is the centre of the Arab press of the Empire. There exist dailies in the capital, also in English, French, Italian, Armenian, and Greek. Owing to the repressive policy of the Government, the editorial is impossible. The contents of a Turkish paper include home and foreign news, a Court gazette, official appointments, advertisements, and a feuilleton. Religious weeklies, as the *Avedafer* in Armenian, have played an important part in mission enterprise.

GREECE. During the War of Liberation, many papers appeared in Athens, but they disappeared in 1833 on the introduction of caution money, by King Otho. Then followed the period of the official organ. Now the Athenian press is represented by several journals in Greek, French, Italian, and English; the daily *Akropolis*, *Ephemeris*, and *Nea Ephemeris*; and the weekly *Journal d'Athènes*, and the *Messenger d'Athènes*.

CHINA. The *Peking Gazette* has already been described. It contains a court calendar, Imperial decrees, and memorials from officers of the State. The European journal has been brought to China by the English and the French. Shanghai and Hong Kong have several dailies in English and Chinese. The native press of China is the product of the past twenty-five years. The earliest was the *Cheng-Pao* of Shanghai, begun by an Englishman, Major, aided by Chinese literati; circulation, 1895, 12,000; the *Hou-pao* (1883); the *Che-pao* at Tien-tsin; and *Kouangpao* at Canton. These have been succeeded by a vernacular press all over the Empire, which has a considerable influence. The *Shih Wupao* of Shanghai is one of several sheets started by a viceroy, in this case Chang Chih-tung, to counteract the vernacular press in private hands, and in August, 1898, the subject of an Imperial rescript.

JAPAN. Japanese journalism owes its initiative impulse and traditions to Fukazawa, who founded and for many years edited the *Sizi Shimpō*, the leading daily paper in the Empire, published at Tokio. Himself one of the ablest editors of the century, as prolific as Girardin, as full of moral earnestness as Greeley, and as able in directing public policy as Delane, his paper in the early stages of the Miji educated Japan. The first periodical, *Manhio*, appeared in 1863. The first daily, *Mainichi Shimbun*, was established in 1871 at Tokio. Among other Japanese papers worthy of mention are: *Nichi Nichi Shimbun* (1872), Count Ito's organ, *Hochi Shimbun*, *Jisi Shimpō*, *Nippon*, *Kohumin Shimbun*, *Kohumin*, and *Noromo*. The *Miro Miro* is a comic paper. In 1883 Japan had 113 newspapers and periodicals, of which one had 1900 circulation; in 1888, 550, and in 1900, 745, of which Tokio had 201, Osaka 56, and Kyoto 51. The dailies number 150,

of which 17 in 1888 had a combined circulation of 130,200.

THE UNITED STATES. The newspaper has an importance in the United States attained nowhere else. A broad area under a common language with a homogeneous population, universal education, easy means of communication, the cheapest mail facilities known, newspaper tolls cheaper in proportion to average distance, though higher for short distances than elsewhere, and a constant interest in political and social affairs, complete freedom from censorship or restriction, except that provided by the libel laws, have given 5 per cent. of the population of the world 40 per cent. of its newspapers. Less accurate than the English newspaper, less well written than the French, less well equipped than the German, the American newspaper occupies a mean position between all three in the extent of its news service, in the freedom of its literary vehicle, and in its habit of treating all subjects from the point of the educator rather than the investigator. Journalism in the United States has shared the conditions due to material circumstances which affect all periodicals. They have already been described for England, where, a dense population occupying a limited area, questions of transportation play a limited part. The journalism of the Revolution, when for newspaper purposes no common communication existed between colonial centres, was limited in influence and circulation to the place and region in which each paper was published, and even the *New York Journal*, in which the *Federalist* appeared, had small influence outside of New York City. When the postal service was fully organized after the Revolution, but remained subject to special carriage until the organization of an adequate stage service along the Atlantic Coast in the third and fourth decades of the nineteenth century, the rates upon newspapers were so high that their circulation was the luxury of a few, and the small group of newspapers edited at the chief centres by men of a commanding personality, known to the public class of the period, had a most important influence, akin to that of the English journal of the same time, from the general knowledge among men of public affairs of the personality of their editors, and their ability to affect the dominant class of their place and region. The organization of a stage service, in particular between New York and Philadelphia, just prior to the development of railroads, and a reduction in newspaper mail rates gave a wide circulation to weeklies and began the political influence of such newspapers, usually the weekly edition of a daily, which lasted from 1840 to 1875. During this period, as with the *New York Tribune*, the real influence and weight of its editor rested, not upon its daily edition, which in this case was always out-topped in New York City in circulation by two or more papers, but upon its weekly, which circulated throughout all the North. Political and religious weeklies during this period were the most profitable of newspaper properties, and the most potent of political, religious, and social factors. Ten years after the close of the Civil War competition began in the telegraph service, both by cable and by land; tolls dropped, newspaper postage was reduced to a nominal figure, the price of paper per pound began to decrease, train service was improved, the early delivery of the morning paper became possible,

owing to presses capable of printing a large edition rapidly before breakfast within a radius of 200 miles, and during the last quarter of the nineteenth century the daily became dominant. It had for more than half a century held an unchallenged field in all cities of over 100,000 population. The changes just recited extended the newspaper radius of all cities of half a million or over, and dailies which had been important at a remove of 100 or 200 miles over a great centre, in towns from 50,000 to 100,000, while they suffered no loss in their value as local means of communication and business properties, lost their weight in the daily newspaper field as organs of political and social importance, now that circulation which had been measured by the 10,000 down to 1885 was measured by the 100,000. From 1840, when the power press, the railroad, and the telegraph made the modern daily newspaper possible, down to 1875, a circulation of 50,000 in New York City was remarkable, and nearly all newspapers were well satisfied with half of this. From 1875 to 1885 these figures doubled. From 1885 to 1900, with a few exceptions, a newspaper could not be considered in any city of over half a million as of importance unless its daily circulation turned 100,000, and in any cities still larger 150,000 to twice these figures was not unknown. The effect of this enormous growth was to change radically both the condition and character of newspapers seeking a large circulation. Where a regulation subscription had been the general source of support, newsstand and street sales became responsible for the great bulk of the edition. Newspapers began sharply to differentiate between the newspaper in each city which sought a large but unstable circulation and the newspaper which aimed at a smaller but secure and more select group of readers. Where one newspaper to the home had been the rule, it became more and more common for the house and office to take from two to five. During the last decade of the nineteenth century, in the struggle for circulation and a general competition, the usual price of the daily newspaper in a large city, which was 4 and 5 cents down to 1880, and from 2 to 3 cents down to 1890, dropped to 1 cent for most of the newspapers having a large circulation, for all in Philadelphia, for all but three English morning newspapers in New York in the general field, while in Boston and Chicago 2 and 3 cents was still maintained. At the same time, a corresponding fall took place in the rate charged for the small 'want' advertisement, and for the special advertising of business firms, a larger and larger share of which was monopolized by 'department stores.'

Boston was first in the field with *Publick Occurrences* (1690), a small quarto sheet, having one page blank. For containing "reflexions of a very high nature," it was suppressed by the Governor of Massachusetts. Next came the *Boston News-Letter* (1704), first conducted by John Campbell, the postmaster. In 1719 it met a bitter rival in the *Boston Gazette*; but with its name changed to the *Massachusetts Gazette and Boston News-Letter*, it grew to be the chief organ of British rule in America down to the evacuation of Boston. In 1721 James Franklin began the *New England Courant*. It suspended in 1727; and two years later Benjamin Franklin, who had been apprenticed to his brother James,

established at Philadelphia the *Pennsylvania Gazette*, which he conducted as a weekly till 1765. The *Pennsylvania Gazette* was then merged in the *North American*. Numerous ventures at Boston led to the *Boston Evening Post* (1735), which was ably conducted as an independent journal down to 1775, when it expired. The new *Boston Gazette* (1755) became the voice of the people against England. To it John Adams contributed the *Letters of Novanglus*. The *Massachusetts Spy* (1770) was another brilliant paper on the Revolutionary side. On the day of the battle of Lexington, it was removed to Worcester, where, after one short suspension, it has continued till the present under the name of the *Worcester Spy*. In other colonies the newspaper had already appeared or was appearing. In 1725 the colonies had two newspapers, one in Boston and one in Philadelphia. At the outbreak of the Revolution the number had increased to 34. The years immediately following saw, amid many failures and successes, the establishment of two dailies: the *Advertiser* of Philadelphia (1784) and the *Advertiser* of New York (1785).

For America, as for the rest of the world, the period of immense expansion in journalism began about 1830, on the establishment of the great New York dailies. The *Daily Sun* (1833), the first penny paper in the United States, was among the pioneers. Reorganized by Charles A. Dana in 1868, it gained wide repute for concise news items and brilliant editorials. The *Herald* (1835), founded by James Gordon Bennett, has long been noted for its exclusive foreign news, often obtained at lavish expense. The *Tribune* (1841), for thirty years under the management of Horace Greeley, was distinguished for its vigorous editorials. It still remains one of the cleanest and most reliable among newspapers. The *Times*, founded in 1851 by Henry James Raymond, has always aimed at sane and conservative comment on contemporary questions. Among other New York dailies of high standing are the *Evening Post* (1801), an independent paper somewhat on the English type, and containing solid and trustworthy book reviews; the *Commercial Advertiser* (evening), which is most favorably known for its financial and literary comment; the *Mail and Express* (evening); and the *Press*, founded in the interests of the Republican Party. The latest phases of modern journalism are represented by the *World* and the *Journal or American*. Excellent dailies are also published in German, French, and Italian. New York has found indispensable a few dailies and numerous weeklies devoted to finance and each important branch of trade. Such are: the *Financial News* (daily); the *Journal of Commerce* (daily); *Bradstreet's*; the *Iron Age*, etc. Each department of knowledge and each profession also has its weekly. Of the many illustrated journals *Harper's Weekly* is the oldest. Among others are *Collier's Weekly* and *Frank Leslie's Illustrated Paper*. In 1875 the *Graphic* was the only illustrated daily. Now a daily without illustration is rare. American humor finds expression in *Puck*, *Judge*, and *Life*; criticism in the *Nation*, in many other weeklies, and in the Saturday or Sunday editions of the dailies. The *Times* publishes a Saturday supplement composed wholly of book reviews and literary comment. Among religious journals, which often include literary criticism, are the *Observer* (Presbyterian); the

Churchman (Episcopal); the *Christian Advocate* (Methodist); the *Examiner* (Baptist); the *Independent* and the *Outlook* (liberal); the *Catholic Review*; the *Catholic American*; and many Hebrew weeklies. Sport, art, science, the drama, fashion and society—each has its own periodicals. *Public Opinion* presents a résumé of current thought. New York still leads the American press. But what has been said of her journals is largely true of Boston, Philadelphia, Baltimore, Cincinnati, Chicago, Saint Louis, and San Francisco. And from certain other cities, sometimes small, are issued newspapers which have gained a national reputation. Such are the *Springfield Republican*, the *Detroit Free Press*, the *Louisville Courier-Journal*, and the *New Orleans Picayune*. The last years of the nineteenth century witnessed the rise of the Sunday issue of the great dailies. These immense Sunday magazines, sometimes running above a hundred pages, with colored illustrations, are now published in all the larger cities.

THE MAKING OF THE NEWSPAPER. For a conception of the wonderful progress of the press, one must leave mere annals and enter the workshop. The newspaper such as Defoe edited was nothing more than a brief chronicle of news gathered haphazard, concluding with the advertisement of a quack doctor. Next came the reporter. The special correspondent here and there appeared in the seventeenth century, but he did not gain his place till the Crimean War, and in the United States not till the Civil War. Now every great daily has its hundred correspondents scattered about the globe. This has been rendered practicable by the cable. For saving expense, news agencies have been formed in Europe and America. Reuter's (1858) was the first for England. The Associated Press of the United States dates from 1849. Though these serve for the smaller papers, they are to the larger papers only hints to be followed up by their own agents. The telegraph, indispensable for gathering news, has been reinforced by the telephone, which is now finding its way into every village. These new sources for obtaining news have revolutionized the office. The editor who personally superintended the issue of his paper is of the past. There can never be another Greeley or Dana. The editor-in-chief of certain papers finds no time even to write a leader. The work of making the paper must be divided and subdivided. A 'city editor' directs the reporters in gathering news. A 'news editor' keeps in touch with outside correspondents through the telegraph and the telephone. What pours in from the press associations and a paper's own avenues must be thoroughly sifted by 'copy editors,' who now throw out far more than they put in. For important news articles there are usually special writers. 'Exchange editors' read other periodicals with scissors in hand, clipping what they think will interest the public. Comment on the news of the day is in the hands of a trained corps of editorial writers. All these and other departments receive their general instructions from the editor-in-chief, whose place has shifted from the old editorial desk to the telephone. There are, moreover, editors for finance, commerce, and sport, and critics for music, the theatre, and literature. Many papers also now employ a woman, with a corps of assistants, to gather the news especially interesting to women. Finally, there

is the 'night editor,' who makes up the paper, arranging all the articles and the headlines. The Sunday issue is under the direction of a special editor, who has his own staff of correspondents. For providing the Sunday newspapers with stories by popular novelists, syndicates were formed just after 1890. The syndicate purchases the manuscript from the author and sells the right of simultaneous publication to one newspaper in each of the great cities, thus making a handsome profit. The proceeds from the transaction have tempted Stevenson, Kipling, and many other well-known novelists. Much miscellaneous manuscript now passes through syndicates. The counting room of the newspaper we can enter only to remark that an expert is required to look after the advertisements. The income from advertisements, once insignificant, is now so great that even the wealthiest daily could not long survive a serious quarrel with its patrons.

Great as all these developments are, the marvellous changes await one who enters the mechanical department. Down to 1814 all papers were printed on hand-presses. Then the cylinder press of Koenig, run by steam and printing about a thousand copies an hour, was introduced by the *London Times*. In the hands of Sir Rowland Hill, Richard M. Hoe, and other later inventors, the so-called 'web-perfecting press' has reached a stage in its development where it will print, fold, paste, and count more than 100,000 copies of eight-page papers an hour. The most recent presses will also print a sheet in six distinct colors. These improvements have been accompanied by quicker means of stereotyping. Plates may be made and clamped on the press within twelve minutes. In the last decade of the nineteenth century hand typesetting gave way to the linotype machine, which, besides reducing the expense of composition by one-half in New York and by one-third in certain other cities, brought the interval between the reception of the latest news and its publication down to less than half an hour. Between 1875 and 1900 paper suitable for print decreased in cost from 12 to 2 cents a pound. New processes in photography have also made easy the rapid reproduction of pictures. The interval between a snapshot and the printed picture is less than two hours. Electricity is displacing steam. The automobile has been pressed into service for getting newspapers on the street; and for wider circulation special trains are employed.

No observer can fail to notice that under the new régime, where the editor-in-chief counts for less, the press of the United States is becoming less personal and more and more independent. True, nearly all American papers are the voice of some party, but they are not its slaves. Certainly public questions are now discussed with a sanity and calmness rare in earlier years.

STATISTICS. According to estimates at the close of the year 1900, the total number of newspapers published in the world was about 50,000 (an increase of 10,000 during the previous ten years), distributed as follows: United States and Canada, 21,789; Germany, 7000; Great Britain, 9000; France, 4300; Japan, 2000; Italy, 1500; Austria-Hungary, 1200; Asia, exclusive of Japan, 1000; Spain, 850; Russia, 800; Australia, 800; Greece, 600; Switzerland, 450; Holland, 300; Belgium, 300; all others, 1000. Of

the 21,789 estimated for the United States and Canada, only 924 were published in Canada. According to frequency of issue, they ran thus: weekly, 15,375; monthly, 2939; daily, 2279; semi-monthly, 296; semi-weekly, 470; quarterly, 180; bi-weekly, 76; bi-monthly, 68; tri-weekly, 52. The number for each State and Territory in the United States was as follows: Alabama, 231; Alaska, 9; Arizona, 54; Arkansas, 257; California, 698; Colorado, 326; Connecticut, 190; Delaware, 42; District of Columbia, 82; Florida, 159; Georgia, 362; Hawaii, 26; Idaho, 70; Illinois, 1706; Indian Territory, 84; Indiana, 859; Iowa, 1073; Kansas, 703; Kentucky, 314; Louisiana, 192; Maine, 154; Maryland, 211; Massachusetts, 618; Michigan, 790; Minnesota, 653; Mississippi, 222; Missouri, 1033; Montana, 92; Nebraska, 617; Nevada, 30; New Hampshire, 105; New Jersey, 384; New Mexico, 52; New York, 2032; North Carolina, 255; North Dakota, 155; Ohio, 1217; Oklahoma, 125; Oregon, 192; Pennsylvania, 1403; Porto Rico, 7; Rhode Island, 59; South Carolina, 128; South Dakota, 267; Tennessee, 289; Texas, 794; Utah, 77; Vermont, 75; Virginia, 240; Washington, 221; West Virginia, 189; Wisconsin, 642; Wyoming, 41.

The fullest analysis ever made of the commercial side of newspapers for any one country appeared in the United States Census Report for 1900. It varies considerably from the figures compiled by advertising agencies in the number of periodicals, because the latter contain numerous transitory publications of small consequence. The growth of the periodical press in the United States during the last half-century is best shown by the following table:

	All classes			Daily	
	Number	Total circulation per issue	Aggregate number of copies issued during the year	Number	Total circulation per issue
1900	18,226	114,926,334	8,168,148,749	2,226	15,192,156
1890	14,901	89,138,934	4,661,113,530	1,610	8,387,188
1880	11,314	31,779,686	2,067,848,369	971	3,566,395
1870	5,671	30,842,475	1,508,548,350	574	2,661,547
1860	4,061	18,861,439	927,561,546	367	1,478,435
1850	3,528	8,142,177	426,469,978	284	758,454

Complete figures exist in regard to the business of publication only during the past twenty years. These are summarized as follows:

In English is *sickname*, and reverse changes are *adder*, *apron*, *auger*, *orange*, *upsire*. A small salamander of the genus *Triton* in Europe and

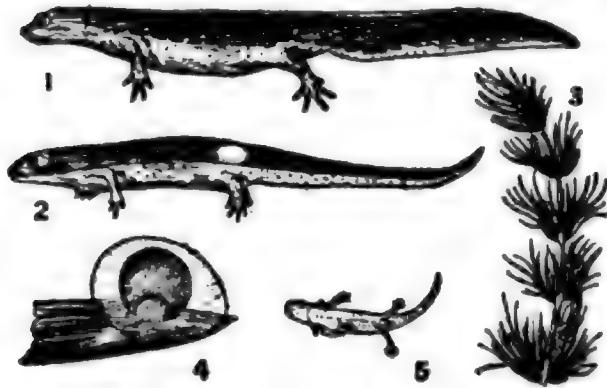
YEAR	Number of publications			Aggregate circulation per issue	Aggregate number of copies issued during the census year
	Total	Reporting	Not Reporting		
1900	31,373	18,226	3,046	114,299,534	8,168,148,749
1890	17,616	14,901	2,715	89,138,934	4,661,113,530
1880	11,314	11,314	.....	31,779,686	2,067,848,369

YEAR	Wage-earners		Pounds of paper used	Value of newspaper products		
	Average number	Total wages		Total	Advertising	Subscriptions and sales
1900	94,604	\$80,333,063	1,233,182,248	\$175,789,639	\$93,942,322	\$79,926,487
1890	75,477	67,074,387	552,876,165	143,566,448	71,243,261	72,323,187
1880	71,615	28,559,336	189,145,048	89,189,674	39,126,384	49,852,592

BIBLIOGRAPHY. The works on the newspaper are all considerably out of date. For a general view of the history of the press down to its recent marvelous development, the best single book is *Hudson's Journalism in the United States*

Asia, and *Diemictylus* in North America. The most familiar American newt is the red-spotted one (*Diemictylus viridescens*). When full grown it is about four inches long, and is greenish-brown above, with a line of vermillion dots on

the sides; below, it is orange dotted with black. It inhabits ditches and quiet waters, where it feeds voraciously on all sorts of small aquatic animals. With the beginning of warm weather the females begin to deposit their eggs, which



AMERICAN GREEN NEWT.

1. Adult male of *Diemictylus viridescens* in the green aquatic dress. 2. Young newt in the vermilion, terrestrial stage. 3. Eggs, attached to a water-weed. 4. An egg, enlarged. 5. Larva, with external gills.

may be laid singly during five or six weeks, and are attached to the leaves of submerged plants. The young hatch in a fortnight or so, and remain in the water, wearing a dull green coat, until the end of the season, when, having completed their first metamorphosis, their gills disappear, the throat and lungs become adapted to breathing air, and they leave the water. Their color now changes to a rich uniform vermilion with fiery button-like spots along the sides. They are then only two or three inches long, and hide under leaves and within rotten logs, feeding upon small worms and the like, but coming out frequently, especially in the night and wet weather. These little creatures are among the prettiest objects in the American woods. This sojourn on land lasts until the autumn of the third or spring of the fourth season, by which time they have nearly attained to full size, and have reached sexual maturity. They then gradually change in color back to the original green, and return to the water, where their lungs cease to act, pharyngeal respiration is reestablished, and they proceed to breed. This species is locally numerous all over the Eastern United States. A much larger species (*Diemictylus torosus*) occurs in the Western States. It is dark brown in color, yellowish beneath, and the tail is provided with fins. It feeds mainly on earthworms.



EUROPEAN CRESTED NEWT.
Male in breeding dress.

Of the Old World species, the most widely distributed is the crested newt (*Triton cristatus*), which is olive-brown with white blotches on the sides, and the males of which, during the breeding season, have serrated crests along the backs. Another well-known species is the

marbled newt (*Triton marmoratus*), with which the crested newt hybridizes. All newts prefer a cool and moist situation, and hibernate usually in the ground. Some species remain all their lives in the water, while others pass most of their lives on land. They cast their skins from time to time, more frequently when young, and the cast skin is eaten. The breeding habits of all resemble those of our American species. Consult: Gadow, *Amphibia and Reptiles* (London, 1901); Gage, "Life History of the Vermilion-Spotted Newt," in *The American Naturalist* (Philadelphia, 1891); Sherwood, *Salamanders Found in the Vicinity of New York City* (New York, 1895); Jordan, "Habits and Development of Newts," in *Journal of Morphology*, vol. viii. (Boston, 1893).

NEW TESTAMENT. See BIBLE.

NEW TESTAMENT CHRONOLOGY. The science which deals with the dates and order of events in the life of Christ and the Apostolic Age.

I. THE CHRONOLOGY OF THE LIFE OF CHRIST. The main data are to be found in the Gospels and checked by comparison with the contemporary events of secular history.

(1) *The Date of the Nativity.*—From Matthew we learn that the birth of Jesus took place "in the days of Herod the King" (ii. 1). The visit of the wise men, the flight of the Holy Family into Egypt, and the massacre of the children under two years of age all preceded Herod's death (ii. 3-18). Thus Herod's death gives us a date later than which the birth of Jesus cannot be placed. According to data in Josephus, it is beyond all doubt that Herod died not long before the Passover of B.C. 4. The star of the wise men may have been the conjunction of Jupiter and Saturn, which occurred in B.C. 7. The Nativity was, however, after the first appearance of the star. Since several events took place between the Nativity and Herod's death, the evidence in Matthew is conclusive only for a date between B.C. 7 and B.C. 4. In Luke ii. 1 the data are more definite. "In those days there went forth a decree from Cæsar Augustus that the [Roman] world should be enrolled. This was the first enrollment made when Quirinius was Governor of Syria." The meaning seems to be that this enrollment was the first one of the kind in those regions, and that it was taken while Quirinius was Governor. This definite statement has been the subject of much discussion. The main points in dispute are: whether Augustus ordered an enrollment in Palestine before the famous one of A.D. 6 (which was, curiously enough, while Quirinius was Governor of Syria), and, if so, whether Quirinius was the Roman official intrusted with its execution. As to the first question, documents recently discovered in Egypt supplement our former imperfect knowledge of Augustus's various censuses, so that we are now reasonably sure that about B.C. 9-8 a census was ordered to be taken in Palestine as a part of the second general census of the Empire, in which Palestine was now, for the first time, included. From B.C. 23, for a number of years, a census was taken every fourteen years. It is likely that the census ordered for the year B.C. 9-8 did not actually take place in Palestine, owing to its peculiar circumstances, until B.C. 7. As to the second question, there is a possibility

that Luke has made a mistake in naming Quirinius instead of Saturninus as the Governor of Syria at the time. Thus both Luke and Matthew agree to the effect that the Nativity took place about B.C. 7 or A.U.C. 747. It would seem that further aid might be derived from Luke iii. 1-3 and 23, which verses apparently state that Jesus was thirty years of age in the fifteenth year of Tiberius Caesar. But this is not the case. We are uncertain (1) from what date Luke reckoned the reign of Tiberius; (2) how much latitude is to be allowed to the expression "about thirty years;" and (3) how close the connection is between v. 23 and vv. 1-3. For these reasons we must be content with the result stated above, and date the Nativity about B.C. 7.

There are no data for determining the month and day of the birth of Jesus. Ancient tradition wavered between two dates, January 6th and December 25th, each of which seems to have been the result of calculation, not based on trustworthy tradition.

(2) *The Date of Jesus' Baptism.*—From Luke we learn that John the Baptist took up his work in the fifteenth year of Tiberius. Such, at least, seems to be the meaning of Luke iii. 1-3, "Now in the fifteenth year of the reign of Tiberius Caesar . . . the word of God came unto John . . . in the wilderness." If Luke reckoned the reign of Tiberius from the death of Augustus, the year August 28-August 29 A.D. would be the year intended. If he counted from A.D. 12, when Tiberius was associated with Augustus, as the first year, then A.D. 26-27 would be the year indicated. Accordingly, the baptism of Jesus was either in A.D. 27 or in A.D. 29. In the Gospel of John we have a datum which enables us to decide between these two dates. In John ii. 20, at the time of Jesus' first public appearance in Jerusalem, which was not long after the beginning of His public ministry, there is the statement that the Temple had been, at the time, forty-six years in the process of construction. Since the reconstruction of the Temple was begun by Herod in B.C. 20-19, the baptism of Jesus could not have been later than A.D. 27. Early in the year A.D. 27 seems, then, the most probable date for this event.

(3) *The Duration of the Ministry.*—The first three Gospels give us only the vaguest hints as to the length of the Lord's public ministry. They begin their narrative of His public life with His work in Galilee after the imprisonment of John the Baptist. But Mark i. 14 ("Now after that John was delivered up, Jesus came into Galilee") seems to imply that some time elapsed between the Temptation and John's imprisonment. This gap is partially filled by the Gospel of John, which also gives a well-ordered arrangement of the events of the ministry narrated by it. Its data are as follows:

ii. 13 sqq., Jesus in Jerusalem at a Passover, after His baptism and a brief sojourn in Galilee.

iii. 23 sqq., a brief sojourn, length not stated, in Judea, before John was imprisoned.

iv. 1-35, Jesus retires into Galilee. On the way, in Samaria, He says to His disciples, "Do ye not say that there are yet four months and the harvest comes?"

v. 1, Jesus goes up to Jerusalem to attend a feast (unnamed).

vi. 1-4, Jesus is again in Galilee at the time of a Passover.

vii. 2 sqq., Jesus goes to Jerusalem to a Feast of Tabernacles. After this there is no mention of a return to Galilee.

x. 22, Jesus is in Jerusalem at the Feast of Dedication; thence He retires beyond Jordan. While here He is called to Bethany by the death of Lazarus. He then goes to Ephraim in Judea.

xii. 1, six days before the (last) Passover Jesus arrives at Bethany.

Two of these data are somewhat uncertain. The reference in iv. 35 to the "four months, and then cometh the harvest," may indicate the actual season of the year when the words were spoken. In that case Jesus must have passed through Samaria in December or January after His first Passover (John ii. 13 sqq.). If the first Passover was that of A.D. 27, the events narrated in chap. iv. took place in December, A.D. 27, or in January, A.D. 28. But it is possible that the statement in iv. 35 may have been a mere proverbial expression used by Jesus to point a lesson. In that case it has no chronological significance, and the journey through Samaria may have taken place in May, A.D. 27. The unnamed feast of v. 1 ("After these things there was a feast of the Jews, and Jesus went up to Jerusalem") introduces the greatest element of uncertainty. The main question is whether it was a Passover. If it was, then John's Gospel gives us four Passovers in Jesus' public ministry. There are two weighty reasons against taking the reference in this sense. First, John's *usus loquendi* would lead us to expect him to have expressly stated that it was a Passover, if such had been the case. Second, a Passover is expressly indicated in the next chapter (John vi. 1-4). If v. 1 refers to a Passover, we have not only a whole year passed over in complete silence by John, but we also have two whole years and more of active public ministry to place before the Passover of John vi. Since the narrative of John at this place meets that of the other Gospels (Mark vi. 30 and parallels), this does not seem very probable. For such reasons it seems better to take John v. 1 as referring to some minor feast between the two Passovers of ii. 13 sqq. and vi. 1-4. The evidence of the Gospel of John, then, is to the effect that there were three Passovers in the public ministry of Our Lord, those of the years A.D. 27, 28, and 29.

(4) *The Date of the Crucifixion.*—All the Gospels agree that the day of the week was Friday. It is a question whether this Friday was the Passover day or the day after the Passover. Since the Passover always came on the fourteenth day of the Jewish [lunar] month Nisan, the question is, Was Jesus crucified on the 14th or on the 15th of Nisan? On this point the evidence of the Gospels appears contradictory. The Synoptic Gospels positively state that Jesus ate his last supper with His disciples on the Passover evening, i.e. on the 14th of Nisan, and that He was crucified on the next or 15th day. But the Gospel of John in several passages, xiii. 1-2, xviii. 28, xix. 13 and 31, appears to place the Crucifixion on the Passover day. Of the references noted, xviii. 28, "they themselves [the Jews] entered not into

the prætorium, that they might not be defiled, but might eat the Passover," and xix. 14, "Now it was the Preparation (*παρασκευή*) of the Passover," are the most important. It is to be noted, however, that the Gospel of John uses the term *τὸ πάσχα*, the Passover, in an inclusive sense to indicate the whole Passover season, just as the Synoptic Gospels use the term *τὰ ἄζυμα*, the [Feast of] Unleavened Bread, in the same broad sense. It is also to be noted that in xix. 31 and 42 the word *παρασκευή*, literally 'preparation day,' is used in its common significance of Friday. It is therefore possible that in verse 14 we should interpret so as to read "it was the Friday of the Passover season." So understood, there is no conflict between John and the Synoptists. If there is actual disagreement, the evidence may be represented as follows:

NISAN	13	14	15	16	17
Jewish customs fixed according to days of Nisan		Passover meal at evening	Holy Rest Day. First day of the Feast of Unleavened Bread	Wave Sheaf	
Synoptic Gospels, as to—					
(1) Days of the week	Wednesday	Thursday	Friday—i.e. the <i>παρασκευή</i> Crucifixion	Saturday	Sunday
(2) Events		Passover meal. Lord's Supper			Resurrection
Gospel of John, as to—					
(1) Days of the week	Thursday	Friday—the <i>παρασκευή</i>	Saturday—i.e. Sabbath, a 'great Sabbath'; xix. 31	Sunday	
(2) Events	Lord's Supper (not identical with Passover)	Crucifixion		Resurrection	

If the year of the Crucifixion was A.D. 29, the Passover was either in April (17th or 18th) or March (18th). The latter is the more probable date.

We therefore arrive at the following results:

- B.C. 9-7. The annunciations concerning the births of the Baptist and Jesus.
7. Birth of Jesus.
- A.D. 26. John the Baptist opens his ministry.
27. (26) Jesus is baptized by John.
27. (Early in the year) Jesus begins His ministry.
27. The first Passover, in Jerusalem (John ii. 13 sqq.).
- 27-29. Passover to Passover, two years of public activity, a year and some months being spent in Galilee.
29. March 18, Friday, the Crucifixion. On Sunday, March 20th, the Resurrection, and 40 days later the Ascension.

These results differ from those most commonly accepted, mainly in that they make the ministry cover but two years and a little over instead of three years or more. The main specific difference is in regard to the feast of John v. 1, which is usually taken as a Passover. The most commonly accepted year for the Crucifixion is A.D. 30 instead of A.D. 29, as given above.

II. CHRONOLOGY OF THE APOSTOLIC AGE. The Apostolic Age began immediately after the Lord's Ascension. Its close may be considered as marked by the passing away of the Apostles and their companions. Our main authority for this period is the Book of Acts. Incidentally, the Epistles furnish some valuable hints. In Acts we are presented with a sketch of the progress of Chris-

tianity, (1) in the city of Jerusalem, chaps. i.-vii.; (2) among the Jewish population of Palestine and Syria, with the transition to work among the Gentiles, chaps. viii.-xii.; and (3) among the Gentiles through the missionary labors of Paul, chaps. xiii.-xxviii. Since the data in reference to Paul's career are more numerous and exact than those connected with the earlier events, we shall make the chronology of Paul's labors the basis of our investigations. We have to consider the evidence furnished by the following data:

(1) *Acts ix. 23 sqq.* Paul's escape from the Jews at Damascus 'many days' after his conversion. In II. Cor. xi. 32 Paul refers to this event, noting that it took place while Aretas was ethnarch of Damascus. In Gal. i. 18 Paul says that he did not leave Damascus for Jerusalem until three years after his conversion.

In all probability Aretas was not ethnarch of Damascus until after the death of Tiberius, March 16, A.D. 37. It is certain that he did not hold this position in A.D. 34. Therefore Paul's conversion was not before A.D. 31, probably not before A.D. 34.

(2) *Acts xi. 27-30 and xii. 25.* Agabus, a prophet, predicted a famine. In consequence, the Christians of Antioch sent aid to Jerusalem by Barnabas and Paul, active workers in the Antioch church. This visit was probably not long before the famine was at its height. Notices in Josephus (*Ant.*, xx. 2, 3 and 5, 2) show that there was such a famine about A.D. 47. The prophecy may well have been uttered two or three years earlier, and the visit may be placed in A.D. 46-47.

(3) *Acts xiii. 7.* Sergius Paulus is mentioned as proconsul of Cyprus. The name of this official has been discovered on an inscription of Cyprus, but his date has not been determined. All that is certain is that he was not proconsul of the island in the years A.D. 51 and 52.

(4) *Acts xviii. 2 and 12.* Paul, soon after his arrival in Corinth on his second missionary journey, meets Aquila and Priscilla, Jews lately banished from Rome in consequence of a decree of the Emperor Claudius. Paul stays in Corinth upward of two years, during which time Gallio was proconsul of Achaia. We have here two data: Claudius's decree and Gallio's proconsulship. The edict of expulsion is mentioned by Suetonius and probably referred to by Tacitus and Dio Cassius, but in such a way that its date cannot be exactly fixed. Orosius (fifth century, A.D.) places it in A.D. 49. As to Gallio,

all that can be said is that he was probably not appointed to the office before the recall of his famous brother Seneca from banishment (A.D. 49). Thus A.D. 49-50 may be accepted provisionally as the most satisfactory date for these facts.

(5) *Acts* xx. 6-7. Paul, on his way to Jerusalem, returning from his third missionary journey, kept the Feast of Unleavened Bread at Philippi, Macedonia. Leaving Philippi, in five days Troas was reached. Here he stayed seven days, leaving on Monday. Reckoning back, it becomes probable, but not certain, that the Passover of that year was on Thursday. In that case, the year was probably either A.D. 56 or 57, the probability being in favor of 56.

(6) *Acts* xxiv. 27. After Paul had been detained as a prisoner for two years, Felix, the Roman Governor of Palestine, was succeeded by Festus. Felix was appointed in A.D. 52 by Claudius, having already been in charge of Samaria for some time. In *Acts* xxiv. 10, two years before Felix's removal, Paul addresses him as having been for 'many years' judge of the nation. The Apostle may have included in the 'many years' the time that Felix spent in Samaria, and the statement should not be pressed as necessitating as many as five or six years after A.D. 52 as the time when they were uttered. Josephus says that Felix, when recalled, had to answer serious charges before Nero, and would have been condemned, had not his wealthy brother Pallas interceded for him. Though Pallas was dismissed from office soon after Nero's accession (A.D. 54), he was for some years a wealthy and influential man. Eusebius's *Chronicle* places the appointment of Festus in the year September 56-September 57. The accuracy of this statement is not beyond doubt. Paul's words in *Acts* xxiv. 10, as well as the general representation of Felix's administration in Josephus, seem to require a date not earlier than A.D. 58 for the recall of Felix and the appointment of Festus. This date will harmonize with the conclusion reached under No. 5 above.

(7) *The Death of Paul*. All that can be said here is that the most ancient tradition of the Church represents that Paul closed his career by suffering martyrdom at Rome under Nero. As to the date, it is most probable that this took place in the cruel persecution by which Nero sought to divert from himself the suspicion of having burned Rome, i.e. in A.D. 64 or 65.

(8) *The Period Covered by Acts i.-xii.* (in reference to the doings of the Jewish-Christian Church of Palestine). The only fixed date we have is the death of Herod Agrippa I. (*Acts* xii. 19 sqq.) in A.D. 44. From this we see that the period covered by these chapters is about fifteen years, since the Crucifixion took place A.D. 29. Within the period we have the probable date, A.D. 34, as that for the conversion of Paul. On the basis of the results thus reached we may construct the following table:

- A.D. 29. Pentecost, first preaching by the Apostles. *Acts* ii.
 29-34 (35). Christianity organized and becomes prominent in Jerusalem. *Acts* ii.-vi.
 34 (35). Stephen martyred. Persecution extends Christianity outside Jerusalem. Paul converted at Damascus. *Acts* vii.-ix.

- 34-37 (35-38). Paul in Arabia. His return to Damascus and escape thence. He visits Jerusalem and goes thence to Tarsus. *Gal.* i. 17-21; *II. Cor.* xi. 32; *Acts* ix. 30.
 34 (35)-44. Rapid extension of Christianity through Palestine, Phœnicia, and Syria, as far as Antioch. *Acts* ix.-xi.
 38-40? Paul and Barnabas in Antioch.
 44. Execution of James, the brother of John. Peter escapes from Herod Agrippa I., who soon after dies at Cæsarea. *Acts* xii.
 46?. Paul and Barnabas carry a contribution to Jerusalem. *Acts* xi. 27-30.
 47 (Spring)-48 (Fall). First missionary journey of Paul. *Acts* xiii.-xiv.
 49 (Pentecost?). The Apostolic Council in Jerusalem. *Acts* xv. (cf. *Gal.* ii. 1-10).
 49. Barnabas and Mark go to Cyprus. *Acts* xv. 35-39.
 49. (Fall)-52 (Summer). The Second Missionary Journey. *Acts* xv. 49-xviii. 22. I. and II. Thessalonians written from Corinth in 50 and 51.
 52 (Early Fall)-56 (Spring). Third Missionary Journey. *Acts* xviii. 23-xxi. 17. I. Corinthians written from Ephesus, 53-54. II. Corinthians written from Macedonia late in Spring of 55. Galatians written from somewhere on the journey to Corinth, in Summer or Fall of 55. Romans written from Corinth in 56.
 56-58. Paul held in Palestine, most of the time in Cæsarea. *Acts* xxiii. 1.
 58 (Fall)-59 (Spring). Paul's voyage to Rome.
 59-61. Two years' imprisonment in Rome. Epistles to Philippians, Colossians, Philemon, and Ephesians.
 61-64. Missionary journey to Spain. Revisits the East. I. Timothy and Titus written.
 64. Again imprisoned in Rome. II. Timothy written.
 64 (65). Executed by order of Nero. According to tradition, Peter also was martyred at Rome about the same time.
 70. The capture of Jerusalem by the Romans under Titus. The Palestinian Christians scattered.
 65(?) -90(?). The Apostle John in Asia Minor (Ephesus).

The table given above differs from the most commonly received chronology (Wieseler's), mainly in that it dates the chief events of Paul's life about two years earlier. Ramsay's dates are, in the main, about one year later than those given above, Harnack's two years earlier.

BIBLIOGRAPHY. Of the large body of literature bearing on New Testament Chronology, particular mention may be made of the following: Ideler, *Handbuch der mathematischen und technischen Chronologie* (Berlin, 1825); Wieseler, *Chronologische Synopse der vier Evangelien* (Hamburg, 1843; Eng. trans., 2d ed., London, 1878); id., *Chronologie des apostolischen Zeitalters* (Göttingen, 1848); id., *Beiträge zur richtigen Würdigung der Evangelien* (Gotha, 1869); Lewin, *Fasti Sacri* (London, 1865); Schürer, *Geschichte des jüdischen Volkes im*

Zeitalter Jesu Christi (Leipzig, 1886-90; Eng. trans., New York, 1891); Harnack, *Chronologie der altchristlichen Litteratur* (Leipzig, 1897); Ramsay, *Saint Paul the Traveler and the Roman Citizen* (New York, 1896); id., *Was Christ Born in Bethlehem?* (London, 1898).

NEW THEOLOGY, THE, or NEW DIVINITY. A term often applied in the last quarter of the last century to a movement represented by Andover Theological Seminary, and embodied in a small volume by its professors, called *Progressive Orthodoxy*, published in 1886. It became clear finally that the movement was larger and deeper than this, and the term is now generally applied to those forms of theological effort which attempt to incorporate fully in theology the approved results of modern thinking, especially such as are derived from the general theory of evolution. The new theology cannot be said to be a consistent system of thought, nor uniform among its various advocates and promoters. There are left and right wings. But with various differences of emphasis and of the completeness with which the separate results of the new methods are adopted, the new theology may be said to agree in the following points: the acceptance of evolution as the method of divine providence in the spiritual sphere as well as in the material; the employment of the methods of the higher criticism in the discussion of the origin and authority of both Testaments; the rejection of verbal inspiration and the substitution for it of greater, or sometimes exclusive, emphasis upon revelation (see *INSPIRATION*); a subjective view of the atonement; increased emphasis upon ethics in distinction from dogmatics, and upon sociological study and work; restatement of positions in eschatology, with a strong tendency to universalism. The tendency of the school is to minimize the supernatural (miraculous), and in the left wing to exclude it. Every important denomination of Christians has some share in this movement.

NEWTON, nū'ton. A city and the county-seat of Jasper County, Ill., 50 miles southwest of Terre Haute, Ind.; on the Embarras River, and on the Indiana and Illinois Southern and the Peoria, Decatur and Evansville railroads (Map: Illinois, D 5). The surrounding region is well adapted to farming and fruit-growing, and there are also coal deposits. The city manufactures flour, woolen goods, lumber products, brick, and tile. Population, in 1890, 1428; in 1900, 1630.

NEWTON. A city and the county-seat of Jasper County, Iowa, 36 miles east by north of Des Moines; on the Iowa Central and the Chicago, Rock Island and Pacific railroads (Map: Iowa, D 3). It is the seat of Newton Normal College, and has a Carnegie library (\$10,000), and a fine post-office building. The city is surrounded by a district engaged in farming and stock-raising, and manufactures agricultural machines, foundry and machine-shop products, brick and tile, flour, etc. The water-works are owned by the municipality. Population, in 1890, 2564; in 1900, 3682.

NEWTON. A city and the county-seat of Harvey County, Kan., 201 miles southwest of Kansas City; on the Missouri Pacific and the Atchison, Topeka and Santa Fe railroads (Map: Kansas, E 3). It has a public library with over

5000 volumes, and Bethel College (Mennonite). The city is a division point on the Santa Fe Railroad, and, as the centre of a fine farming and stock-raising section, has considerable trade. There are some manufactures, principally flour and grain drills. Newton was settled and incorporated about 1871. It is governed by a mayor, elected biennially, and a council. The water-works are owned and operated by the municipality. Population, in 1890, 5605; in 1900, 6208.

NEWTON. A city in Middlesex County, Mass., adjoining Boston; on the Charles River and on the Boston and Albany Railroad (Map: Massachusetts, E 3). Within the municipal limits are 15 villages, the city occupying an area of about 18 square miles. Newton has a site of great beauty, several hills contributing to its picturesqueness, and it is one of Boston's handsome suburbs. There are 160 acres of city parks, besides the Metropolitan Park reservation (118 acres), and the Metropolitan parkways, which extend along the Charles River. The city maintains a public library (61,400 volumes), and is the seat of the Newton Theological Institution (Baptist), opened in 1825, the Lasell Seminary for women, opened in 1851, and the Allen School for boys, opened in 1853. Among the more prominent buildings are the First Baptist Church and Eliot Church, and the high school and several grammar schools. The Eliot Memorial in honor of the 'Apostle to the Indians' stands near the site of Waban's Wigwam, where John Eliot began on October 28, 1646, to preach to the Indians, in the town called 'Nonantum.' A large cemetery is in the heart of the city. Though Newton is primarily a residential city, it is engaged to a considerable extent in manufacturing. Its industrial establishments include machine shops, fire-alarm supply works, silk mills, worsted mills, rubber works, manufactories of paper boxes, curtains, railway signals, cordage, shoes, etc. The manufacturing interests are promoted by the water power of Charles River. Under a charter, last revised in 1899 and 1902, the government is vested in a mayor, hereafter to be elected for two years, and a board of aldermen, in which each ward is represented by three members—one alderman elected annually by the ward, and two aldermen-at-large elected from the ward on a general ticket, one being chosen each year to serve two years. Some of the administrative officials are elected by the board of aldermen, and some are subject to confirmation by that body upon nomination of the mayor. The school committee is chosen by popular vote for terms of three years. Newton spends annually in maintenance and operation more than \$1,000,000, the principal items being: for interest on debt, \$265,000; for sinking funds, \$119,500; for schools, \$200,000; for drains, parks, sewers, and streets, \$170,000; for the police department, \$70,000; for municipal lighting, \$53,500; for the fire department and wires, \$58,000; for the charity department, \$25,000; for the health department, \$21,000. Newton is one of the wealthiest cities per capita in the United States; the assessed valuation of property, real and personal, in 1902 was about \$62,000,000, and the net debt January 1, 1903, \$4,331,283.94. The water-works are owned and operated by the municipality. Population, in 1890, 24,379; in

1900, 33,587. Settled in 1631 and originally a part of Cambridge (Newtowne), Newton was incorporated as a separate town in 1688, being called New Cambridge until 1692. It was chartered as a city in 1873. Consult Smith, *History of Newton, Massachusetts* (Boston, 1880).

NEWTON. A town and the county-seat of Sussex County, N. J., 60 miles west by north of New York City; on the Delaware, Lackawanna and Western Railroad (Map: New Jersey, C 1). It is known as a summer resort; has the Newton Collegiate Institute and the Dennis Library (subscription), with over 8000 volumes. The surrounding country is largely agricultural, though there is considerable mineral wealth, and the city manufactures shoes, silks, paper boxes, and roofing slate. The water-works are owned by the municipality. Population, in 1890, 3003; in 1900, 4376.

NEWTON, ALFRED (1829—). An English ornithologist and zoologist. He was born at Geneva, Switzerland, of British parents, and graduated at Magdalene College, Cambridge, in 1853. As a traveling fellow of the college he visited Lapland, Iceland, the West Indies, North America, Spitzbergen, and other countries between the years 1854-64, and by bringing the subject to the notice of the British Association he was instrumental in getting passed the acts of Parliament for the protection of birds. He was made vice-president of the Royal and the Zoological Societies, president of the Cambridge Philosophical Society, and received gold medals from the Linnean and the Royal Society. His publications include: *The Zoology of Ancient Europe* (1862); *Zoology* (1874; 2d ed. 1894); *The Birds of Greenland* (1875); and *A Dictionary of Birds* (1893-96). He edited *The Ibis* for five years (1865-70), and contributed the article on Ornithology to the ninth edition of the *Encyclopædia Britannica*.

NEWTON, CHARLES THOMAS (1816-94). An English archaeologist. He was educated at Christ Church, Oxford. In 1840 he became assistant keeper of the department of antiquities in the British Museum, and in 1852 obtained the appointment of vice-consul at Mytilene, whence he was transferred in 1853 to Rhodes. His position was avowedly in the interest of the British Museum, and his time largely devoted to archaeological travels and excavation. In 1856 he began his great work at Budrun, the ancient Halicarnassus, where he discovered the site of the famous Mausoleum, and recovered many remains of the ancient sculptures. He next worked at Branchidæ and Cnidus, securing valuable results. He was rewarded by an appointment to the consulship at Rome in 1860, and in 1861 was made keeper of Greek and Roman antiquities in the British Museum, a position which he held until failing health led to his resignation in 1885. From 1880 to 1888 he was Yates professor of classical archaeology at the University College, London. In 1861 he married Ann Mary, daughter of the artist Joseph Severn, and herself an artist of high reputation. She died in 1869. Newton's great service lay in widening the narrow circle of classical studies in England, by drawing attention to the importance of art and archaeology in any estimate of Greek life. For the museum his long term proved of great importance, as he was able to secure large grants

and acquire five valuable collections of antiquities. He received the honorary degree of D.C.L. from Oxford in 1875, LL.D. from Cambridge, and Ph.D. from Strassburg in 1879. He published many short papers and discussions, some of which were collected in his *Essays on Art and Archaeology* (London, 1880), including the best popular account of Greek inscriptions. Other important works were: *History of Discoveries at Halicarnassus, Cnidus, and Branchidæ* (London, 1862-63) and *Travels and Discoveries in the Levant* (ib., 1865).

NEWTON, GILBERT STUART (1794-1835). An English portrait and genre painter. He was born at Halifax, Nova Scotia, September 20, 1794, the son of Edward Newton, British collector of customs. Newton's parents had quitted Boston after the evacuation by British troops in 1776, but his mother returned to that city upon the death of his father in 1803. He studied painting with his uncle, Gilbert Stuart. In 1817 he traveled in Italy, and studied at Florence, later visiting Paris, where he was influenced by Watteau. He entered the schools of the Royal Academy, and in 1832 was made Academician. Among his chief works are: "The Deserted" (1821), Metropolitan Museum, New York; "The Lovers' Quarrel" (1826); "The Dull Lecture" (1825), Lenox Library, New York; "Don Quixote in His Study" (1828); "The Lute-Player," New York Historical Society; "Yorick and the Grisette" (1830) and "The Widow, or the Dutch Girl" (1829), National Gallery, London; "Portia and Bassanio" (1831), South Kensington Museum; and his last picture, "Abelard," exhibited at the Royal Academy in 1833. Among his portraits are those of Thomas Moore, Sir Walter Scott, and Washington Irving. Newton's pictures, although deficient in drawing, are good in coloring, refined and individual in conception. Suffering from mental derangement, in 1833 he was removed to an asylum at Chelsea, where he died of consumption, August 5, 1835.

NEWTON, HUBERT ANSON (1830-96). An American astronomer and mathematician, best known for his researches on meteors. He was born at Sherburne, N. Y., and graduated at Yale in 1850. In 1855 he was appointed professor of mathematics at Yale. His chief labor, the study of the laws of meteoroids and of comets and their interrelation, began with the attempt to contribute to the theory advanced by Professor Olmsted of Yale in 1833, that meteors were a part of a mass of bodies moving round the sun in a fixed orbit. Newton calculated five possible orbits and showed the mode of deciding between them, by a computation of the secular motion of the node. He supervised the work of the Connecticut Academy of Arts and Sciences in 1861 in regard to the August and November meteors; prepared a map of the heavens for its use; and identified comets with meteors and shooting stars. This led to his valuable statistical study of comets. On these subjects he became a world-wide authority, winning from the National Academy of Sciences the Smith gold medal for his researches on meteors. Many of these were published in the *Memoirs of the National Academy*, the *Journal of Science*, and the *American Journal of Science*.

NEWTON, SIR ISAAC (1642-1727). A famous English mathematician and natural philosopher,

born at Woolsthorpe, in Lincolnshire. Newton received his early education at the grammar school of Grantham, in the neighborhood of his home, at Woolsthorpe. On June 5, 1661, he left home for Cambridge, where he was admitted as subsizar at Trinity College. On July 8th following he matriculated as sizar of the same college. He immediately applied himself to mathematical studies, and within a very few years not only made himself master of most of the works of value then existing, but had also begun to make some progress in original methods for extending the science. In the years 1665 and 1666 he made many important mathematical inventions and discoveries, including that of the binomial theorem, the method of tangents of Gregory and Clavius, the direct method of fluxions (integral calculus), and the action of gravity on the moon. According to a legend, which, however, is seriously considered by certain authorities, in the year 1665 the fall of an apple, as Newton sat in his garden at Woolsthorpe, suggested the most magnificent of his subsequent discoveries—the law of universal gravitation (q.v.). On his first attempt, however, to apply the law, to explain the lunar and planetary motions, he employed an estimate then in use of the radius of the earth, which based on the value of a degree of latitude then prevalent, was so erroneous as to produce a discrepancy between the value of the real force of gravity and that required by theory to explain the motions, and indicated only an approximate verification of his theory. He accordingly abandoned for a number of years the hypothesis for other studies, which consisted chiefly of investigations of the nature of light and the construction of telescopes (q.v.). In 1666 he had acquired a prism, and in 1668 completed his first reflecting telescope, with which he observed Jupiter's satellites. In a variety of ingenious and interesting experiments where a spectrum was produced by sunlight refracted through a prism in a darkened room, he was led to the conclusion that rays of light which differ in color differ also in refrangibility. This discovery enabled him to explain an imperfection of the telescope, which had not till then been accounted for. The indistinctness of the image formed by the object-glass was not necessarily due to any imperfection of its form, but to the fact of the different colored rays of light being brought to a focus at different distances. He concluded rightly that it was impossible for an object-glass consisting of a single lens to produce a distinct image. He went further, and too hastily concluding, from a single experiment, that the dispersive power of different substances was proportional to their refractive power, he pronounced it impossible to produce a perfect image by a combination of lenses. This conclusion—since proved erroneous by the invention of the achromatic telescope by Chester More Hall, about 1729, and afterwards, independently, by Dolland (q.v.) in 1751—turned Newton's attention to the construction of reflecting telescopes; and the form devised by him is the one which, at later periods, proved so useful in astronomical researches.

It was on January 11, 1672, that Newton was elected a member of the Royal Society, having become known to that body from his reflecting telescopes, and a month later his famous paper on a "New Theory About Light and Color" was

read before that body, in which he states that "Light consists of rays differently refrangible" and that "Colors are not qualifications of light derived from refractions or natural bodies, as is generally believed, but original and connate properties which in divers rays are divers." He also said that "White light is ever compounded and to its composition are requisite all the aforesaid primary colors mixed in proper proportion." In 1675 Newton communicated to the Royal Society a paper on light and color, which contained an explanation of the production of colors by thin plates or films, and in which were given the results of the first measurements of the colored rings now known as Newton's rings (q.v.). Newton formulated the emission theory of light from hypotheses previously advanced by Descartes, and a complete exposition of that theory was the result. All of Newton's investigations in light and color were collected into a work with the title of *Optics*, published in 1704. The development of the theory was accomplished by rigid dynamical reasoning, and the explanations of reflection, refraction, diffraction, and the colors of thin plates were made on the basis that light consisted of luminous corpuscles sent out from the light-giving body. This theory, while it did not survive the work of Young and Fresnel, nevertheless had more points in common with the undulatory theory than is generally supposed (*Optics*, book ii., part iii., prop. XII.). At what period Newton resumed his calculations about gravitation, employing the more correct measure of the earth obtained by Picard in 1670, does not clearly appear; but it was in the year 1684 that it became known to Halley that he was in possession of the whole theory and its demonstration. It was on the urgent solicitation of Halley that he was induced to commit to a systematic treatise these principles and their demonstrations. The principal results of his discoveries were set down in a treatise called *De Motu Corporum*, and were afterwards more completely unfolded in the great work entitled *Philosophiæ Naturalis Principia Mathematica*, which was finally published about midsummer, 1687.

Shortly before the *Principia* was given to the public, Newton, who since 1669 had occupied the Lucasian chair at Cambridge, was called to take an active part in defending the rights of the university against the illegal encroachments of James II. The conspicuous part which he had taken on that occasion procured him a seat in the Convention Parliament, in which he sat from January, 1689, to its dissolution in 1690. In 1696 he was appointed warden of the mint, and in 1699 was promoted to the office of master of the mint, an office which he held till the end of his life. He again took a seat in Parliament in the year 1701, as the representative of his university. Thus engaged in the public service, he had little time left for mere scientific studies—pursuits which he always held of secondary importance to the public duties in which he was engaged. In the interval of public duty, however, Newton showed that he still retained the scientific power by which his great discoveries had been made. He was president of the Royal Society from 1703 till his death, a period of twenty-four years, being each year reelected. In this position, and enjoying the confidence of Prince George of Denmark, he did much toward the advancement of science; and one of his most



Isaac Newton.

SIR ISAAC NEWTON

FROM AN ENGRAVING BY ROBERT C. BELL, AFTER A PAINTING BY SIR GODFREY KNELLER

important works during this time was the superintendence of the publication of Flamsteed's *Greenwich Observations*—a task, however, not accomplished without much controversy and some bitterness between himself and that astronomer. The controversy between Newton and Leibnitz, as to priority of discovery of the differential calculus, or the method of fluxions, was raised rather through the partisanship of jealous friends than through the anxiety of the philosophers themselves, who were, however, induced to enter into and carry on the dispute with some degree of bitterness and mutual recrimination. The details of these controversies, with all other information of the life of this philosopher, will be found admirably collected in the biography by Brewster, who wrote, not only with an intimate acquaintance with Newton's works, but in possession of all the materials collected in the hands of his family. Newton died on March 20, 1727, and his remains received a resting-place in Westminster Abbey, where a monument was erected to his memory in 1731. A magnificent full-length statue of the philosopher, executed by Roubilliac, was erected in 1755 in the antechapel of Trinity College, Cambridge. This work was assisted by a cast of the face taken after death, which is preserved in the University Library at Cambridge. In 1699 Newton was elected a foreign associate of the Academy of Sciences, and in 1705 he received the honor of knighthood from Queen Anne. Among the best editions of Newton's principal works are the quarto edition of the *Optics* (London, 1704), and the quarto edition of the *Principia*, published at Cambridge, England, in 1713. Consult: Brewster, *Memoirs of the Life, Writings, and Discoveries of Sir Isaac Newton* (London, 1855-60); Pemberton, *View of Sir Isaac Newton's Philosophy* (ib., 1728); Ball, *History of Mathematics* (ib., 1893); id., *Essay on Newton's Principia* (ib., 1893); and Glazebrook, in the *Dictionary of National Biography*, xl. (New York, 1894).

NEWTON, JOHN (1622-78). An English mathematician and astronomer, born at Oundle, Northamptonshire. He studied at Oxford and remained loyal to the King under Cromwell. Newton was something of an educational reformer, urged intelligent instruction in mathematics, and wrote text-books on arithmetic, geometry, astronomy, logic, and rhetoric. But his most important labors were for the facilitation of the decimal system and of logarithms. His *Institutio Mathematica*, with its logarithmic tables and descriptions of applications to astronomy, dialing, and navigation (1654), is one of the earliest books of its kind in English.

NEWTON, JOHN (1725-1807). A Church of England divine. He was born in London, July 24, 1725, son of a sea-captain. After a little time at a boarding-school in Essex, he went to sea with his father at the age of eleven. During the next six years he made other voyages with his father and adopted infidel opinions. He became midshipman on a man-of-war, but deserted, was caught, flogged, and degraded. In 1745 he set sail for India as a common sailor, and was landed penniless on the African coast near Sierra Leone. In 1747 an English captain, arriving at Sierra Leone with a request from his father to look out for him, rescued him from

a most degraded condition, and took him home. On the voyage during a storm he became converted, and thenceforth was a changed man. Soon afterwards he was appointed commander of an African slaver, and for four years continued in the slave trade, the cruelties of which afterwards he labored earnestly to expose. In 1754 a sudden attack of sickness led him to abandon a seafaring life, and from 1775 to 1760 he was tide-surveyor at Liverpool. At this time he studied Greek and Hebrew, and the best theological works in Latin, French, and English. In 1764 he was ordained and appointed curate of the parish of Olney, Buckinghamshire, where he remained sixteen years. He entered heartily into the religious work and views of Wesley and Whitefield. At Olney he published in 1764 *An Authentic Narrative of Some Remarkable and Interesting Particulars in the Life of the Rev. John Newton*. Here, too, he formed an intimate friendship with Cowper, and in connection with him produced the *Olney Hymns* (1779). Most of them were written by himself for the use of his congregation. In 1780 he became rector of the united parishes of Saint Mary Woolnoth and Saint Mary Woolchurch, Lombard Street, London, where he remained till his death, in London, December 21, 1807. His works, besides those already mentioned, were a *Review of Ecclesiastical History* (1770); *Omicron's Letters* (1774); *Cardiphonia, or the Utterances of the Heart* (1781); *Messiah: Fifty Discourses on the Scriptural Passages of the Oratorio of Handel* (1786); and numerous sermons, discourses, tracts, and letters. His collected works were edited with memoir by Cecil (London, 1808). Consult, also, the memoir by Bickersteth (ib., 1843).

NEWTON, JOHN (1823-95). An American military and civil engineer and soldier. He was born in Virginia and was educated at West Point, receiving a commission in the Corps of Engineers on his graduation in 1842. After serving as assistant professor of engineering at the United States Military Academy for three years, he was occupied with the construction of fortifications and river and harbor improvement on the Atlantic coast. During the Civil War, after receiving the rank of brigadier-general of volunteers, he was summoned to assist in constructing the defenses of Washington. He took part in the battles of Gaines's Mill, Glendale, South Mountain, and Antietam, and in command of a division he was present at Fredericksburg, at Salem, and at Gettysburg. In the invasion of Georgia he led a division of the Army of the Cumberland through all the engagements preceding the capture of Atlanta, and March 13, 1865, he was made brevet major in the United States Army. After the war he was occupied in strengthening the defenses of New York Harbor, in removing the obstacles to navigation at Hell Gate (q.v.) and other portions of the East River, in harbor improvements at Lake Champlain, and New York Harbor. June 30, 1879, he attained the rank of colonel in the corps of engineers; in 1884 was made brigadier-general and chief of engineers; retired in 1886. He was commissioner of public works, New York City, 1887-88, a position which he resigned to become president of the Panama Railroad Company in 1888.

NEWTON, RICHARD HEBER (1840—). A clergyman of the Protestant Episcopal Church.

He was born in Philadelphia. He studied at the University of Pennsylvania and Philadelphia Divinity School, and was ordained in 1862. From 1869 to 1902 he was rector of All Souls' Church in New York City, and in the latter year accepted the position of chaplain at Leland Stanford, Jr., University at Palo Alto, Cal. He belongs to the 'broad church' party and has won distinction for his advocacy of liberal ideas. He has published: *Studies of Jesus* (1881); *Right and Wrong Uses of the Bible* (1883); *The Book of the Beginnings* (1884); *Philistinism* (1885); *Social Studies* (1887); *Church and Creed* (1891); *Christian Science* (1898).

NEWTON-AB/BOT. A market-town in Devonshire, England, on the Teign estuary at the mouth of the Lemon, 15 miles south of Exeter (Map: England, C 6). It has railway works, a shipping trade, and considerable commerce in agricultural produce and cattle. Its principal industry is the manufacture of ornamental pottery from china clay and potter's clay, found in the neighborhood. Lignite and tin ore are mined. It has some interesting old buildings, a town hall, and municipal markets. In the vicinity are important remains of a Roman encampment. Charles I. lodged at Newton Abbot during his western campaign, and here William III. was first proclaimed King in 1688. Population, in 1891, 11,000; in 1901, 12,500.

NEWTON-IN-MAKERFIELD, māk'ēr-fēld, or **NEWTON-LE-WILLOWS**. A manufacturing town in Lancashire, England, 15 miles west of Manchester (Map: England, D 3). The chief industries are paper-making, printing, sugar refining, railway wagon manufacturing, and coal-mining. It has a town hall, mechanics' institute, and grammar school. There is a beautiful lake in the town called Newton Mere, which is covered, during the summer months, with the pleasure-boats of the residents. Horse-races are held here in June, and horse and cattle fairs in May and August annually. The barony belonged to Edward the Confessor. Population, in 1891, 12,861; in 1901, 16,699.

NEWTON'S RINGS. The colored rings seen when a thin film of air or other substance intervenes between the surfaces of two plates of glass. This phenomenon is named from its discoverer, Sir Isaac Newton, who in his work on *Optics* describes how he took a plano-convex lens designed for a fourteen-foot telescope and placed it with its plane side downward on top of a double convex lens constructed for a telescope of about fifty feet in length. On slowly pressing the upper lens against the lower, a number of concentric rings having the point of contact of the lenses as their centre appeared, increasing in size as the pressure was increased. This arrangement of a lens and plane surface is often employed in performing the experiment, and the thickness of the film and the wave lengths of the different kinds of lights can be ascertained. The effect is due to the interference (q.v.) of the waves of light reflected from the upper and lower surfaces of the thin film of air, which from nothing at the point of contact gradually increases in thickness with the distance from the centre. If light of one color, or, speaking more scientifically, of a single wave length, is used, the rings will be alternately bright and dark, the bright waves being produced by the

combination of the various waves caused by interference and overlapping. Therefore the colors of Newton's rings are not pure spectral colors, though they are extremely brilliant and varied. In the centre, where the glass surfaces are in contact, there is a dark spot, and as the air film begins to have an appreciable thickness the rings are formed. They were divided by Newton into a series of orders, seven in number, though usually not more than four or five are seen. The colors of the first order, from the central black circle outward, are gray, whitish, straw color, orange, brick-red, and dark purple, the last color corresponding to a thickness of the film of .000011 of an inch or .00028 of a millimeter. In the second order we have the purest colors, which run through a succession of violet, blue, peacock, yellow, orange, red, and violet, the thickness of the air film in the last instance amounting to .000022 of an inch or .00055 of a millimeter; in the third and fourth orders we also have a succession of colors; in the fifth we have pale green, pale rose, and rose; in the sixth, pale peacock, and pale rose and rose; and in the seventh, pale green and rose. When the thickness of the film reaches .001 millimeter the color appears as pale green, and is included in the fourth order, but from this point the colors begin to fade and disappear. By means of these rings we are enabled to measure the distance between two transparent surfaces which are in seeming contact. In case the light passes through the plates instead of being reflected, the colors are reversed, and we have the rings formed with the complementary colors. See **LIGHT**, sections *Interference* and *Diffraction*. Consult: Thompson, *Light Visible and Invisible*; Preston, *Theory of Light* (New York, 1894).

NEWTON THEOLOGICAL INSTITUTION. A divinity school at Newton Centre, Mass., founded in 1825, under the supervision of the Baptist churches of New England, but open to members of any Christian denomination. It has a three years' course leading to the degree of bachelor of divinity. In 1902 there were 8 instructors and 61 students. The buildings, eight in number, are valued with the grounds at \$400,000. The institution has a library of 24,000 volumes, an endowment of \$800,000, and property estimated at \$1,300,000.

NEWTOWN. Formerly a town in Queens County, N. Y., since 1898 included in the Borough of Queens, New York City (q.v.) (Map: New York City, G 6). Newtown was founded by New Englanders in 1652, and was known as Middleburgh until 1664, when it came under the jurisdiction of Connecticut, and was renamed Hastings. It received its present name and became part of New York in 1665. During the Revolution it was occupied for some time by British troops. Consult J. Riker, Jr., *The Annals of Newtown* (New York, 1852).

NEWTOWNARDS, nū'ton-ārdz'. A town in county Down, Ireland, 13 miles by rail from Belfast, on Lough Strangford (Map: Ireland, F 2). It has many interesting ruins, notably those of the Old Parish Church. For a hundred years the manufacture of linen goods has been the most important industry. Newtownards was chartered as a borough by James I. Population, in 1901, 9110.

NEW ULM. A city and the county-seat of Brown County, Minn., 26 miles west by north of Mankato; on the Minnesota River, and on the Chicago and Northwestern and the Minneapolis and Saint Louis railroads (Map: Minnesota, D 6). It has a handsome court house, Saint Alexander Hospital, a public library and high school and Turnverein libraries, Saint Michael's Academy, and Dr. Martin Luther College (Lutheran). New Ulm is the centre of a rich agricultural and stock-raising section, and carries on considerable trade. Its industrial establishments comprise grain elevators and flour mills, breweries, cigar factories, brick plants, machine shops, cooperage shops, and manufactories of pipe organs, woolens, pottery, and creamery products. Under a revised charter of 1891, the government is vested in a mayor, elected biennially, and a council. There are municipal water-works and electric-light plants. Settled in 1854, New Ulm was incorporated in 1876. It was in 1862 the scene of an Indian massacre. A memorial has been erected to the citizen soldiers killed by the Indians, and on Hermann Heights is a fine monument in honor of Hermann (Arminius). Population, in 1890, 3741; in 1900, 5403.

NEW WAY TO PAY OLD DEBTS, A. A play by Massinger, printed in 1632. It was written probably in 1625. Fletcher has been credited with a share in it, but his part, if any, was slight. It was the most popular of Massinger's plays, and was acted until recent times.

NEW WESTMINSTER. The former capital and one of the chief cities of the Province of British Columbia, Canada, on Fraser River, in the midst of the gold region, 15 miles above the mouth of the river, 75 miles northeast of Victoria (Map: British Columbia, E 5). The river at this point is about a mile wide and contains several inhabited islands. The terminus of the Great Northern Railway via Blaine is on the opposite bank. The city is the centre of considerable tracts of arable land, is delightfully located, has a fine climate, and a heavy rainfall. Its leading industry is salmon fishing, several establishments exporting the fish in cans and barrels. Other kinds of fish are caught for this trade. Fish oil is manufactured. New Westminster has also a large traffic in lumber and furs, a woolen mill, foundries, iron works, machine and carriage factories, etc. Anthracite and bituminous coal are exported. There are, in the city, Methodist and Roman Catholic colleges, the provincial asylum for the insane, the Dominion penitentiary, and public library; and New Westminster has municipal water-works, electric lights, an electric street railroad, and public parks. Population, in 1891, 6678; in 1901, 6499.

NEW YEAR'S DAY. The first day of the year. The custom of celebrating by some religious observance, generally accompanied by festive rejoicing, the first day of the year, appears to have prevailed among most of the ancient nations. The Jews, the Egyptians, the Chinese, the Romans, and the Mohammedans, although differing as to the time from which they reckoned the commencement of the year, all regarded it as a day of special interest. In Rome the year anciently began in March; and when Numa, according to the ancient legend, made the

year begin on January 1st, that day was held sacred to *Janus Bifrons*, who was thus supposed to turn at once back upon the old year and forward into the new. On the establishment of Christianity, the usage of a solemn inauguration of the new year was retained; but considerable variety prevailed, both as to the time and as to the manner of its celebration. Christmas Day, the Annunciation (March 25th), Easter Day, and March 1st have all, at different times or places, shared with January 1st the honor of opening the new year; nor was it till late in the sixteenth century that January 1st was in most countries accepted as the first day of the new year. The early fathers—Chrysostom, Ambrose, Augustine, Peter Chrysologus, and others—in reprobation of the immoral and superstitious observances of the pagan festival, prohibited in Christian use all festive celebration; and, on the contrary, directed that the Christian year should be opened with a day of prayer, fasting, and humiliation. The mandate, however, was but partially observed.

The social observances of the first day of the new year appear to have been in substance the same in all ages. From the earliest recorded celebration we find notice of feasting and the interchange of presents. Tradition referred the origin of New Year's gifts among the Romans to Tatius, King of the Sabines (B.C. 747). Branches cut from the wood consecrated to Strenia, the goddess of strength, were received by him on the first day of the new year as presents of good omen. He sanctioned the custom and called the gifts *strenæ* (cf. French *jour d'étrennes*). In later times in Rome similar practices attended the worship of Salus. Simple *strenæ*, consisting of branches of bay and of palm, sweetmeats made of honey, figs, or dates as a good omen that the year might bring only joy and happiness (Ovid, *Fasti*, i., 185-190), finally gave way to gifts of more elaborate character. The custom of presenting gifts to the Emperor became so general that the people went *en masse* to carry him presents and to wish him a happy new year. The writers of the Empire describe other observances—exchanging visits, masquerading, and feasting—which characterized the day. The festival held by the Druids at the opening of the year resembles the worship of Salus by the Romans. The priests cut the sacred plant and distributed the sprays. In many countries the night before New Year's, 'Saint Sylvester's Eve,' was celebrated with great festivity, which was prolonged till after twelve o'clock, when the new year was ushered in with congratulations, visits, and mutual wishes for a happy new year. This is an ancient Scottish custom, which also prevails in many parts of Germany, where the form of wish—"Prosst- (for the Lat. *prosit*) Neu-jahr"—"May the new year be happy"—attests the antiquity of the custom. In many places the practice of tolling bells at midnight, and thus 'ringing in the new year,' is still observed. Many religious communions are wont to celebrate it with a special service or watch night. In the Roman Catholic Church the *Te Deum* is often sung at the close of the old year in thanksgiving for the blessings granted during its course, and New Year's Day is a holy day of obligation, because on it falls the Feast of the Circumcision.

NEW YORK (popularly called the 'Empire State'). A North Atlantic State of the United

States. It lies between latitudes $40^{\circ} 30'$ and $45^{\circ} 1'$ north, longitudes $71^{\circ} 51'$ and $79^{\circ} 46'$ west, and is bounded on the northwest by Lake Ontario and the Saint Lawrence River, which separate it from the Canadian Province of Ontario; on the north by the Province of Quebec; and on the east by the States of Vermont, Massachusetts, and Connecticut, a part of the Vermont boundary being formed by Lake Champlain. On the south the Atlantic Ocean and its arms, Long Island Sound, New York Bay, and Staten Island Sound, surround Long Island and Staten Island, which belong to the State, while the mainland portion is bounded by a part of these waters and by the States of New Jersey and Pennsylvania. On the west the boundary is completed by the latter State, together with Lake Erie and the Niagara River. New York has roughly the shape of a triangle, with the base on the Great Lakes and the apex extending down to the ocean. Its extreme length from north to south is 312 miles, and from east to west 326 miles. It ranks twenty-sixth in size among the States, its area being 49,170 square miles, of which 47,620 square miles are land surface.

TOPOGRAPHY. The topographical features of New York are varied and complex, but a certain number of more or less well-marked physical divisions may be recognized. The great Appalachian belt first comes out upon the coast in this State. The Piedmont plain, which has such a distinctive development farther south, is here scarcely represented; and the coastal plain is represented only by Long Island, which is low and sandy, with an average elevation of about 70 feet and a maximum of 380 feet. The first division of the mainland, covering the southeastern corner of the State, consists of the Highlands, an extension of the Highlands of New Jersey. It is a rugged region rising in some of its peaks to a height of about 1500 feet, and is pierced by the Hudson in a magnificent gorge. It falls into gentle undulations toward Long Island Sound and New York Bay. Northwest and north of the Highlands follows an extension of the Kittatinny Valley of New Jersey. This is low compared with the neighboring elevations, but east of the Hudson the land rises into the Taconic Range, 2800 feet high, which runs along the eastern boundary into Massachusetts and Vermont, where its extension forms the Green Mountains. West of this Taconic region rises the extension of the Pennsylvanian part of the Appalachian system in the form of a vast plateau covering more than one-third of the State, and reaching from the Hudson to within two or three miles of Lake Erie. It is deeply eroded by river valleys lying in places over 1000 feet below the higher portions. Its eastern part rises in many peaks over 3000 feet in the wild and much dissected mountain region known as the Catskills, whose highest peak, Slide Mountain, has an altitude of 4205 feet. South of the Catskills are the Shawangunk Mountains. The average elevation of the western part of the great plateau is about 1200 feet, with some points reaching 2000 feet. Throughout its length on the north, east, and southeast, it is bounded by a limestone escarpment in some places very high and abrupt, and known in the east as the Helderberg Mountain. North of this escarpment is a low-lying region, forming in the west the lake shore plain and in the east the Mohawk Valley. The latter is bounded on the north by

an irregular and hilly country, which merges imperceptibly into the last great topographical region, the Adirondacks. The Adirondacks with their outlying hills cover the entire northern part of the State. Their central portion is heavily forested, and is a famous summer resort. Several of their peaks are over 4000 feet high, and Mount Marcy, the highest point in the State, has an altitude of 5344 feet.

HYDROGRAPHY. The rivers of the State flow in all directions, and supply five main systems—the Saint Lawrence, Hudson, Mississippi, Susquehanna, and Delaware. The Saint Lawrence drainage basin is the largest in the State, but includes mostly small streams flowing into Lakes Erie and Ontario, the Saint Lawrence River, and Lake Champlain. The largest of these streams are the Genesee, the Oswego, and the Black rivers, all emptying into Lake Ontario. The second drainage basin is that of the Hudson—the only large river flowing entirely within the State. It explains in large part the commercial supremacy of New York, since through its western branch-valley of the Mohawk, through which it has been practicable to construct a canal, it opens a continuous waterway into the heart of the Continent. Even before the Erie Canal was constructed the Hudson and Mohawk valleys constituted an important trade route between the Atlantic and the Great Lakes. The Delaware and Susquehanna rivers both rise in this State, draining its south-central portion. The latter is a large river before it crosses the boundary, but is not navigable. The Mississippi system is represented only by the Allegheny River in the extreme western part of the State. Many of the rivers flow through picturesque gorges, and are broken by falls and rapids, the most noted of which, besides Niagara, are those of the Genesee at Rochester.

New York is dotted with numerous lakes celebrated for beauty. Some of them are of considerable size, and nearly all are of elongated type, formed by the damming of river valleys by glacial materials. This type appears most conspicuously in the group known as the Finger Lakes in the western part of the State. They lie nearly parallel in a north and south direction. The largest are Lakes Seneca and Cayuga, each nearly 40 miles long and from 2 to 3 miles wide. Lake Chautauqua in the extreme west and the picturesque Lake George in the extreme east are of similar formation, as is also Oneida Lake in the central portion, though the last has a width of over 5 miles, with a length of 20 miles. The Adirondack region abounds in mountain lakes of romantic beauty.

CLIMATE. The climate of the State is of the continental rather than the insular type, though the extreme coastal regions of Long Island are somewhat tempered by the ocean. The range of temperature is nowhere as great as in the States of the Northwestern plains. The average maximum is about 100° and the minimum zero, or a few degrees below, but these figures vary much with the topography, the winters in the Adirondacks being very cold. The mean temperature for January is 30° on the coast, 26° in the northwest, and 15° in the Adirondacks. The corresponding figures for July are 72° , 70° , and 64° . The rainfall is abundant throughout the State. In the Adirondacks it is nearly 60 inches, and at New York City, 42 inches. In the rest of the State

AREA AND POPULATION OF NEW YORK BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Albany.....	F 3	Albany.....	528	164,555	165,571
Allegany.....	B 3	Belmont.....	1,018	43,240	41,501
Broome.....	E 3	Binghamton.....	696	62,973	69,149
Cattaraugus.....	B 3	Little Valley.....	1,330	60,866	65,643
Cayuga.....	D 2	Auburn.....	722	65,302	66,234
Chautauqua.....	A 3	Mayville.....	1,062	75,302	88,314
Chemung.....	D 3	Elmira.....	394	48,265	54,063
Chenango.....	E 3	Norwich.....	847	37,776	30,568
Clinton.....	G 4	Plattsburg.....	1,041	46,437	47,430
Columbia.....	G 3	Hudson.....	647	46,172	43,211
Cortland.....	D 3	Cortland.....	486	28,657	27,576
Delaware.....	E 3	Delhi.....	1,531	45,496	46,413
Dutchess.....	G 4	Poughkeepsie.....	800	77,879	81,670
Erie.....	B 3	Buffalo.....	1,040	322,981	433,686
Essex.....	F 1	Elizabethtown.....	1,834	33,052	30,707
Franklin.....	F 1	Malone.....	1,717	38,110	42,853
Fulton.....	F 2	Johnstown.....	486	37,650	42,842
Genesee.....	B 2	Batavia.....	481	33,365	34,561
Greene.....	F 3	Catskill.....	644	31,598	31,478
Hamilton.....	F 2	Lake Placid.....	1,747	4,762	4,917
Herkimer.....	E 2	Herkimer.....	1,426	45,608	51,049
Jefferson.....	E 1	Watertown.....	1,252	68,806	70,748
Kings.....	F 5	Brooklyn.....	77	898,547	1,166,582
Lewis.....	E 2	Lowville.....	1,265	20,806	27,427
Livingston.....	C 3	Geneseo.....	635	37,801	37,059
Madison.....	E 3	Morrisville.....	649	42,802	40,545
Monroe.....	C 2	Rochester.....	643	189,586	217,854
Montgomery.....	F 3	Fonda.....	399	45,099	47,488
Nassau.....	G 5	Mineola.....	252	.....	55,448
New York.....	F 5	New York.....	63	1,515,301	2,050,600
Niagara.....	B 2	Lockport.....	522	62,491	74,961
Oneida.....	E 2	Utica.....	1,180	123,922	132,800
Onondaga.....	D 2	Syracuse.....	794	146,247	168,735
Ontario.....	C 3	Canandaigua.....	652	48,453	49,605
Orange.....	F 1	Goshen.....	849	97,859	103,859
Orleans.....	B 2	Albion.....	396	30,803	30,164
Oswego.....	D 2	Oswego.....	974	71,883	70,881
Otsego.....	E 3	Cooperstown.....	978	50,861	48,939
Putnam.....	G 4	Carmel.....	259	14,849	13,787
Queens.....	G 5	Jamaica.....	129	128,050	152,999
Rensselaer.....	G 3	Troy.....	664	124,511	121,697
Richmond.....	F 5	Richmond.....	57	51,633	67,021
Rockland.....	F 5	New City.....	180	35,162	38,298
St. Lawrence.....	F 1	Canton.....	2,810	85,048	89,063
Saratoga.....	F 2	Ballston Spa.....	830	57,663	61,089
Schenectady.....	F 3	Schenectady.....	210	29,797	46,852
Schoharie.....	F 3	Schoharie.....	648	29,164	26,854
Schuyler.....	C 3	Watkins.....	339	16,711	15,811
Seneca.....	D 3	Ovid & Waterloo.....	328	28,227	28,114
Steuben.....	C 3	Bath.....	1,401	81,473	82,822
Suffolk.....	G 5	Riverhead.....	918	62,491	77,582
Sullivan.....	F 4	Monticello.....	367	31,031	32,306
Tioga.....	D 3	Owego.....	518	29,935	27,951
Tompkins.....	D 3	Ithaca.....	477	32,923	33,830
Ulster.....	F 4	Kingston.....	1,128	87,062	88,422
Warren.....	F 2	Caldwell.....	805	27,866	29,943
Washington.....	G 2	Argyle.....	796	15,690	15,624
Wayne.....	C 3	Lyons.....	624	19,739	18,699
Westchester.....	G 4	White Plains.....	450	146,772	183,355
Wyoming.....	B 3	Warsaw.....	693	31,134	30,413
Yates.....	C 3	Penn Yan.....	348	21,091	20,318





it ranges between 35 and 45 inches, being least in the northwest.

GEOLOGY. There are two areas of Archæan rocks, which probably represent the portions of the State that rose above the pre-Cambrian ocean. These are the Adirondack region of the north and the Highlands of the extreme south. Both consist of very ancient crystalline and metamorphic rocks, granites, gneisses, etc., with intruded basic rocks forming the central or Mount Marcy group of the Adirondacks. The northern Archæan area is flanked on the north by outcrops of Potsdam sandstone of the Cambrian Age, and again on all sides by a narrow band of Trenton limestone, while a tongue of Lower Cambrian extends from the southern end of Lake Champlain toward the Hudson Valley. In the early Silurian Age a great upheaval connected the Adirondacks with the Highlands and raised above sea-level the regions bordering these on the west. That portion now appears as Lower Silurian slates and limestones, running in a great curve from Lake Ontario toward Lake George, and thence south and southwestward into the Kittatinny Valley of New Jersey. On this formation the Upper Silurian rests unconformably and crops out along the southern shore of Lake Ontario. The rest of the State, including the entire southwestern and south-central portion as far east as the Hudson Valley, remained submerged until the close of the Devonian Age, when, in the early Carboniferous Age, it was raised by the great Appalachian upheaval. This portion is now covered by rocks of the Devonian system, forming the great western plateau, which is terminated by the abrupt escarpment formed by the Helderberg limestone. The eastern portion of the plateau is more folded and upturned than the western, and is capped by harder sandstone, whence it remains at a higher level as the Catskill Mountains. The Upper Devonian may have been overlain by a light Carboniferous stratum; but if so, the latter has been entirely worn away, and the State contains no rocks later than the Upper Devonian, with the exception of a small area of Triassic and Cretaceous strata in the southeastern part. Glacial action has been very effective in shaping the present topography of New York, by the formation of lakes, the changing of river courses, the scooping out of some valleys and filling in of others, and the deposition of moraine materials, these materials covering the older rock-formations in an irregular sheet from a few inches to several hundred feet in thickness, and constituting the principal soil of the State.

MINERAL RESOURCES. The coal measures, which are so extensively developed south of the boundary, are not represented in this State. There are valuable clay deposits in the lowlands around the lakes and river valleys, formed by the deposits from the larger lakes which covered those regions in Pleistocene times. The granites of the Archæan regions, the limestones of the Trenton and Niagara formations in the northwest, and the Potsdam and Catskill sandstones, especially those layers of the Hamilton group known as the Hudson River bluestone, form valuable sources of building stone. The principal metallic ore is iron, which occurs in extensive beds of magnetite and hematite in the crystalline rocks of the Adirondacks. Interbedded with the shales of the Upper Silurian strata south of

Lake Ontario are extensive deposits of rock salt from 15 to 150 feet thick, while other minerals are found in smaller quantities in various parts of the State.

MINING. New York has no coal mines, and is in this respect in marked contrast with the sister Commonwealth of Pennsylvania. The State ranks high in the stone-quarrying industry. All the more important varieties of stone, as well as industrial clays, are worked. The output of limestone in 1900 was valued at \$1,730,162, the largest for any year in the decade 1890-1900. The sandstone for the same year (nearly two-thirds being bluestone) was valued at \$1,467,496—also the largest value attained from 1890 to 1900. The annual production of granite and of marble each ranges in value from about \$200,000 to \$500,000. Slate is of less importance. New York produces over half of the total output of rock cement for the country, the value for 1900 being \$2,045,451. Portland cement is also made. The value of the clay products for 1900 was \$8,073,769—a little less than in 1890—of which over one-sixth represented pottery, and the remainder brick and tile. New York is the largest salt-producing State, the value of the product being over one-third that for the entire country. Prior to 1893 New York was exceeded by Michigan in the salt output, but it has regularly held first rank since that year. Since 1898 the annual value has been more than \$2,000,000. The yield of the different kinds of iron ore in 1900 was: red hematite, 44,467 long tons; brown hematite, 44,891; magnetite, 345,714; and carbonate, 6413 long tons, the value of the entire product being \$1,103,817. Petroleum and natural gas are obtained in the western part of the State. The value of the natural gas yield was greatest in 1890—\$552,000. The highest subsequent figure was that for 1900—\$363,367. Only one State, Wisconsin, exceeds New York in the value of its mineral waters, the total receipts being \$929,038, from 44 springs reporting in 1900.

FISHERIES. The fishery industries, like those of most of the Middle Atlantic coast States, have greatly declined in value of late. Its vessel fisheries, however, show an increase. In 1898 there were 9185 persons engaged in the industries, as against 12,246 in 1891. The value of the catch for the same year was \$3,545,189, showing a decline of nearly 30 per cent. since 1891, although the amount of the catch increased during the same period. Suffolk County, on Long Island, is the foremost county in the State in fisheries. The oyster represents more than one-half of the total value. Next come menhaden, bluefish, and clams. In the counties bordering on the Hudson the fisheries are of minor importance. The chief species here are shad and alewives. The lake fisheries of New York are also of some importance. (For particulars, see *Fisheries* in the article on UNITED STATES.) The menhaden industry has been considerably consolidated in late years. Its product in 1898 was \$405,488. The value of the canned fish amounted in 1900 to \$197,869.

AGRICULTURE. For a long time New York was the first State in agricultural importance, and as late as 1890 was surpassed by Illinois alone in the value of farm products. In 1900, although this figure had increased 51 per cent. in the decade ending with that year, the amount was

exceeded in three Western States. Each decade since 1870 has witnessed a decrease in the value of farm land and farm improvements, a fact generally explained by the rise of Western competition. The area of improved land reached its maximum in New York in 1880, and declined in each of the subsequent decades. In 1900 74.3 per cent. of the land area of the State was included in farms, and of this amount 68.9 per cent. was improved. The average size of farms decreased from 112.1 acres in 1850 to 99.9 acres in 1900. Tenant farming is growing in favor, and embraced in 1900 23.9 per cent. of all farms. Over one-half of the total crop acreage is devoted to hay and forage, and exceeds the corresponding area in any other State. The importance of the dairy industry gives a special value to hay. While the total product is sometimes exceeded in other States, it generally stands first as to total value. Oats is the most important cereal and is a favorite crop in the Saint Lawrence Valley. Wheat and corn are of about equal prominence. Both regained from 1890 to 1900 a part of the very large loss of area which characterized them in the preceding decade. Only one other State rivals New York in the production of rye and buckwheat.

After hay, the potato is the most valuable farm product. The State is unapproached in the area devoted to this vegetable, and in the value of this product. New York also takes first rank in garden farming. Long Island is almost wholly devoted to this industry, for which it has the special advantage of being near to the New York market. In the production of beans the State holds second rank. In the western counties north of the watershed and in Ulster County are large fruit orchards, the apple trees constituting 70 per cent. of the total number of fruit trees in the State. Grapes are grown abundantly in the southern part of the Hudson Valley and in the lake region. Tobacco is raised in the Chemung Valley and northeastward to the eastern end of Lake Erie. Hops are a prominent crop in some of the central counties, but recently there has been a significant decrease, owing to Western competition. A large income is annually obtained from the products of floriculture. Fertilizers are very commonly used throughout the State, an average of \$20 per farm being expended for them. The following table of acreages explains itself:

CROP	1900	1890
Hay.....	5,154,965	5,243,010
Oats.....	1,329,753	1,417,371
Corn.....	658,654	493,320
Wheat.....	657,736	462,561
Buckwheat.....	289,862	280,029
Rye.....	177,416	236,874
Barley.....	111,658	349,311
Potatoes.....	395,640	357,464
Beans.....	129,298	.....

STOCK-RAISING. Stock-raising is characterized by the great prominence of dairy cows. The number of cows has increased steadily, and the dairy industry has likewise grown. In 1900 the value of dairy products constituted 30.5 per cent. of the gross farm income. The receipts from the sales of milk in that year were \$36,248,833, and from sales of butter, \$9,868,446. From 1890 to 1900 there was a decided increase in the number of cattle and a marked decrease in the number of sheep. Poultry products are a very

prominent item. The following table of the holdings of stock is self-explanatory:

	1900	1890
Dairy cows.....	1,501,606	1,440,230
Other cattle.....	1,094,781	691,102
Horses.....	628,438	664,430
Mules and asses.....	3,651	4,636
Sheep.....	984,516	1,528,976
Swine.....	676,639	843,342

FORESTS AND FOREST PRODUCTS. Forests of white pine, spruce, and hemlock originally covered the Adirondacks, and, mingled with hard woods, were common throughout other parts of the State. New York has long played a prominent part in the lumber industry of the country, and in 1850 ranked first among the States in the value of timber products. As a result the merchantable timber has been generally removed except in the Adirondacks, and most of the pine has been cleared from that region. The State possesses here 1,163,414 acres. In 1900 there were in New York 705,914 acres in private reserves, and 1,356,816 acres were owned by individuals or companies for other purposes. Hemlock and spruce are cut in the largest quantities. From the table below it will be seen that while the value of the lumber and timber products, as also the planing mill products, etc., decreased somewhat during the decade, the value of paper and wood pulp increased 88.2 per cent. This gave the State first rank in this industry.

MANUFACTURES. The leading position of New York as a manufacturing State dates from about 1825, when the Erie Canal was finished. The largest absolute gain in the industry was made from 1880 to 1890. The percentage of the population engaged in the industry as wage-earners increased from 6.4 in 1850 to 11.7 in 1900. There was, however, a decrease in the last decade of that period. The total value of manufactures for the year 1900 was \$2,175,726,900. This figure was one-seventh greater than that for Pennsylvania—the only other State which approaches New York in this respect. The figure was in fact nearly one-sixth of that for the United States. This position is held by the State despite the comparative lack of iron manufacturing and textile industries. It is due to the great number of factories and shops producing the more highly finished products. The State is not without valuable resources of field, forest, and mine, and counts also among its advantages the sources of an abundant water-power, including the Niagara Falls. But its advanced position is the outgrowth rather of its superior situation with respect to both home and foreign markets. The construction of the Erie Canal westward through the Mohawk Valley—the only natural break in the Appalachian Mountain range—established early communication between the Hudson River and the Great Lakes, and brought to New York much of the commerce of the West. The water routes determined the location of nearly all the large towns, which in turn largely determined the location of railway routes. At the southern extremity of this system of water transportation was New York Harbor, with its superior natural facilities for shipping. New York City thus became the metropolis of the country, and extensive manufacturing industries sprang up in and about it. About three-fifths

INDUSTRIES	Year	Number of establishments	Average number wage-earners	Value of products, including custom work and repairing	Rank among the States
Total for selected industries for State.....	1900 1890	24,417 21,309	502,839 445,867	\$1,380,975,268 1,082,595,478	
Increase, 1890 to 1900.....		3,108	56,972	\$298,379,790	
Per cent. of increase.....		14.6	12.8	27.6	
Per cent. of total of all industries in State.....	1900 1890	31.0 32.4	59.2 59.3	63.5 63.3	
Clothing—total.....	1900 1890	4,304 3,466	90,017 78,674	\$233,370,447 141,968,351	
Clothing, men's, factory product.....	1900 1890	2,531 2,661	41,300 54,110	126,478,057 96,880,957	First
Clothing, women's, factory product.....	1900 1890	1,673 805	48,717 24,764	106,892,390 45,087,394	First
Furnishing goods, men's.....	1900 1890	970 215	21,610 11,671	31,000,834 14,379,970	First
Millinery and lace goods.....	1900 1890	393 165	11,274 6,088	21,037,782 10,803,361	First
Musical instruments—total.....	1900 1890	193 211	7,244 7,142	15,509,839 15,713,919	First
Textiles—total.....	1900 1890	537 627	64,901 61,007	94,263,047 86,642,771	
Carpets and rugs, other than rag.....	1900 1890	12 15	5,603 8,879	15,029,218 14,606,116	Second
Cotton goods (including cotton small wares).....	1900 1890	52 42	9,259 8,316	10,788,003 9,777,295	Tenth
Hosiery and knit goods.....	1900 1890	242 201	26,470 19,828	35,886,048 24,776,582	First
Silk and silk goods.....	1900 1890	92 185	7,861 12,719	12,706,246 19,417,796	Fourth
Woolen goods.....	1900 1890	65 91	4,033 2,838	6,715,006 5,188,020	
Worsted goods.....	1900 1890	7 14	3,726 3,870	5,958,259 5,763,102	
Fur goods.....	1900 1890	500 281	4,454 4,342	15,828,996 12,454,273	First
Shirts.....	1900 1890	324 377	13,565 17,948	22,782,802 17,483,958	First
Gloves and mittens.....	1900 1890	244 212	9,889 6,208	10,835,898 7,369,730	First
Boots and shoes, factory product.....	1900 1890	223 257	15,796 15,361	25,586,631 23,661,204	Second
Leather—tanned, curried, and finished.....	1900 1890	147 210	5,530 5,300	23,205,991 23,318,078	Third
Iron and steel.....	1900 1890	30 44	5,418 5,848	13,858,553 15,849,537	Seventh
Foundry and machine-shop products.....	1900 1890	1,352 1,081	50,173 39,133	96,636,517 72,084,500	Second
Ironwork, architectural and ornamental.....	1900 1890	203 155	4,942 4,018	12,745,249 8,380,281	First
Electrical apparatus and supplies.....	1900 1890	134 66	10,370 3,890	22,695,024 8,199,180	First
Jewelry.....	1900 1890	260 195	3,022 1,994	10,244,624 7,385,139	Third
Sugar and molasses, refining.....	1900 1890	14 14	3,275 810	90,680,478 17,157,694	First
Coffee and spice, roasting and grinding.....	1900 1890	87 70	1,541 1,260	22,470,856 31,013,213	First
Confectionery.....	1900 1890	858 557	7,230 5,920	18,842,148 12,920,812	First
Patent medicines and compounds.....	1900 1890	392 227	2,885 1,467	17,075,937 8,032,938	First
Tobacco—chewing, smoking, and snuff.....	1900 1890	42 30	1,020 1,531	4,632,101 4,431,373	
Tobacco—cigars and cigarettes.....	1900 1890	3,055 2,858	26,051 26,768	49,028,479 47,422,603	First
Liquors—total.....	1900 1890	279 249	7,730 7,084	58,282,253 54,006,249	
Flouring and grist-mill products.....	1900 1890	1,513 1,235	2,489 5,389	42,796,340 52,550,744	Second
Slaughtering.....	1900 1890	110 181	3,099 3,744	57,431,293 76,642,151	
Soap and candles.....	1900 1890	91 101	2,020 1,711	12,833,645 9,030,962	First
Cheese, butter, and condensed milk, factory product.....	1900 1890	1,908 1,308	2,439 2,461	26,557,888 14,385,966	First
Chemical products—total.....	1900 1890	279 288	8,854 8,720	40,663,363 41,338,134	First
Printing and publishing.....	1900 1890	2,640 2,230	32,948 27,587	95,232,051 68,929,001	First
Lithographing and engraving.....	1900 1890	111 94	6,335 4,094	11,002,856 8,333,764	First
Lumber and timber products.....	1900 1890	1,765 1,734	6,850 12,981	16,766,977 17,160,547	Twelfth
Lumber, planing mill products, including sash, doors, and blinds.....	1900 1890	509 540	11,515 14,179	29,756,257 33,765,173	First
Agricultural implements.....	1900 1890	87 116	5,551 5,020	10,537,254 11,680,842	Third
Carriages and wagons.....	1900 1890	893 1,098	6,981 9,776	13,068,385 16,803,241	Second

INDUSTRIES	Year	Number of establishments	Average number wage-earners	Value of products, including custom work and repairing	Rank among the States
Cars and general shop construction and repairs by steam railroad companies.....	1900	82	13,062	\$16,194,850	Third
	1890	46	8,585	9,046,025	
Furniture, factory product.....	1900	354	14,481	23,643,245	First
	1890	415	13,211	23,539,011	
Gas, illuminating and heating.....	1900	101	5,381	20,917,726	First
	1890	94	3,970	18,716,683	
Petroleum, refining.....	1900	4	2,629	27,184,524	Third
	1890	9	3,096	26,786,841	
Paper and wood pulp.....	1900	179	9,268	26,715,628	First
	1890	153	5,339	14,192,240	

of the total State output is accredited to New York City, but this output includes many industries of only local concern, such as the manufacture of gas and of bread and other food preparations, carpentering, plumbing, tinsmithing, and masonry work. In the different branches of the clothing and garment industry, New York City and other towns of the State produce more than a third of the output of the United States. The production of men's and women's factory-made clothing is largely confined to the metropolis. The work is generally performed in small workshops or tenement rooms. This system grows out of the necessity for specialization owing to the large number of patterns used, and is favored by the abundance of cheap labor available where there are such large numbers of foreigners unable to secure more profitable employment. This branch of industry is of comparatively recent development. Troy shares with New York in the extensive production of men's furnishing goods—shirts, neckwear, etc. Millinery and lace goods and silk and silk goods are New York City products, the last having suffered a large decline from 1890 to 1900 owing to the removal of establishments, in quest of cheaper rents and certain other advantages, to points outside the State. Yonkers is the centre of a large knitting industry, and Cohoes and Utica are noted for their carpet and rug manufactures. The manufacture of fur goods in New York City, and of boots and shoes at different points, is extensive. Tanning and the manufacture of leather are also very important.

While the iron and steel industry is of comparatively small and decreasing importance, the foundry and machine-shop industry is rapidly developing, and in 1900 gave the State second rank. The printing press and steam engine are the best known of these products. The industry is well represented at most of the large centres. New York is unrivaled in the manufacture of electrical apparatus and musical instruments. Especially prominent are the manufactures of refined sugar and molasses, roasted and ground coffee and spice, confectionery, patent medicine, tobacco, and liquors—most of which are produced almost wholly in New York City. Flour and grist milling, slaughtering and meat-packing, and the factory production of cheese, butter, and condensed milk, are more generally distributed over the State. In the first-named industry the State ranks second. On the opening of the Erie Canal, Rochester, being favored with water power from the falls of the Genesee River, became the leading 'flour city' of the United States, and New York held first place until the comparatively recent development of the industry at Minneapolis. Between 1890 and 1900 both the flouring and slaughtering industries declined. The

factory production of cheese, butter, and condensed milk, on the contrary, increased during that period nearly 85 per cent., and the State continues to hold first rank in this line. The manufacture of chemicals, including paints and varnishes, has attained large proportions in New York City. The printing industry of New York is more than twice that of any other State, and the metropolis is the centre of the periodical press as well as of book publishing. New York has long ranked as one of the foremost States in the brewing industry. The preceding table is a summary for the leading industries.

COMMERCE AND TRANSPORTATION. In maritime commerce New York far outranks any other State in the Union. In the fiscal year ending June 30, 1901, 64 per cent. of the imports and 35.60 per cent. of the exports of the entire nation passed through the port of New York. Its traffic to and from other United States coast points is between two and three times the volume of its foreign trade. In addition it has a vast trade along the Hudson. Buffalo is the chief lake port of the State, and has an immense commerce with the West. With this commerce may be included that of Tonawanda. Oswego is the principal port on Lake Ontario. Other important shipping points are: Charlotte, Sodus Point, Fair Haven, and Cape Vincent on Lake Ontario, Ogdensburg on the Saint Lawrence River, Rouses Point, Plattsburg, and Whitehall on Lake Champlain, and Newburgh and Rondout on the Hudson River. The total traffic for the entire State can best be noted in connection with the means of inland transportation.

New York was the first State to enter actively on the work of canal construction. In addition to the Erie Canal, opened in 1825, the State has constructed the Champlain Canal, the Oswego Canal, and several other branch canals, and enlarged the Erie Canal to four times its original dimensions. The total expenditure on canal construction has been nearly \$100,000,000. In recent years, owing to railroad competition and the neglect of the State to improve the canals, the traffic on them has declined, most of the branch canals have been abandoned, and only on the Erie and Champlain routes is there any considerable tonnage. Proposed plans for the enlargement of the Erie Canal constitute a most important question for the State.

The first railroad in the State was the Mohawk and Hudson, opened in 1831 from Albany to Schenectady, a distance of seventeen miles. By 1842 there were lines extending from Albany to Buffalo. Within another decade the Erie road across the southern part of the State and the Hudson River road from New York to Albany had been completed. Since then roads have been built over every section of the State, and the

different lines have been united into great systems. There were, in 1900, 8095 miles of road and over 12,000 miles of track in the State. The total traffic in 1899 was 150,000,000 passengers, moved 3,500,000,000 passenger miles, and 170,000,000 tons of freight, moved 24,000,000,000 ton-miles—being one-fourth of the passenger traffic and one-fifth of the freight traffic of the entire country. The principal railroad systems crossing the State are the New York Central and Hudson River, the Erie, the Lackawanna, the New York, Chicago and Saint Louis (with the West Shore), the New York, Ontario and Western, and the Lehigh Valley. Other important systems enter at the east and west. There is a State board of railroad commissioners, having general supervision of railroads and their operation with reference to public safety and convenience. The board is empowered to investigate and report violations of the law.

BANKS. The paramount position of New York City in the American financial world places New York State in the lead among the States in the number and resources of its financial institutions. The first bank of the State was the Bank of North America, incorporated in 1782. In 1791 the second bank was chartered under the name of the Bank of New York. In 1804 an act was passed prohibiting banking and the issuing of currency in the State except under a special charter from the Legislature. Due to the high profits, banking charters were eagerly sought and became political favors. At the time of the declaration of war with Great Britain in 1812 there were twenty banks in the State, and twenty-four more were chartered between 1812 and 1829. As the bank charters were for a limited number of years, and most of them were to expire in 1831, the banks in 1828 made a combined effort for a general renewal of their charters. But a strong opposition developed to this plan. The careless distribution of charters to political friends had produced bad results, and the New York currency was becoming less secure. A reform of the banking system was therefore undertaken in 1829, and the plan of securing bank circulation by the formation of a safety fund was successfully carried through. The law required all banks with new or renewed charters to contribute one-half of one per cent. of their capital annually to a common safety fund, out of which losses from bank failures were to be covered. A board of three bank commissioners was created by the same bill, and quarterly examinations and annual reports pro-

vided for. In 1832 fifty-two banks were members of the safety fund, and twelve did not belong to it. The system of clearing houses originated in New York City. The total exchanges for the first year (1854) were more than five and a half billions, and in 1900 more than sixty billion dollars. Consolidation has latterly become a prominent feature of the banking business of New York, about thirty small banks having been bought out

object of popular dissatisfaction, which expressed itself in a demand for a free banking system. As a result of this agitation a free banking law was passed in 1838, which, in order to secure the bank currency, compelled the investment of the bank capital in New York State bonds or equally good securities and their deposit with the State. This was the plan afterwards adopted by the Federal Government in the national banking system. For some time both systems of banking worked side by side, notwithstanding a great deal of friction. For twelve years (1829-41) this safety fund was not drawn upon, as no chartered bank failed during that time. But the failure of six banks in 1841 so exhausted the fund that a law was passed in 1842 limiting the guarantee to circulation only, and not to all the liabilities of the failing banks. As the charters of the chartered safety fund banks expired, most of them reorganized under the free banking law. This was amended in 1840 by limiting the deposits to New York State bonds, as many of the other securities deposited had proved worthless. In the many bank failures during the crisis of 1841, this system of deposits proved its value, preventing serious losses on circulation.

In the severe financial crisis of 1857 this system was again put to a severe test, but notwithstanding a general suspension of specie payment for some time, the banks remained firm. At the time of the introduction of the national banking system the New York banking was not only the greatest, but also the most secure in the country. The new system was therefore not welcomed, and specially heavy taxes were imposed on the national banks. These taxes were, however, declared unconstitutional by the Federal courts. The State banks were forced to obtain national charters, and from 309 in 1863 the number of State banks was reduced to 45 in 1868. After that their number increased but slowly until 1880 (70), when a steady increase began. Since 1894 capital has preferred the new form of organization known as trust companies, which, while doing a general banking business, are yet different enough to have a more favorable system of taxation. Savings banks have existed in the State since 1819, and their number grew rapidly, especially after the Civil War, increasing from 71 in 1863 to 150 in 1873. Though since then their number has gradually diminished, the amount of deposits has increased immensely. See article on BANK, BANKING.

The condition of the banks in New York State in 1902 is shown as follows:

	National banks	State banks	Private banks	Trust companies	Savings banks
Number.....	352	193	14	70	127
Capital.....	\$126,058,000	\$25,515,000	\$223,000	\$53,225,000	\$.....
Surplus.....	80,643,000	17,326,000	73,000	70,887,000	115,540,000
Cash, etc.....	199,777,000	75,396,000	191,000	10,481,000	9,339,000
Deposits.....	785,921,000	254,412,000	2,611,000	881,001,000	1,051,689,000
Loans.....	772,391,000	218,816,000	1,798,000	701,284,000	464,997,000

vided for. In 1832 fifty-two banks were members of the safety fund, and twelve did not belong to it.

The financial crisis of 1837 was heavily felt in New York, where the banks suspended specie payments, and bills of many concerns passed at a discount. The chartered banks became the

The system of clearing houses originated in New York City. The total exchanges for the first year (1854) were more than five and a half billions, and in 1900 more than sixty billion dollars. Consolidation has latterly become a prominent feature of the banking business of New York, about thirty small banks having been bought out

by larger institutions, and in many instances becoming local branches of the same. The largest financial transactions all over the country mostly emanate from New York, and, besides, New York City remains the main channel for all financial transactions between the Old and New Worlds. The New York clearing house is therefore the clearing house for the whole nation. The New York money market regulates the country's money markets, and is beginning to assert a dominant influence upon the European world. Many foreign loans have been floated in New York during the last few years, and many foreign securities listed on the New York exchange. The greatest industrial and railroad consolidations between 1890 and 1900, though chartered in New Jersey and Delaware, and uniting property located in various parts of the Union, are nevertheless all creatures of 'Wall Street'—as the New York financial world has come to be known.

FINANCE. At the close of the Revolutionary War the State, by the sale of public lands, formed a general fund, the revenues of which were to defray the expenses of government, and for some time this was actually accomplished. Another fund was established for school purposes. In 1814 the State even paid out of this fund the direct tax levied by the National Government. A State tax became necessary after that, but was discontinued in 1826. In 1817 the State entered upon the system of public improvements, mainly canal construction, and a public debt of more than \$7,000,000 was created for that purpose. At the same time a sinking fund was organized, and the tolls of the canals, as well as the salt duties, were assigned to it so as to prevent financial difficulties. After the construction of the main Erie Canal, other lateral canals were undertaken, which increased the public debt. In 1827 the State entered upon a new policy of lending its credit to private companies for public improvements, and \$5,228,700 was loaned to ten companies, chiefly railroads. Some of them failed, the most important one being the Erie Railroad (in 1842). Their indebtedness (\$3,665,000) became a burden upon the State fund. The total debt then amounted to more than \$20,000,000, and the State was threatened with insolvency. A new course was therefore adopted in 1842. All expenditures upon public works were stopped, outstanding debts funded, and a tax imposed to meet the expenses of government and the payment of interest. The new Constitution of 1846 provided for a special canal sinking fund and a general sinking fund, and prohibited the creation of a new indebtedness except for war purposes, and even then only after popular sanction by a referendum. This last provision has been preserved in the present Constitution. Under these strict regulations the bounty State debt of \$30,000,000 was created in 1865 to meet the expenses of the Civil War, and at that time the State debt reached its maximum of \$53,000,000. After that the debt was rapidly reduced by means of the sinking fund. In 1870 it was only \$32,400,000; in 1880, \$8,988,000. The year 1893 saw the total extinction of the debt.

But a public debt was again created toward the year 1900 for purposes of canal improvement. Since 1842 the main source of the State income was a direct tax upon all assessable property. Between 1890 and 1900 other sources, such as licenses, fees from foreign corporations, etc.,

became more important, and at the end of the nineteenth century several energetic efforts were made to separate the sources of State and local taxation. New taxes were laid upon banks, trust companies, public franchises of corporations. Further efforts in the same direction were made in 1902. On January 1, 1903, the debt of the State amounted to \$10,000,000. The aggregate receipts of the ten funds for which separate accounts are kept were \$27,049,558, or, subtracting transfers from one fund to the other, \$24,042,462. The main sources of income were a State tax for general and for school purposes, 29 per cent.; inheritance tax, 14 per cent.; excise tax, 17½ per cent.; and corporation tax, 25½ per cent. The expenditures were \$26,609,055, or, excluding transfers, \$23,601,959, leaving a surplus of \$440,503. Balance in treasury (1903), \$6,992,599.

GOVERNMENT AND ADMINISTRATION. The last revision of the Constitution took place in 1894, and on being approved by the vote of the people of the State went into force on January 1, 1895. It provides for a census in 1905 and every tenth year thereafter. It permits of amendments if passed in two consecutive Legislatures by a majority of each House, and adopted by a vote of the people. It provides for the submission to the people of the question of a constitutional convention every twenty years, or oftener if ordered by the Legislature. A voter in New York must have been a citizen of the United States ninety days, a resident of the State one year, of the county four months, and of the town or precinct thirty days. The registration of voters is required, but such registration cannot be required for town and village elections except by express provision of law. The holding of party primaries in the cities is regulated by statute. The Legislature consists of a Senate of 50 members, chosen for two years, and an Assembly of 150 members, chosen annually. Of the latter, sixty are elected in New York City. The Assembly districts are single-member districts. Each county, except Fulton and Herkimer, has at least one representative. The more populous counties are formed into Assembly districts, but county lines are not crossed. The members of either House receive a salary of \$1500 and mileage. The capital of the State is Albany.

EXECUTIVE. The Governor is elected for two years. He has the right to veto legislative measures, including items in appropriation bills, but his veto may be over-ridden by two-thirds of the members of each branch of the Legislature. He has the power to pardon; he may remove certain State and local officers; and with the consent of the Senate he makes appointments to a number of positions. With the Governor there are elected for the same term a Lieutenant-Governor (who is president of the Senate), a Secretary of State, a Comptroller, a Treasurer, an Attorney-General, and a State Engineer and Surveyor. The most important appointive officers are the superintendent of public works (who has charge of the State canals), and in addition the superintendents of banking, of insurance, and of State prisons; also a commissioner of labor statistics, a factory inspector, an excise commissioner, and a commissioner of agriculture. There are boards or commissions, also appointed, for charities, health, lunacy,

railroads, tax equalization, quarantine, forestry, etc.

JUDICIAL. The highest court in the State is the Court of Appeals, composed of a Chief Justice and six associate justices, elected singly for terms of fourteen years. The Supreme Court is composed of seventy-six judges, each elected for fourteen years. They act in eight judicial districts. There are also county courts, surrogates' courts, and city courts.

LOCAL GOVERNMENT. The Legislature provides for the organization of cities and incorporated villages, and restricts their power of taxation assessment, borrowing money, contracting debts, etc., "so as to prevent abuses. . . ." It divides all cities into three classes, according to size, and provides that all special legislation shall be submitted for the approval of the cities concerned, although they may be passed later over the city's veto. In the counties, the board of supervisors, elected by towns and wards of cities, have control of public buildings and the care of the poor, and they audit the accounts of county officers. The cities are governed under special charters, varying in their provisions.

Since 1848 married women have had separate rights to real and personal property in New York State. They may carry on business, and may sue or be sued on their own account. A husband may convey directly to his wife, and a wife to her husband. Absolute divorce is granted only for adultery. Women may practice law. No youth under eighteen and no woman under twenty-one may be employed in a factory for more than 60 hours in one week, nor may any child under thirteen be so employed at all.

MILITIA. In 1900 there were 1,639,395 men of militia age. The militia in 1901 numbered 14,410.

POPULATION. The population of the State by decades has been as follows: 1790, 340,120; 1800, 589,051; 1810, 959,049; 1820, 1,372,111; 1830, 1,918,608; 1840, 2,428,921; 1850, 3,097,394; 1860, 3,880,735; 1870, 4,382,759; 1880, 5,082,871; 1890, 5,997,853; 1900, 7,268,012. From fifth rank in 1790 the State advanced to first place in 1820, and has ever since held this position. The largest absolute increase and the largest per cent. of increase since 1860 were witnessed from 1890 to 1900. In that decade the rate of increase was slightly greater than that for the United States, being 21.2 per cent., as against 20.7 per cent. The growth during that time, however, was wholly on the part of the urban population. In 1900 the 83 cities of the State with a population of over 4000 each contained together 71.2 per cent. of the total population, only two other States having a higher per cent. of urban population. The large urban population accounts for the high average density per mile—152.6. This figure is exceeded in only three States.

The location of New York City, as the gateway to the large foreign immigration to the United States, has resulted in giving the metropolis an unusually large foreign element. In 1900 the foreign-born in the State numbered 1,900,425—nearly twice as many as in any other State. The striking characteristic of the foreign element in New York as compared with the country in general is the prominence of the Irish, Jews, and Italians. The State contains nearly four times as many Irish as any other State except Massachusetts; nearly three times as many Italians;

and nearly as many Jews as all the rest of the country combined. Of the native white population, those born of foreign parents numbered 2,415,845 in 1900. There were 99,232 negroes, 7170 Chinese, and 5257 Indians. The female sex slightly outnumbers the male.

CITIES. The population of the 12 largest cities in 1900 was: New York, 3,437,202; Buffalo, 352,387; Rochester, 162,608; Syracuse, 108,374; Albany, 94,151; Troy, 60,651; Utica, 56,383; Yonkers, 47,931; Binghamton, 39,647; Schenectady, 31,682; Auburn, 30,345. The State sends 37 members to the National House of Representatives.

RELIGION. The large immigration into New York has resulted in a very rapid increase of the Catholic and the Jewish populations. Particularly in New York City have these two elements become prominent. Among the Protestant denominations the Methodists are the most numerous, followed by the Presbyterians, Baptists, Protestant Episcopalians, Lutherans, and Congregationalists. Protestantism in New York City is characterized by the prominence of the Protestant Episcopal Church, this Church being much stronger there than elsewhere in the Union.

EDUCATION. Several school teachers were brought to New Netherland by the Dutch West India Company, but under the English rule popular education was neglected by the Government. In the eighteenth century several private academies were established, and in 1754 King's College was founded, and was reorganized in 1784 as Columbia College. At the latter date the Regents of the University were constituted a supervisory authority over higher education. The first step toward public common schools was taken in 1789, when two lots of land were assigned to each township for gospel and school purposes. But it was not until 1812 that an active movement set in to establish a State system. In 1854 a State Department of Public Instruction was organized, and soon afterwards the plan of free common schools was adopted, and State taxes for schools were very largely increased. The various schools are under the immediate direction of district trustees, and of boards of education in the towns and cities. The State superintendent exercises a general supervision over the common schools. The Regents of the University, a board of nineteen members elected for life, with four State officers *ex-officio*, continue to supervise secondary education. This board incorporates all higher institutions, distributes the State grants to academies and high schools, and for this purpose conducts a system of secondary school examinations and certificates which embraces this phase of public education throughout the State.

School attendance is compulsory between the ages of eight and sixteen years. The illiterate population of the State is 5.5 per cent. of the total population of ten years of age and over. The proportion of illiterates is 1.2 per cent. for native white, 14 per cent. for foreign white (12.5 in 1880), and 12.8 per cent. for colored. According to the school census of 1901 the school age (five to eighteen) population of the State was 1,620,287, of whom 1,242,416 were enrolled in the public schools in the same year. The average attendance in 1901 was 873,157, as against 642,984 in 1890. There were 35,591 teachers employed in the public schools of the State in 1901, of whom

5147 were males. The percentage of male teachers has shown a constant decrease since 1880, when it amounted to 26 per cent. The total school revenue was \$38,460,277 in 1901, of which \$26,451,363 was derived from local taxes, \$3,500,000 from State taxes, \$272,477 from the permanent school fund, and \$8,245,437 from other sources. The expenditure per pupil of average attendance in 1901 was \$41.68—the highest expenditure of any State in the Union. Normal education is provided by 16 public normal schools which had 5426 students in 1901. The State maintained in 1901 383 high schools, with 63,549 students. There were besides 199 private high schools and academies, with an attendance of about 11,000.

The most important as well as the oldest university is Columbia, in New York City. There is no State university, but Cornell University, in Ithaca, awards certain State scholarships on examinations. The other important institutions are Union College, in Schenectady; New York University, New York City; Hamilton College, Clinton; universities at Syracuse, Rochester, and Buffalo; Colgate University, Hamilton; Hobart College, Geneva; the Catholic colleges of Manhattan, Saint Francis Xavier, and Saint John's, all in New York City; and the College of the City of New York. Vassar College, at Poughkeepsie, and Barnard College, now part of Columbia University, are two of the leading women's colleges in the country. Among the fifteen theological seminaries the most noted is the Union, in New York City. There are seven law schools, twelve medical schools, three dental, and four schools of pharmacy. In each of these professions there are systems of State examinations required of all who wish to practice in New York. The New York Society Library, founded in 1700, claims to be the first in the State. In 1838 the Legislature set aside part of the income from the United States deposit fund for the establishment of a district library system, and this State aid is now distributed by the Regents of the University.

CHARITABLE AND PENAL INSTITUTIONS. The State boards of charities, lunacy, and corrections are each appointed by the Governor and Senate. The board of charities exercises an advisory supervision over the State and local charitable institutions and private institutions to which public charges are committed. It visits and inspects over 500 institutions, containing more than 60,000 inmates. A law of 1902 provides for the appointment by the Governor and Senate of a fiscal supervisor of State charities; and another law of the same year provides that the Governor, the president of the State Board of Charities, and the State Controller act as a commission to approve plans, specifications, and contracts for the construction of State institutions. These include an industrial school at Rochester, an asylum for feeble-minded children at Syracuse, one for feeble-minded women at Newark, a custodial asylum at Rome, an asylum for orphan Indian children at Iroquois, houses of refuge at Hudson and Albion, reformatory for women at Bedford, Craig colony for epileptics at Sonyea, women's relief corps home at Oxford, soldiers' and sailors' home at Bath, school for the blind at Batavia, hospital for crippled and deformed children at Tarrytown, and a hospital for the treatment of incipient pulmonary tuberculosis at

Raybrook. There are a number of private institutions which receive State appropriations. A total of 15,780 persons were supported in the county almshouses during the year ending October 1, 1900, and also over 70,000 were supported at the city and town almshouses. In addition more than 209,000 persons received temporary relief during that period. The various institutions under the supervision of the board expended \$16,107,000 during the year ending September 30, 1900.

The board of lunacy has supervision over the State insane hospitals. These are located at Utica, Poughkeepsie, Middletown, Buffalo, Willard, Binghamton, Ogdensburg, Rochester, Wards Island, Kings Park, L. I., Flatbush, L. I., Gowanda, Matteawan, and Dannemora. In 1900 their inmates numbered 23,267. There are also 20 institutions and private houses authorized to receive the insane. These had in the same year 934 patients. The maintenance of the State insane hospitals for the year ending September 30, 1900, cost \$3,594,873, or \$164.79 per patient. The State penitentiaries are county institutions, of which there are six, located respectively in the counties of New York, Kings, Erie, Albany, Monroe, and Clinton. These receive short-term convicts committed for minor offenses. Counties not having penitentiaries of their own send this class of convicts by contract to the penitentiary of some other county. Convicts sentenced for terms exceeding one year are sent to the State prisons at Ossining (Sing Sing), Auburn, and Clinton, or to the reformatories at Elmira and Napanock, and to the one for women at Bedford. There are also houses of refuge for women at Hudson and Albion. The total prison population in 1902, including that of county jails, the New York City prisons, and workhouses, was 96,932, as against 149,677 in 1898. The more frequent application of the law of suspended sentence and the abolition of the fee system in the various counties are thought to have been largely responsible for this decrease. The Elmira Reformatory has acquired a widespread reputation because of its system of instruction and training. The prisoners committed to it have the advantage of an indeterminate sentence and a parole law. In New York, since 1880, death by electricity has been substituted for hanging as the penalty for murder.

HISTORY.

New York Bay was discovered by Verrazano in 1524, but though Portuguese, French, and Spanish navigators, in all probability, visited the harbor during the sixteenth century, no important explorations were made before 1609, when almost simultaneously Samuel de Champlain, the founder of Quebec, in August, and Henry Hudson, sailing in the *Half Moon* under the Dutch flag, in September, entered the limits of the present State. Champlain's action in lending the Huron Indians aid against the Iroquois imbued the Five Nations with an implacable hatred for the French, and to a great extent determined in advance the fate of their colonizing schemes in America. Hudson's account of New Netherland, as he named the region, and of the great river, called at first Mauritius and then North, and finally Hudson, which he had ascended to the highest navigable point, led Dutch merchants, eager for furs, to dispatch trading vessels to the new

country in 1610 and subsequent years. Just below Albany, Captain Christensen built Fort Nassau in 1613 (abandoned in 1617), and about the same time a number of traders built their posts on Manhattan Island. A trading company, organized in 1615, concluded two years later at Tawasantha, near Albany, a treaty with the Iroquois, who remained to the last friends of the Dutch. With the founding of the West India Company in 1621 a fairly active immigration began. A number of Walloons brought over by Captain May in 1623 were settled on Manhattan Island, on Long Island, and up the Hudson at Fort Orange (later Albany), founded in 1622. In 1626 Peter Minuit was made director-general of the company, and bought Manhattan Island from the Indians. (See NEW YORK CITY, section on *History*.) The greater part of the population of New Netherland, 200 in number in 1625, were agents of the company, whose object in the main was trade and not colonization; and as it guarded its monopoly jealously and offered few inducements to permanent settlers, progress for a few years was slow. Quickly, however, individual directors discovered the advantageous facility with which the Indians might be brought to part with their lands, and in 1629 the patroon system, a system of feudal tenure on an extensive scale, was established. Kilian Van Rensselaer purchased a large tract of land in the neighborhood of Albany, and Michael Pauw bought Staten Island and Pavonia. Ships from Holland stocked these great estates with colonists, tools, and animals. The acquisition of land continued under Wouter Van Twiller (q.v.), who came over in 1633, and under Kieft (q.v.), who succeeded Van Twiller in 1638. The abandonment of the company's trade monopoly was followed by a large influx of colonists, among whom were many English Puritans and French Huguenots. The population was cosmopolitan even in 1643, when, according to Father Jogues, 400 or 500 inhabitants spoke eighteen different languages and were divided into Calvinists, Lutherans, Catholics, Puritans, Baptists, and other more minute denominations. Wars with the Algonquin Indians, caused by the greed of Kieft, brought the colony near to destruction. The settlements around New Amsterdam were wiped out and the town itself was threatened. In the moment of highest danger Kieft was forced by popular demand to appoint a council of eight to assist him in carrying on the war. This was the beginning of representative government in New York. Peter Stuyvesant (1647-64) appointed a council of nine to advise him and acted in systematic opposition to it. Sincerely solicitous for the welfare of the colony, he reserved it for himself to determine in what that welfare consisted and how it was to be attained. Defying alike the popular will and the orders of the States-General in Holland, he ruled, arrested, confiscated, silenced public speech, and dictated the outline for the Sunday sermon. New Amsterdam was given a burgher government in 1653, but Stuyvesant had the appointment of the magistrates. He upheld bravely the rights of the company against the Swedes on the Delaware, whom he dispossessed, and the English in Connecticut and Long Island, but the citizens grew weary of him and yielded in 1664 to an English fleet under Colonel Nicolls, which had come to enforce the Duke of York's title to the region.

New Netherland became New York, and was ruled by the Duke's Governors (a Legislature was refused), and the 'Duke's laws.' Taken by the Dutch in 1673, it was returned to England in the following year. At the time of the English occupation New Netherland had a population of about 8000, comprising many nationalities, with the Dutch predominant. Life in the colony had not that deep spiritual tinge which it bore in New England, but it was more gracious and more free. The churches were well supported, and the school system was excellent, but breweries and drinking-shops found their place in the order of things. In religion a broad toleration, in social life a hearty gayety and timely hospitality marked this cosmopolitan colony of well-fed traders and farmers.

The Dutch did not take kindly to the English rule in the beginning. The desire of the people for some share in the government remained unsatisfied. Complaints against the arbitrary imposition of taxes and customs culminated in a demand, expressed in the form of petitions, for a popular assembly, and this was finally granted in 1683, when a provincial assembly summoned by Governor Dongan passed the Charter of Liberties, granting freedom of religion to all Christians, and the suffrage to all freeholders. An important treaty with the Iroquois in 1684 confirmed the alliance between them and the English and made them definitely the enemies of the French, who retaliated with punitive expeditions into the country, in 1687 under Denonville, and later, repeatedly, under Frontenac. In 1686 New York and Albany obtained new charters, but in the following year the provincial assembly was dissolved, absolute rule was restored, and New York became a part of the Dominion of New England, under Governor Andros. The Revolution of 1688 in England found two parties in the colony, the richer classes who were loyal to James II., the popular majority in favor of William of Orange. Exaggerated reports of Catholic intrigues caused Jacob Leisler (q.v.) to seize the fort at New Amsterdam in the name of William and Mary. A committee of safety made him commander-in-chief, and the popular assembly in 1689 gave him autocratic power. He held the fort against a force of troops from England, but willingly laid down his authority when Governor Sloughter, the King's appointee, arrived. The clergy and the wealthy merchants hated Leisler as the champion of popular ideas, and brought about his death on a charge of treason in 1691.

The period from 1690 to the Revolution was marked by almost continuous disputes between the Governor and the Assembly on the questions of the Governor's salary, the collection and the disposal of the revenue, the control of the courts, and the establishment of an endowed Church. Of the Governors the larger number were impetuous peers sent to America to grow fat as best they might. They bargained with the Assembly for an increase in salary, participated in gigantic land frauds in common with minor officials and prominent citizens, and in one instance, the notable case of Governor Fletcher (1692-98), shared in the profits of piracy. There were, however, Governors of a far higher character, men like Bellomont (1698-1701), to whom the rehabilitation of Leisler's memory is due, Robert Hunter (1710-19), or William Burnet (1720-28), who was an ardent champion of the royal power, but nevertheless an honest man,

and zealous for the welfare of the province. But in spite of political turmoil the growth of the colony was rapid and uninterrupted. In 1720 the population consisted of 31,000 whites and 4000 negroes; in 1756 it comprised 83,000 whites and 13,000 negroes, and in 1771 168,000 whites and negroes. The first newspaper, the *Gazette*, a Government organ, was published in 1725, and the second, the *Weekly Journal*, an opposition sheet, appeared in 1733. For his criticism of the Governor's conduct the editor of the *Weekly Journal*, John Peter Zenger (q.v.), was brought to trial for libel in 1734, but, supported by the people and the Assembly, he won his case and vindicated the freedom of the press in New York. In 1746 the Assembly appropriated £250 toward the foundation of King's College. The people who fought for the freedom of the press and established King's College were the same who in 1741, thrown into a paroxysm of fear by the baseless rumors of a negro insurrection, murdered 31 negroes and drove out 71 others by due process of the law. In the early French and Indian wars New York suffered heavily, for, owing to the factious disputes between the Governor and the Assembly, the border was left without any troops and the frontier settlements were swept clean by the French and their Indian allies. In 1690 Schenectady was destroyed. Sir William Johnson kept the Iroquois friendly to the English, and the alliance with them was strengthened at the Albany Convention of 1754 (q.v.). By the Treaty of Fort Stanwix in 1768 a definite line of delimitation between the English and the Indian territory was traced.

As early as 1762 petitions and remonstrances against the oppressive commercial laws had been submitted to Parliament and the King. In 1764 the Assembly appointed a committee to correspond with the other provinces concerning the common cause, and in October, 1765, a colonial Congress assembled at New York. The imposition of the stamp duty was followed by the outbreak of disorder, in which the Sons of Liberty (q.v.) were prominent, and non-importation agreements were entered into by the people. Though the commercial interests of the colony suffered greatly, the Assembly refused to vote supplies for the troops, and on January 18, 1770, the Sons of Liberty and the British soldiers fought the battle of Golden Hill on John Street in the city of New York. There was peace till 1773, when the arrival of tea ships aroused the Sons of Liberty to renewed activity. By 1775 the Provincial Assembly had become devotedly Tory, and unrepresentative of popular opinion. Its last session occurred on April 3d. On April 20th a Provincial Congress, comprising representatives of seven counties outside of New York City, met at New York, and elected delegates to the Continental Congress. Upon the news of the battle of Lexington a committee of 100, in which the more conservative element among the revolutionists predominated, took possession of the Government and issued a call for a provincial convention, which assembled July 10, 1776, at White Plains, and subsequently removed to Kingston, where it adjourned April 20, 1777, after drawing up a constitution for the State of New York. For military events during the War of the Revolution, see UNITED STATES.

The Articles of Confederation were ratified in 1778. Two years later New York ceded its pub-

lic lands in the West to Congress, and in 1786 it terminated its dispute with Massachusetts by granting it the right of preëmption to about 6,000,000 acres of land in the western part of the State. Of this vast tract more than 3,500,000 acres came by purchase into the possession of Robert Morris (q.v.), who disposed of a large area, embracing a considerable part of that section of the State, to a number of citizens of Amsterdam, who in 1798 were authorized by the Legislature to hold land within the State. This tract came to be popularly known as the Holland Purchase. Land speculation was entered into on an extensive scale, and the region filled up rapidly with immigrants from New England. The dispute regarding the possession of Vermont, to which New York laid claim, was settled by the erection of an independent State, Vermont being admitted into the Union in 1791. The fear of too strong a central government and the desire to retain possession of its rich custom-house made New York ill-inclined toward the newly framed Federal Constitution. Two of its three delegates withdrew from the Federal convention, and only after ten States had adopted the Constitution did a State convention ratify it, by 30 votes to 27 (July 26, 1788). From the very outset party lines were sharply drawn in the State. The Federalists were led by Alexander Hamilton, John Jay, and General Schuyler. Among the leaders of the various factions of the Republicans were the two Clintons—George, and after him De Witt—the Livingstons, and Aaron Burr. Federalist from 1795 to 1800, the State became Republican after that year, and passed under the domination of De Witt Clinton, who remained in power till 1822 except for a brief period of eclipse between 1815 and 1817. Politics during this period were venal, and personal ambitions determined the attitude of factions. The followers of the ascendent faction were rewarded with the grant of bank charters and valuable franchises, and, favored by the provisions of the Constitution, which gave the power of appointment to office and removal to a council of appointment (in 1821 there were 15,000 offices, military and civil, at its disposal), the spoils system was developed to perfection and was introduced later by Van Buren into national politics. To De Witt Clinton is due the rise of the canal system which brought such prosperity to the State. The project of an Erie Canal had been discussed by Gouverneur Morris in 1777; it was revived by Clinton in 1810, and work on the Erie Canal was begun in 1817 and terminated in 1825. The success of the undertaking brought about Clinton's election to the Governorship in 1824 and 1826, though his political following had really been shattered.

Clinton was succeeded in power by the Albany Regency (q.v.), a group of men headed by Martin Van Buren, Silas Wright, William L. Marcy, and John A. Dix, who made machine politics an exact science. Personal rivalries and short-lived popular movements determined the general course of events. From 1836 to 1842 the anti-Masonic agitation (see ANTI-MASONS), assiduously fanned into life by Thurlow Weed, was powerful enough to decide the outcome of State elections. The anti-rent troubles originating in the grievances of the farmers against their landlords—the successors of the patroons and the great land companies—lasted from 1836 to 1846, when feudal tenure was abolished by the new

Constitution. (See ANTI-RENTISM.) The attitude of the Democrats toward such questions as anti-Masonry, State and national banks, and the canal system, was not uniform. Dissensions between the Conservatives (see HUNKERS) and the Radicals (see BARNBURNERS) enabled the Whigs to carry the State in 1838. After 1840, when the Liberty Party arose, the anti-slavery feeling was strong in the agricultural parts of the State, and in 1848 the Barnburner Democrats, led by Van Buren, broke away to aid in forming the Free-Soil Party. The Whigs and Know-Nothings gained and lost power in swift succession before the Civil War broke out. The mercantile and manufacturing classes in 1860 advocated peace at any price, but the mass of the people were Unionist. The reaction following upon the disasters of the first year and a half of the war put the Democrats into power. In July, 1863, occurred the draft riots in New York City. (See DRAFT RIOTS IN NEW YORK.) The war measures of President Lincoln were denounced violently by the State authorities, and the election of 1864 was bitterly fought, the outcome being decided in favor of the Republicans by the votes of the men at the front.

The economic development of New York has continued uninterrupted after the war, and has fully justified its title of the 'Empire State.' Its history, however, has been characterized by much of that corruption which has marked the post-bellum politics of many States. The period in general presents a dead level of partisan rule relieved by occasional spasmodic upheavals of civic virtue. The gubernatorial power, nevertheless, has been repeatedly in the hands of able men, several of whom attained national eminence. From 1863 to 1871 New York City was ruled by the notorious William M. Tweed (q.v.). In 1875, and again in 1899, frauds in connection with the management of the State canals, involving high officials and others, together known as the Canal Ring, were discovered. In the assignment of public contracts much dishonesty was displayed. The State Capitol at Albany and the county court house at New York are monuments of what patient industry may accomplish in the way of nursing a modest estimate into an enormous defalcation. Many attempts, however, were made to remedy political evils by legislation. Laws were passed to check lobbying, to insure honest party primaries, and to reform the civil service. The question of tax reform was an important subject of legislation after 1880, and brought the State into conflict with the powerful railway, gas, and insurance corporations upon the question whether their capital stock and the value of their franchises were subject to taxation or not. The rise of the Labor Party in 1886 was the cause of much important labor legislation. Laws limiting the hours of daily work and protecting women and children in factories and shops were passed in 1892 and subsequently. Much attention has been devoted to the preservation of the Adirondack forests. In 1867 the public schools of the State were made entirely free, and in 1875 primary education was made compulsory.

The Constitution of 1777 was revised in 1821; the councils of revision and appointment were abolished, and the Governor was given the veto power. Many offices formerly filled by appointment were made elective, and, in general,

the new Constitution represented a great advance toward democracy. This tendency was continued in the Constitution of 1846, which put an end to feudal tenure in lands, abolished the court of chancery, established a court of appeals, and made all judges of the higher courts elective. By amendments adopted in 1869 (when a new Constitution framed in 1867 was rejected by the people), 1874, and 1882, further reforms in the judiciary were carried out, negro voters were freed from the property qualification hitherto imposed upon them, penalties for bribery and corruption in office were established, and the canals were freed from toll. Of the thirty-four amendments submitted to the people by the Constitutional Convention of 1894, the most important among those adopted were concerned with the reform of the judiciary, the shortening of the Governor's term to two years, and the re-apportionment of the legislative districts of the State.

New York is an uncertain State both in national and State elections, and the influence exerted by its large electoral vote on the outcome of Presidential contests has given it the well-earned name of the 'pivotal State.' Notable cases were the elections of 1844, 1848, and 1884. In 1844 Polk received 1,337,243 votes in the State, against 1,299,062 votes cast for Henry Clay, and 62,300 votes cast for Birney, the candidate of the Liberty Party. Polk thus failed to secure an absolute majority, but won the State and the Presidency by a slight plurality. In 1848 the dissensions in the Democratic Party in the State enabled Taylor to secure the Presidency. In 1884 Cleveland, the Democratic candidate, carried the State by a plurality of 1149 and secured the Presidency. New York voted for the Republican candidates from 1796 to 1808. In 1812 it cast its vote for De Witt Clinton, who had been nominated by the section of the Republican Party opposed to the domination of the Congressional caucus, and had been indorsed by the Federalists. It voted for Monroe in 1816 and 1820, divided its vote among Adams, Crawford, Clay, and Jackson in 1824 (26 out of 36 for Adams), and between Adams and Jackson in 1828 (20 out of 36 for Adams). It was Democratic in 1832, 1836, 1844, and 1852, and Whig in 1840 and 1848. From 1856 to 1864 it was Republican, and then entered on a course of vacillation. It voted for Seymour (Democrat) in 1868, Grant (Republican) in 1872, Tilden (Democrat) in 1876, Garfield (Republican) in 1880, Cleveland (Democrat) in 1884, Harrison (Republican) in 1888, and Cleveland (Democrat) in 1892. The State went decidedly Republican on the money question in 1896 and 1900. The following is a list of the Governors of New York as a colony and a State:

DIRECTORS-GENERAL OF NEW NETHERLAND

Cornelis Jacobsen May.....	1624-25
William Verhulst.....	1625-26
Peter Minult.....	1626-33
Wouter Van Twiller.....	1633-38
William Kieft.....	1638-47
Peter Stuyvesant.....	1647-64

ENGLISH COLONIAL GOVERNORS

Richard Nicolls.....	1664-68
Francis Lovelace.....	1668-73

DUTCH OCCUPATION

Anthony Colve.....	1673-74
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ENGLISH COLONIAL GOVERNORS

Edmund Andros.....	1674-83
Thomas Dongan.....	1683-88
Francis Nicholson (Lieutenant-Governor under Governor-General Andros).....	1688-89
(Jacob Leisler).....	1689-91
Henry Sloughter.....	1691
Major Richard Ingoldsby (acting).....	1691-92
Benjamin Fletcher.....	1692-98
Richard Coote, Earl of Bellomont.....	1698-1701
John Nanfan (acting).....	1701-02
Edward Hyde, Lord Cornbury.....	1702-08
John, Lord Lovelace.....	1708-09
Richard Ingoldsby (acting).....	1709-10
Gerardus Beekman (acting).....	1710
Robert Hunter.....	1710-19
Peter Schuyler (acting).....	1719-20
William Burnet.....	1720-28
John Montgomerie.....	1728-31
Rip van Dam (acting).....	1731-32
William Cosby (acting).....	1732-36
George Clarke.....	1736-43
George Clinton.....	1743-53
Danvers Osborne.....	1753
James de Lancey (acting).....	1753-55
Charles Hurdy.....	1755-57
James de Lancey (acting).....	1757-60
Cadwallader Colden (acting).....	1760-61
Robert Monckton.....	1761
Cadwallader Colden (acting).....	1761-65
Henry Moore.....	1765-69
Cadwallader Colden (acting).....	1769-70
John Murray, Lord Dunmore.....	1770-71
William Tryon.....	1771-77

STATE GOVERNORS

George Clinton.....	1777-95
John Jay.....	1795-1801
George Clinton..... Democratic-Republican.....	1801-04
J. Morgan Lewis.....	1804-07
Daniel D. Tompkins.....	1807-16
John Taylor (acting).....	1816-17
De Witt Clinton.....	1817-23
Joseph C. Yates.....	1823-25
De Witt Clinton.....	1825-28
Nathaniel Pitcher (acting).....	1828-29
Martin Van Buren..... Democrat.....	1829
Enos T. Throop.....	1829-33
William L. Marcy.....	1833-39
William H. Seward..... Whig.....	1839-43
William C. Bouck..... Democrat.....	1843-45
Silas Wright.....	1845-47
John Young..... Whig.....	1847-49
Hamilton Fish.....	1849-51
Washington Hunt.....	1851-53
Horatio Seymour..... Democrat.....	1853-55
Myron H. Clark..... Whig.....	1855-57
John A. King..... Republican.....	1857-59
Edwin D. Morgan.....	1859-63
Horatio Seymour..... Democrat.....	1863-65
Reuben E. Fenton..... Republican.....	1865-69
John T. Hoffman..... Democrat.....	1869-73
John A. Dix..... Republican.....	1873-75
Samuel J. Tilden..... Democrat.....	1875-77
Lucius Robinson.....	1877-79
Alonzo B. Cornell..... Republican.....	1879-83
Grover Cleveland..... Democrat.....	1883-84
David Bennett Hill (acting).....	1884-86
David Bennett Hill.....	1886-92
Roswell P. Flower.....	1892-95
Levi P. Morton..... Republican.....	1895-97
Frank S. Black.....	1897-99
Theodore Roosevelt.....	1899-1901
Benjamin B. Odell.....	1901—

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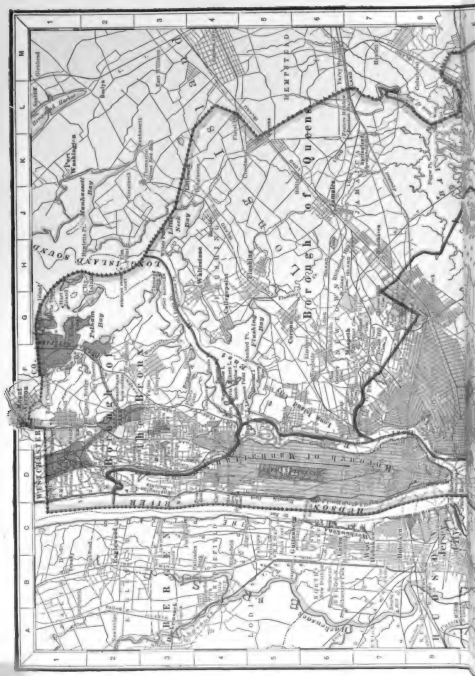
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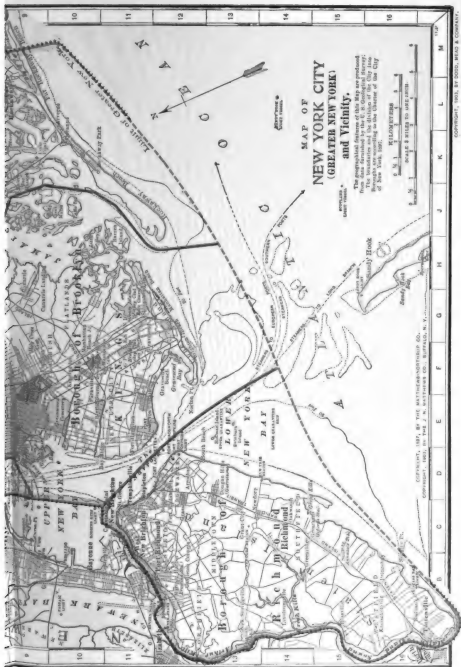
NEW YORK. The chief city of the State of New York, the commercial metropolis of the United States, the largest city of the Western Hemisphere, and after London the largest city in the world. It is situated at the mouth of the Hudson River, which enters the Atlantic Ocean through New York Bay, 205 miles in a direct line northeast of Washington, 715 miles east by south of Chicago, and 190 miles southwest of Boston; latitude of the City Hall, 40° 42' N., longitude 74° W.

The climate, on the whole, is very healthful and enjoyable, but is subject to great extremes. As the continental climate extends to the Atlantic coast of North America, the temperatures of New York City depend, to an important extent, upon the meteorological conditions of the interior regions. The humidity due to the proximity of the sea tends to increase the discomfort both of oppressively hot and severely cold days. The average annual temperature is about 54° Fahr. The mean temperature of the three winter months is about 34°; spring, 52°; summer, 75°; autumn, 57°. July is almost invariably a little warmer than the other summer months. The temperature of the hottest day ranges from 90° to 99°, and the mercury sometimes falls to zero or even below. The annual precipitation is from 36 to 42 inches, the amount of snow being from 20 to 30 inches. Cyclonic storms from the West Indies occasionally bring very high winds, accompanied with a heavy fall of rain or snow.

New York Harbor, one of the finest in the world, has an entrance about a mile wide, between Fort Hamilton, the southwest corner of the Borough of Brooklyn, and Fort Wadsworth, the point opposite on Staten Island. This entrance, known as the Narrows, leads into a fine bay bounded by New Jersey and Manhattan Island on the north, Long Island on the east, Staten Island on the southwest, and New Jersey on the west. It is about five miles wide and six miles long from north to south. The bronze statue, 'Liberty Enlightening the World,' by Bartholdi (see LIBERTY, STATUE OF), the largest statue of modern times, 151.41 feet in height, stands upon a pedestal 155 feet high on Bedloe's Island in the bay. The torch held aloft by the figure is lighted at night by electricity. Governor's Island, near the Battery, the southern point of Manhattan Island, containing 65 acres, is occupied by the United States Government for military purposes. Ellis Island, a mile and a half from the Battery, architecturally prominent, with a fine modern building, also belongs to the United States Government and is used as a landing place for immigrants. On Swinburne and Hoffman Islands, in the Lower Bay, are institutions of the Quarantine Station.

Previous to 1874 the city did not extend beyond Manhattan Island. At the beginning of that year parts of Westchester County were incorporated with it, and in 1895 more territory in Westchester County was annexed. In 1898 the city's





boundaries were enlarged to include Kings County and part of Queens County, on Long Island, the whole of Richmond County (Staten Island), and part of the towns of East Chester and Pelham, south of Westchester County. The city, which embraces an area of 309 square miles, consists of five boroughs. These, in order of area, rank as follows: Queens (124 square miles), Brooklyn (66 square miles), Richmond (57 square miles), the Bronx (40 square miles), and Manhattan (22 square miles). The Borough of Manhattan consists of Manhattan Island (q.v.) and several small islands adjacent. The Borough of Brooklyn is coextensive with Kings County. (See BROOKLYN.) All that section of the city north-east of the Harlem River, with a number of islands, constitutes the Borough of the Bronx. It is nearly bisected by the Bronx River, and is mainly residential, its northern portion having a

Manhattan Island (q.v.), which contains the chief offices of the city, its greatest banks, business houses, museums, tenements, and palaces, lies between the Hudson, East, and Harlem rivers, and is $13\frac{1}{2}$ miles long, with a greatest breadth of $2\frac{1}{4}$ miles at Fourteenth Street. The southern end of the island is laid out irregularly, the early settlers having built their houses wherever they saw fit, the streets being laid out afterwards. Above Canal Street there is greater regularity, while above Tenth Street the city is laid out, with a few exceptions, in blocks about 200 feet in length from north to south, and from about 400 to about 900 feet from east to west. The cross streets are 60 feet wide, as a rule, although there are a number 100 feet wide, placed at an average distance of half a mile apart, in order to facilitate heavy traffic. The avenues running north and south are generally 100 feet wide.

The great artery of New York is Broadway, which unfortunately is only 80 feet wide in the business section of the city, its width being nearly doubled in its northern half. On the east side of the city along the avenues D, C, B, A, First, Second, and Third, counting west from the East River, and in an adjoining area to the south, are the great tenement house districts. On the West Side, along the Hudson, and including the district between Seventh and Tenth Avenues, are manufacturing plants, lumber yards, gas houses, and also many cheap tenements. In the central part of the city, toward the southern end of the island, with Broadway as the main artery, are the largest banks and great commercial houses. Farther up is



WALL STREET ABOUT 1765.

distinctly suburban character, though much of the southern part is closely built up. The Borough of Queens includes that portion of Long Island within the municipal limits, to the north and east of Brooklyn. It comprises Long Island City, Flushing, Jamaica, Newtown, and part of Hempstead. A number of the islands in Jamaica Bay belong to the Borough of Queens. Long Island City is noted for its great industrial establishments. The remainder of the borough consists of many pretty suburban villages and not a few tracts of farm land. The Borough of Richmond is coextensive with Richmond County, the whole of Staten Island. It is largely a district of residences, although it contains a great number of establishments. The seaside resorts in the boroughs of Brooklyn, Queens, and Richmond are frequented in summer by thousands. New York extends over a distance of more than 30 miles from the Yonkers line on the northeast to the southwest extremity of Staten Island.

the retail shopping district, and above that are the homes of the well-to-do classes. Fifth Avenue, which but a few years ago was occupied solely by the homes of rich people, is becoming more and more a business thoroughfare as far as Fiftieth Street. Above Fiftieth Street, however, the character of the present structures—churches, fine club houses, and the spacious homes of the rich—will probably prevent great changes. In 1865, when Central Park was approaching completion, the districts on both sides of the park east and west were entirely unimproved. Along Fifth Avenue, from Sixtieth Street to One Hundredth Street, there were not a dozen houses, where to-day is a solidly built line of handsome dwellings. On the west side of the park the change has been still greater, but in addition to private dwellings there are hundreds of apartment houses. On Riverside Drive, the boulevard which skirts the Hudson River, there are both private residences and

apartment houses. Riverside Drive is one of the most beautiful avenues in the world. Uptown along the West Side there are miles of small, artistic private houses until the neighborhood of 110th Street is reached, where over large areas apartment houses are again the rule. The upper part of the island along the East Side is solidly built up with tenement houses. A rocky ridge, rising steeply from the Hudson, with an equally abrupt descent toward the east, extends through

a cañon than a street. Chief among the buildings here are the great banks, and the Sub-Treasury, a Doric building of granite, upon the site of the old City Hall, from the balcony of which Washington was inaugurated as first President of the United States. In Broad Street, which runs south from the Sub-Treasury, is the new Stock Exchange, costing \$2,000,000. Opposite the Stock Exchange is the Mills Building, erected twenty years ago at a cost of \$4,000,

000. It was the first of the luxurious office buildings in the financial district. On the other side of Exchange Place is the Broad-Exchange, a twenty-story granite pile. Trinity Church, the most interesting of New York's churches, stands upon land granted by the English Government in 1697. The original plot embraced a tract of many acres running down to the Hudson River. The first church was completed in 1697, the present one in 1846.



BROAD STREET IN 1796.

the upper part of Manhattan Island, rising finally into hills of nearly 250 feet elevation. These eminences, in part known as Washington Heights, offer charming sites for dwellings, and are in some places compactly built up, while extensive tracts are still covered with woods, presenting exquisite bits of scenery along the Hudson and Harlem rivers.

Blackwell's, Ward's, and Randall's islands, picturesquely situated in the East River, are used for city institutions for the care of the poor, sick, and disorderly. Contagious disease hospitals are maintained by the city on the small islands off Port Morris, in the Borough of the Bronx.

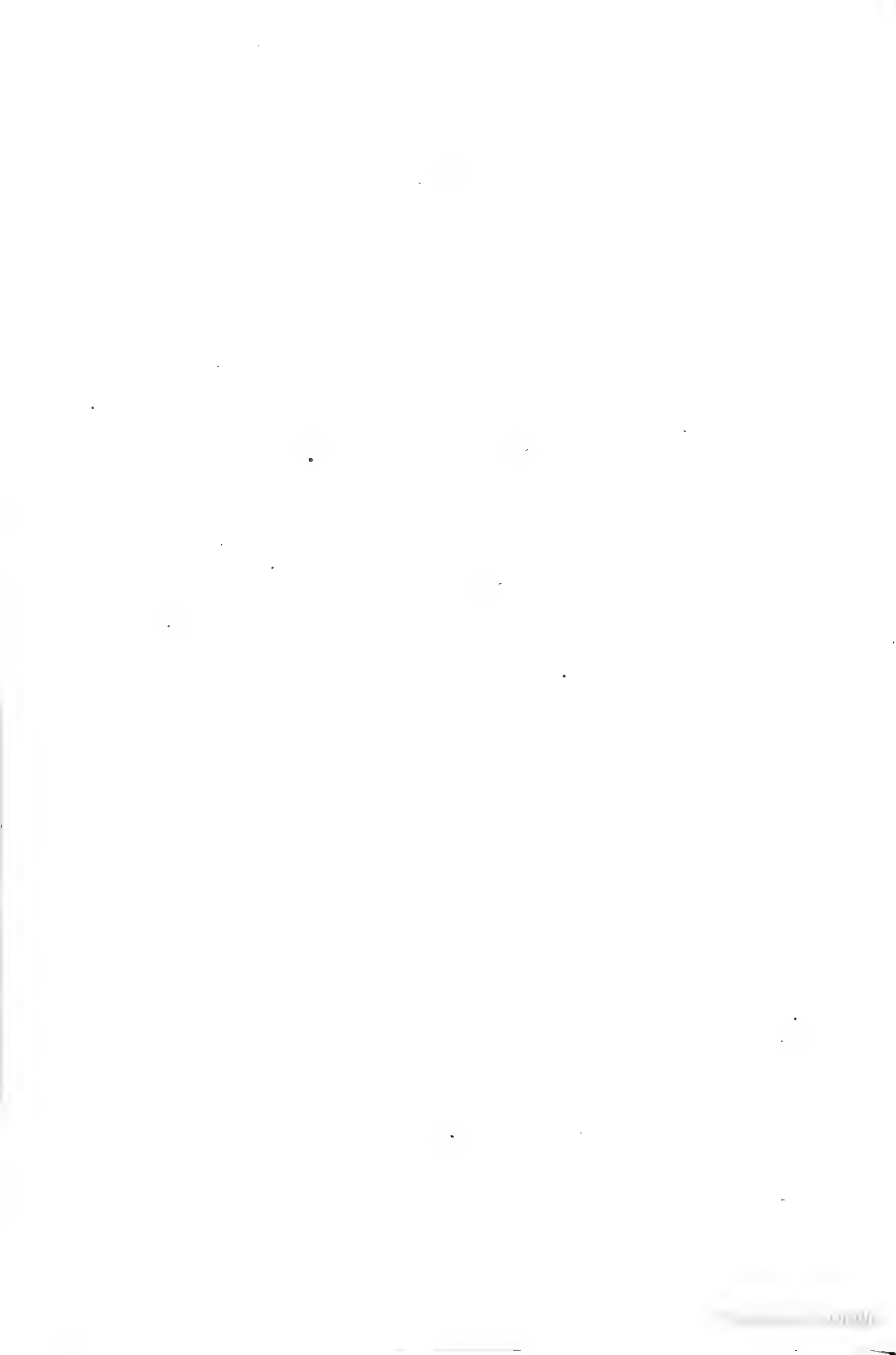
BUILDINGS. Viewed from the bay, the business part of the Borough of Manhattan presents a most extraordinary conglomeration of towering office buildings, varying from ten to twenty-five stories in height, huddled together in apparent confusion upon a strip of land less than a mile wide. Beginning at the Battery, the first building of importance is the Produce Exchange, a modern Renaissance structure of brick and terra cotta, with a fine tower 225 feet high. Opposite the Exchange, on Bowling Green, is the new Custom House, upon the site of the official residence built by the city for General Washington. From Bowling Green to Wall Street, Broadway is lined with immense business structures, each of them costing millions of dollars, occupied by the Standard Oil Company, the Manhattan Life Insurance Company, the Commercial Cable Company, the Union Trust Company, and other large corporations. The Consolidated Stock and Petroleum Exchange is at Broadway and Exchange Place. From Trinity Church, running east to the river, is Wall Street, a narrow thoroughfare so completely lined on both sides with buildings from twelve to twenty stories high, used by banks and financial institutions, as to resemble more

It is a Gothic structure of brown stone. In the churchyard are many monuments in memory of well-known persons. On Broadway, from Trinity Church to the City Hall, are some of the most imposing of the insurance buildings. That of the Equitable Life Assurance Society occupies a whole block. Here also is the building of the American Surety Company, with a cornice 307 feet above the pavement and a foundation extending 72 feet below the street. On the opposite side of Broadway is the main office of the Western Union Telegraph Company. In Cedar Street, a few doors from Broadway, is the Clearing House, maintained by the associated banks of New York. It is a beautiful structure of white marble. In Liberty Street is the palatial home of the Chamber of Commerce. At the junction of Broadway and Park Row stands the Post Office, a large and imposing composite structure, of Doric and Renaissance, upon a triangular plot. Opposite the Post Office is Saint Paul's Chapel, where Washington's pew is shown. Across the way is the old Astor House, a granite hotel which fifty years ago was considered the most luxurious establishment of its kind in the country. Above the Post Office is the City Hall, in City Hall Park. Near by are the entrance to the Brooklyn Bridge, the great buildings of the *World*, *Tribune*, and *Times* on the east, and the lofty structures of the Postal Telegraph Building and Home Insurance Company on the west. To the south is the Park Row Building, one of the tallest in the country, twenty-five stories high, not counting the towers. The City Hall is the most beautiful of New York's earlier buildings. It was begun in 1803 and finished in 1812 at a cost of \$500,000. White marble was used for the front and sides, but brown stone for the back, as it was supposed that the city would not extend beyond it. Back of the City Hall is the



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NEW YORK
VIEW OF THE SOUTHERN END OF MANHATTAN ISLAND



County Court House, a marble building in Corinthian style, and almost opposite, at the corner of Chambers and Centre Streets, is the new and palatial Hall of Records. The Criminal Courts Building, a superb structure on Centre Street, is connected with the Tombs Prison by a covered bridge. The Tombs, a nickname of the city prison, suggested by its original gloomy architecture in Egyptian style, rebuilt in 1898 and much enlarged, is now, architecturally, one of the finest of modern prisons.

Broadway, from Chambers Street to Tenth, is largely given up to wholesale trade, one of the most prominent features along the route, however, being the massive building of the New York Life Insurance Company. West of Broadway, below Canal Street, lies the great wholesale dry goods centre of the United States, and farther uptown are the wholesale dealers in straw goods, millinery, feathers, and ready-made clothing. Where Broadway changes its direction at Tenth Street, the character of business changes.

Here is Grace Church, one of the most attractive ecclesiastical edifices in New York. It is an ornate Gothic structure, built of white limestone. There are other buildings connected with the church, the whole forming a striking group. In this neighborhood are the Astor Library, long the most important library in the city, the Mercantile Library, and at Fourth Avenue and Eighth Street, Cooper Union (q.v.), a brownstone building erected in 1857. Union Square, once the limit of the retail business of the city, and until 1860 surrounded by private houses, is now wholly given up to business. At the lower end of Fifth Avenue, in Washington Square, stands the Washington Arch, erected by popular subscription at a cost of \$128,000, and completed in 1892. It is 70 feet high. On the east side of Washington Square is the large building of New York University, housing the schools of Law and Pedagogy and the Graduate School, and various business establishments. It occupies the site of the celebrated Gothic collegiate structure pulled down in 1894-95. In the district north by east of Union Square lies Gramercy Park, and, at Second Avenue, Stuyvesant Square, on which stands Saint George's Church, with its lofty spires. At Eleventh Street and Second Avenue is the old home of the New York Historical Society, built in 1857. The new building of the society, at Seventy-sixth Street and Central Park West, will cost \$1,000,000. The new Lying-In Hospital at Second Avenue and East Seventeenth Street is one of the handsomest structures of its class in the city. Bellevue Hospital, founded in 1826, occupies two blocks extending from Twenty-sixth to Twenty-eighth street on First Avenue to the East River; the City Morgue is situated in the grounds at the foot of Twenty-sixth Street. Broadway from Ninth Street to Thirty-fifth Street, Sixth Avenue, and Fourteenth and Twenty-third streets contain most of the great retail shops of the metropolis. When the *Herald* Building, copied after a Venetian palace, was built at Thirty-fifth Street and Broadway in 1894, there were but few large retail stores in the neighborhood. To-day the vicinity of Broadway and Thirty-fourth Street bids fair to become the centre of retail trade. One of the largest department stores in the country occupies the block on the west side of Broadway between

Thirty-fourth and Thirty-fifth streets. Along the line of Broadway, from Twenty-third to Fifty-ninth street, are situated a number of important hotels, apartment houses, and the leading theatres of the city. At the angle of Broadway and Fifth Avenue, upon a triangle, 87 by 190 feet, stands a twenty-story wedge-shaped building known as the 'Flatiron,' visible for miles, and presenting a striking architectural contrast with the Madison Square Garden. The graceful tower of the latter, copied from the Giralda of Seville, is surmounted by a gilded statue of Diana. On the east side of Madison Square is the handsome office building of the Metropolitan Life Insurance Company. Another beautiful and imposing marble building is the Court House at Twenty-fifth Street and Madison Avenue, used by the Appellate Division of the Supreme Court.

Saint Patrick's Cathedral (Roman Catholic) on Fifth Avenue, between Fiftieth and Fifty-first streets, ranks among the most imposing Gothic edifices in this country. It is built of white marble in the form of a Latin cross, and its two beautiful spires rise to a height of 332 feet. It cost \$2,000,000. The corner-stone was laid in 1858, and the church was dedicated on May 25, 1870. At Forty-second Street and Fourth Avenue is the Grand Central Station. Above Fifty-ninth Street, on Broadway, apartment hotels are the great feature of this thoroughfare. The first hotels of this character, in which the tenants furnish their own apartments, but take their meals in a common dining-room, appeared in 1888. To-day there are more than one hundred apartment hotels in Manhattan, each housing from 40 to 200 families, and many more are being built. One of the largest groups of apartment houses is that known as the Navarro, at Seventh Avenue and Fifty-ninth Street, built about sixteen years ago at a cost of \$5,000,000. Another noted building of this type is the Dakota, at West Seventy-second Street, facing Central Park. One of the largest of the new apartment hotels is the Ansonia, at Seventy-fourth Street and Broadway, which covers a plot of land 200 X 400 feet, and is 16 stories high.

At 116th Street are the buildings of Columbia University, including a magnificent library, costing about \$1,000,000. Near by are Saint Luke's Hospital and the beginnings of the great Protestant Episcopal Cathedral of Saint John the Divine. The building stands upon a rocky bluff overlooking the Harlem plains on the east. Various estimates of from thirty to fifty years as the time required to finish the building have been made, and the cost may be anywhere from ten to twenty million dollars. In vastness of dimensions and beauty of design it will take its place among the great cathedrals of the world. On Amsterdam Avenue, between 109th and 110th streets, the new building of the National Academy of Design is approaching completion, the well-known Venetian-Gothic building, formerly occupied by the Academy, at the corner of Twenty-third Street and Fourth Avenue, having been demolished in 1901. Facing Central Park on the west side of Seventy-seventh Street is the Museum of Natural History, one immense wing of which, the southern façade, is already complete. On the east side of the park, and within it, facing on Fifth Avenue at Eighty-second Street, is the Metropolitan Museum of Art. The Lenox Library occupies a massive limestone building fronting Cen-

tral Park, between Seventieth and Seventy-first streets. Farther up Fifth Avenue at One Hundredth Street is the new Mount Sinai Hospital, one of the largest and most perfectly appointed in the country. At 123d Street and Riverside Drive is the tomb of General Grant, a mausoleum in classic style, covering an area about 100 feet square and rising 160 feet from the ground. It stands upon a bluff overlooking the Hudson. The cornerstone was laid in 1892 and the building was dedicated on April 27, 1897. The bodies of General Grant and of his wife lie in twin granite sarcophagi in the crypt under the dome. Farther north, in the Borough of the Bronx, are the handsome library and other buildings of New York University.

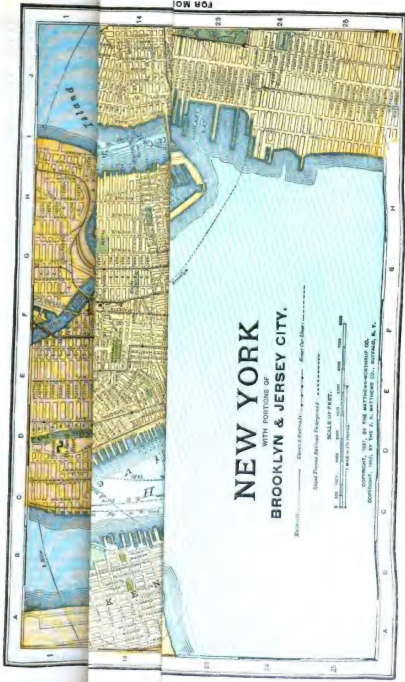
PARKS. The first proposal to make a public park for New York was about the beginning of the last century. In 1802 some citizens advocated the setting aside for this purpose of twenty acres around the Collect Pond, a sheet of water situated where the Tombs prison now stands, which was used in summer for boating and in winter for skating. The scheme was rejected, on the ground that the proposed park would be too far from the city. Washington Square, at the beginning of the century the Potter's Field, was redeemed about 1840, and a little later Union Square and Madison Square were cleared of squatters and laid out as parks. It was William Cullen Bryant who first proposed to make a large public park in the upper part of the city. In 1840 he suggested the appropriation of a strip of land known as the Goose Pasture at Sixtieth Street. His plan was to take a section running across the island from river to river. A strip of land was finally appropriated for a public park, but running north and south instead of east and west. Work was begun in 1857. Central Park is now one of the most beautiful pleasure-grounds in the world. It contains 840 acres. About 400 acres are wooded, this area including specimens of nearly every tree and shrub that can be made to grow here. There are nine miles of drives, with thirty miles of foot-paths and other roads; many bridges, archways, and tunnels; several lakes; a large reservoir a mile and a half in circuit; an imposing mall, lined with superb trees; and a large number of statues. Zoölogical and botanical gardens are also among its attractions. On fine days in summer from fifty to sixty thousand persons visit the park. Lawns are provided for free tennis courts, and there is a field for baseball and other games. One of the chief curiosities of Central Park is the Obelisk (see CLEOPATRA'S NEEDLES and OBELISK) presented to the city by the late Khedive of Egypt, Ismail Pasha, which was brought here in 1880.

In Central Park are an equestrian statue of Simon Bolivar, the gift of Venezuela; a bronze statue of Burns, presented by resident Scotchmen; a granite statue of Alexander Hamilton; a life-size bronze statue of Morse, erected in 1871 by the telegraphers of the country; a bronze statue of Sir Walter Scott by John Steele; a bronze statue of Shakespeare by J. Q. A. Ward, unveiled on May 23, 1872, the 300th anniversary of the poet's birth; a bronze statue called "The Pilgrim," by J. Q. A. Ward, commemorating the landing of the Pilgrims in 1620; an heroic bronze statue of Daniel Webster, by Thomas Ball; and busts of Beethoven, Cervantes, Humboldt,

Schiller, and Thomas Moore. At the entrance to the park at Fifty-ninth Street and Eighth Avenue stands a marble monument to Columbus, a shaft surmounted by a statue, unveiled in 1892. At the Sixth Avenue and Fifty-ninth Street entrance is a bronze statue of Thorwaldsen, erected in 1894 by the Danes of New York. On the Plaza at Fifth Avenue and Fifty-ninth Street is an imposing equestrian statue of General Sherman by Augustus Saint Gaudens. Opposite the Lenox Library, at Seventieth Street and Fifth Avenue, is a memorial to Richard M. Hunt, the architect, consisting of a semi-circular bench with a bronze bust of Hunt, by French, and ornamental figures. The most notable statues in other parts of the city are the bronze figure of Peter Cooper, south of the Cooper Union, by Saint Gaudens; the bronze statue of John Ericsson, by J. Scott Hartley, at the Battery; the statue of Farragut, by Saint Gaudens, in Madison Square Park; the bronze statue of Garibaldi, in Washington Square, by Turini, presented to the city by the Italian residents; the colossal bronze statue of Horace Greeley, in Greeley Square, by Alexander Doyle; the bronze statue of Lafayette, by Bartholdi, in Union Square, presented by French residents in 1876; the bronze statue of Abraham Lincoln, in Union Square, modeled by H. K. Browne, and erected by popular subscription in 1867; the equestrian statue of Washington, in Union Square, also by Browne; and the colossal bronze figure of Washington, by J. Q. A. Ward, at the entrance of the Sub-Treasury in Wall Street.

The most important park of the city after Central Park is Brooklyn's pleasure-ground, Prospect Park. (For description, see BROOKLYN.) The third in interest is Bronx Park, which includes an area of 661 acres on both sides of the Bronx River. It has superb botanical and zoölogical gardens, opened to the public in 1899. Van Cortlandt Park, north of Kingsbridge, is even larger in extent (1132 acres), but is as yet largely undeveloped. The old Van Cortlandt mansion here, erected in 1784, now serves as an historical museum. There are golf links, grounds for baseball, tennis, and polo, and a lake frequented in winter by thousands of skaters. Pelham Bay Park, on the Sound, near Baychester, is the largest of the New York City parks, containing 1756 acres. It is diversified by lakes and islands, and has a shore line of nine miles. These three suburban parks, the Bronx, Van Cortlandt, and Pelham, are connected by a driveway, maintained by the Park Department. On Manhattan Island millions of dollars have been spent in reclaiming and beautifying the strip of land along the edge of the Hudson River from Seventy-second Street to 130th Street, known as Riverside Park, and since 1901 a handsome viaduct and driveway across Manhattan Valley connects the Park with the northern heights. Morningside Park, the bluff at Columbus Avenue, between 110th and 123d Streets, has also been laid out with excellent taste. The Hudson River Speedway, extending for two miles along the western bank of the river from 155th Street to 208th Street, was completed in 1898. Above Manhattan Island are Crotona and Claremont Parks, near the village of Tremont, and Saint Mary's Park (28 acres) at 149th Street. There are many squares and small parks throughout the city. The playgrounds and recreation piers, of which

FOR MO



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WITH PORTIONS OF
BROOKLYN & JERSEY CITY.

SCALE OF FEET.



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there are several, should be mentioned in connection with this phase of municipal activity. The Park Department has also under its care a well-stocked aquarium (q.v.) in the old Castle Garden at the Battery.

CHURCHES. There are about 1200 churches in the City of New York, not counting those of Brooklyn, ranging in seating capacity from 200 to 2,000. The Dutch Reformed Church (36 societies) has the oldest Protestant organization in New York. The finest of its churches is the Third Collegiate, at Fifth Avenue and Forty-eighth Street, which owes its ample endowment to fortunate real estate investments. Other handsome buildings of this denomination are the Bloomingdale Church, at the Boulevard and Sixty-eighth Street, and the Holland Church, at Fifth Avenue and Twenty-ninth Street. Next in antiquity is the Protestant Episcopal Church (85 parishes). Something has already been said of the parent church, Trinity, of the new cathedral of Saint John the Divine, and of Grace Church. This denomination possesses a number of notable buildings, several of which are chapels of Trinity, built and supported out of its endowment. Saint George's, the Transfiguration (at Twenty-ninth Street and Madison Avenue), Saint Thomas's, and Saint Bartholomew's are all fine examples of ecclesiastical architecture. The most noted Presbyterian church (57 churches) is that known as the Fifth Avenue, at Forty-fifth Street. The Madison Square Church and the Brick Church, at Fifth Avenue and Thirty-seventh Street, are among the strongest organizations of the denomination. The John Street Methodist Episcopal Church (60 Methodist and Episcopal churches) occupies the site of the first of this denomination in America, and is known as the cradle of American Methodism. The most noted Baptist church (47 churches) is that at Fifth Avenue and Forty-sixth Street. Among the Congregational churches is the Tabernacle, whose trustees, having sold the old church building at Broadway and Thirty-fourth Street, are now building at Broadway and Fifty-sixth Street. All Souls, at Fourth Avenue and Thirty-fourth Street, is the oldest of the Unitarian churches, while the Divine Paternity, at Central Park West and Seventy-sixth Street, holds a similar position among the Universalist churches. There are 112 parishes of the Roman Catholic faith, the Cathedral of Saint Patrick, at Fifth Avenue and Fiftieth Street, being one of the finest church buildings of the city. The oldest of its churches is Saint Peter's, in Barclay Street, which stands upon the site of a chapel built in 1786. The first Jewish synagogue of the city (94 societies) was the Shearith Israel, founded about 1675, and now possessing a beautiful temple at Central Park West and Seventieth Street. The Temple Emanu-El, at Fifth Avenue and Forty-third Street, the Beth-El, at Fifth Avenue and Seventy-sixth Street, and the Temple Israel, in Harlem, are all fine buildings. Also noteworthy are the temples of the First Church of Christ (Scientist), Central Park West and Ninety-sixth Street, and of the Second Church, Central Park West and Sixty-eighth Street. The Young Men's Christian Association, which for 30 years had its headquarters at Fourth Avenue and Twenty-third Street, has now finished a new house on the same street, west of Seventh Avenue. The association has fifteen branch buildings. That at Madison Avenue and Forty-fifth Street, for

railroad employees, was erected by the late Cornelius Vanderbilt. The Young Women's Christian Association has a beautiful home at 7 East Fifteenth Street.

EDUCATIONAL INSTITUTIONS. The number of schools within the jurisdiction of the city, omitting the Nautical School, exceeds 500. Of corporate schools, orphan asylums, and industrial schools there are above 50, with an average attendance of some 18,000. The College of the City of New York (q.v.), at Lexington Avenue and Twenty-third Street, was established in 1847 under the name of the New York Free Academy. It will soon move to handsome buildings, estimated to cost \$4,000,000, at 138th Street and Convent Avenue. The Normal College, at Sixty-ninth Street and Park Avenue, has accommodations for 1600 students. There is also a State Normal School at Jamaica, in the Borough of Queens. An important work of the Department of Education is the lecture system, under which free evening lectures are given in nearly a dozen places from October to May. The Board of Education also provides free night schools. The most important of the private educational institutions is Columbia University (q.v.), on Morningside Heights. Barnard College (q.v.), for women, and the Teachers College, for both sexes, are affiliated with the university. The College of Physicians and Surgeons (the medical department of the university) occupies extensive buildings on Sixtieth Street, near Roosevelt Hospital. Barnard College and the Teachers College, with which is incorporated the Horace Mann School, also have suitable buildings of their own on Morningside Heights. New York University (q.v.) maintains professional departments in the Borough of Manhattan, and undergraduate and engineering schools at University Heights, in the Borough of the Bronx. Its main site, in the Bronx, on the heights overlooking the Harlem and the Hudson, is one of singular beauty. Here is the Hall of Fame (q.v.). The Union Theological Seminary, which has academic relations with New York University, occupies a building at Fourth Avenue and Sixty-ninth Street. It is one of the chief training schools for ministers of the Presbyterian Church. The Protestant Episcopal Church maintains its General Theological Seminary in a group of beautiful buildings, modeled after the Oxford College type, at Ninth Avenue and Twentieth Street. The new building of the Jewish Theological Seminary of America, in 123d Street, between Amsterdam Avenue and Broadway, was dedicated in 1903. Cooper Union occupies a prominent place among the educational institutions of the city. Its classes, with very few exceptions, are entirely free. The attendance is large. Saint John's College, at Fordham, in the Borough of the Bronx, the College of Saint Francis Xavier, and Manhattan College are important institutions under control of the Catholic Church. Cornell University (q.v.) maintains part of its medical department in New York City. Among independent professional institutions are the New York Law School; the New York Homeopathic Medical College and Hospital, the New York Medical College and Hospital for Women, and the Eclectic Medical College; the New York College of Dentistry and the New York Dental School; and the College of Pharmacy of the City of New York.

LIBRARIES AND MUSEUMS. For many years the Astor Library, founded under the will of John Jacob Astor, who died in 1848, leaving \$400,000 for the purpose, was the only free library of importance in the city. The Mercantile Library, which was founded in 1820, is a subscription library with more than 230,000 volumes. The Astor Library, in Lafayette Place, is entirely for reference, and is visited by about 125,000 readers every year. The Lenox Library (reference), at Fifth Avenue and Seventieth Street, the gift of the late James Lenox, was opened to visitors in 1877. In 1895 the Astor and Lenox libraries and the Tilden trust fund were consolidated as the New York Public Library (q.v.). The number of volumes is now over 785,000. The new building for the Public Library, a vast structure of white marble, 366 feet long and 246 feet wide, is upon the site of the old reservoir at Fifth Avenue, between Fortieth and Forty-second streets. Its estimated cost is about \$5,000,000. It has shelving capacity for 1,250,000 volumes. The first circulating library dates from 1880. There are now sixteen circulating libraries and reading rooms, which form a part of the general system, the New York Public Library, the New York Free Circulating Library, and other libraries having been consolidated. In the same year Andrew Carnegie offered the city \$5,200,000 for the purpose of building branch libraries on condition that the city furnish sites. Some sixty libraries will be built under this gift. The first one was opened in January, 1903. The library of Columbia University contains about 325,000 volumes, of which 10,000 are in the reference room open to the public. The Cooper Union Library contains about 32,000 volumes, the chief feature of which is a complete set of patent office reports. Among the private libraries of importance are those of the Historical Society, the Geographical Society, and the New York Society Library. The last, founded in 1754, has about 100,000 volumes. There are also special collections of books belonging to the American Society of Civil Engineers, the New York Academy of Medicine, with 46,000 volumes, the New York Law Institute, having about the same number, and the Bar Association.

The Metropolitan Museum of Art, the most important in this country, for which a superb series of buildings on the east side of Central Park is projected, and partly completed, is the outcome of a public meeting held in 1869. Gifts came in so rapidly from citizens that the Legislature authorized the building of a fire-proof structure in Central Park at a cost of \$500,000. This was formally opened in 1880. During the last twenty-five years a collection of art objects of every description, to the value of several million dollars, has been gathered, chiefly by gifts from public-spirited citizens. There are paintings, statuary, porcelains, ivories, tapestries, musical instruments, and Greek, Roman, and Egyptian antiquities. In 1902 a handsome entrance wing facing on Fifth Avenue was finished. The Rogers bequest of \$6,000,000 will enable the Museum to make great progress. The American Museum of Natural History, on Central Park West, contains vast collections of stuffed animals, birds, reptiles, fishes, shells, and fossils. The main lecture hall will seat 1000 persons. Museums of great interest are maintained

also by the Historical Society, Columbia University, and the Lenox Library, the last named having a fine picture gallery.

THEATRES, CLUBS, HOTELS. New York has about 40 theatres, in addition to almost as many more variety houses and concert halls. The largest is the Metropolitan Opera House, opened in 1883, which occupies the block bounded by Broadway, Seventh Avenue, Thirty-ninth and Fortieth streets. It seats 3200 persons. Among the largest and most luxurious of the theatres, all of which are on or near Broadway, are the Broadway, at Forty-first Street; the Casino, at Thirty-ninth Street; the Criterion, at Forty-fourth Street; Daly's, at Thirtieth Street; the Knickerbocker, at Thirty-eighth Street; the Empire, at Fortieth Street; the Herald Square, at Thirty-fifth Street; the Garrick, at Thirty-fifth Street; the Manhattan, at Thirty-third Street; Wallack's, at Thirtieth Street; the Savoy, at Thirty-fourth Street; the Victoria and Belasco's, at Forty-second Street; the New York, at Forty-fifth Street; and the Majestic, at Fifty-ninth Street. In other parts of the town should be mentioned the American Theatre, at Eighth Avenue and Forty-second Street; the Garden Theatre, at Madison Avenue and Twenty-seventh Street; and the Irving Place Theatre, a German high-class theatre, at Fifteenth Street and Irving Place. Among the newest theatres are the Lyceum, in Forty-fifth Street, and the Hudson, in Forty-fourth Street. The most important music hall of the city is that built by Andrew Carnegie at Fifty-seventh Street and Seventh Avenue, which is known by its founder's name. It was opened in May, 1891. It is one of the finest concert halls in the world, and cost more than \$1,000,000. The main hall seats 3000 people, and there are two smaller concert rooms. The most important concerts of the season, such as those of the Philharmonic Society, the Boston Orchestra, and the Oratorio Society, are given here. Mendelssohn Hall, a beautiful music room occupied by the Mendelssohn Glee Club, in West Fortieth Street, is used for many of the smaller concerts, recitals, etc. The total seating capacity of New York's places of amusement has been estimated at over 80,000. The Harlem section also has several fine theatres, among which are the Harlem Opera House, near Seventh Avenue on 125th Street, and the West End Theatre, on 125th Street west of Manhattan Avenue. The Star Theatre, at Lexington Avenue and 107th Street, is also a large house.

The clubs of New York number more than 200. The oldest and most conservative of the non-political clubs is the Union, at Fifth Avenue and Fifty-first Street, organized in 1836. The Union League Club, at Thirty-ninth Street and Fifth Avenue, is the largest political club. The most important club of artists and literary men is the Century Association, organized in 1847, which possesses a beautiful building in West Forty-third Street. Among other noted clubs may be mentioned the Army and Navy, City, Calumet, Colonial, Grolier, Knickerbocker, Lawyers', Lotus, Metropolitan, New York, Players', Progress, Reform, and University. The Players' Club, as its name implies, has a membership largely composed of theatrical people. Its beautiful home on Gramercy Park, costing \$250,000, was presented to the club by the distinguished tragedian Edwin





Booth. The University Club membership is restricted to graduates of colleges. Its club house, an imposing structure of granite, opened in May, 1899, at Fifth Avenue and Fifty-fourth Street, is one of the finest in the city. The New York Yacht Club also has a magnificent club house on West Forty-fourth Street.

New York has about 40 hotels that may be ranked as first-class, with as many more in the second class, and perhaps 100 of a lower grade. The largest and best-known is the Waldorf-Astoria. It is built upon the site of the family mansions in which lived for many years John Jacob Astor and William Astor, his brother. This structure covers the block between Thirty-third and Thirty-fourth streets, bordering Fifth Avenue, and having a depth of 500 feet. It is 16 stories in height, and contains over 1000 rooms for guests, a large ballroom, and a number of smaller apartments used for public dinners, concerts, etc. The Buckingham, at Fifth Avenue and Fiftieth Street; the Holland House, at Fifth Avenue and Thirtieth Street; the Murray Hill, at Park Avenue and Forty-first Street; the Manhattan, at Madison Avenue and Forty-second Street; the Netherland and the Savoy, at Fifth Avenue and Fifty-ninth Street, are large and luxurious hostelrys, which accommodate from 800 to 2000 guests. Farther downtown, a number of the Broadway hotels, such as the Fifth Avenue, at Twenty-third Street, the Hoffman House, at Twenty-fifth Street, and the Imperial, at Thirty-second Street, are equally popular. Several immense hotels, among which may be mentioned the Plaza, at Fifty-ninth Street and Fifth Avenue, and the Majestic, at Seventy-second Street and Central Park West, are known as family hotels of the best type. The most luxurious restaurants in the city are Delmonico's, at Forty-fourth Street and Fifth Avenue, and Sherry's, almost opposite. In the business district the Café Savarin, in the Equitable Building, is well known.

CHARITIES. The great number of immigrants landing at the port of New York, the poorest of whom remain in the city, tends to increase the dependent class. The administration of public charities is under a separate department governed by a commissioner, who appoints two deputies and other subordinate officers. New York City differs from other large American cities in that it grants large subsidies to private charitable institutions, the amount spent in this way exceeding that apportioned to public charities. In 1901 the city maintained three almshouses, with 3646 inmates, and 11 hospitals, two of which are asylums for idiots, with 53,991 patients. Nearly all of the city institutions and some of the State and private institutions are located on Randall's, Ward's, and Blackwell's islands, in the East River. Sailors' Snug Harbor, a home for aged seamen, is on Staten Island. This institution derives an income of \$250,000 from valuable Broadway real estate, with which it is endowed. The orphan asylums of New York are under private control. Private charity is active and thoroughly organized; and much has been done to correlate the different agencies by the Charity Organization Society of New York City. The society has a number of sub-committees in charge of the different districts into which the city is divided. The Brooklyn Bureau of Charities performs a similar function in that borough.

Among the more important organizations which give attention to charitable work are the United Hebrew Charities, Children's Aid Society, Saint Vincent de Paul Society, and the Association for Improving the Condition of the Poor. The conditions in the crowded sections of the city have been greatly improved by the work of Social Settlements and similar institutions, of which there are a large number, some denominational, others non-sectarian. Manhattan alone has some 25, the best known of which are University Settlement and the Educational Alliance.

INTERCOMMUNICATION. The problem of passenger transportation within the limits of New York City and its residential areas offers peculiar difficulties. The wholesale business is at the lower end of Manhattan Island, and the shopping districts in the middle, while the dwelling districts are at the upper end, and across the waterways in the surrounding regions. The crowding and discomfort on the various car and ferry lines during the 'rush' hours surpass anything of the kind known in any other city of the world. There are car lines on almost all the thoroughfares leading north from the business district, the limit of surface transportation in this direction having been practically reached. The first elevated railroad was opened on Ninth Avenue in 1870, from the Battery to Fifty-ninth Street. The Sixth Avenue line, opened in 1878, extended from the Battery to the Harlem River, the upper half being on the line of Ninth and Eighth avenues. Similar lines were built on Third and Second avenues to the Harlem River, and later the Third Avenue line was carried across the Harlem River into the northern suburban districts. The elevated roads, on which it was found practicable to run trains by steam at a high rate of speed and at very short intervals, with a minimum of danger, soon proved utterly inadequate for the traffic. In 1892 the first cable line in Manhattan was established on Broadway. In 1898 the underground electric trolley system was introduced and rapidly supplanted the cable all over Manhattan. The overhead trolley system still prevails in other portions of Greater New York. In 1902 the elevated roads began to run their trains by electricity. A contract was awarded in January, 1900, by a commission created for the purpose, for an underground rapid transit railway system running from one end of Manhattan to the other, with a branch, starting at 104th Street, to the Bronx. Work upon the subway was begun in February of that year. The time fixed by the contract for the completion of the system was four years and a half, and the original price was \$36,500,000. The contractors were conceded the right to operate the road for fifty years. Thirty-five stations are provided for on the main line and 13 on the Bronx branch. An extension of the subway to Brooklyn was decided on in May, 1901. The cars will be operated and lighted wholly by electricity. Express trains will run on two central tracks.

There is a very extensive ferry system between Manhattan and the surrounding region. Besides the ferries to Brooklyn (q.v.), lines connect with Jersey City, Hoboken, Weehawken, Fort Lee, Staten Island, and other points. During the winter months the ferry traffic is somewhat impeded by occasional fogs and floating ice. The construction of the Brooklyn Bridge (see BRIDGE) in 1883 greatly facilitated communication with

Brooklyn; but in recent years the bridge has been wholly inadequate. A second bridge was begun in 1896, extending from Delancey Street, Manhattan, to Broadway, Brooklyn; three other bridges are projected: from Grand Street, Manhattan, to Williamsburg, Brooklyn; from Corlears Hook, Manhattan, to the Navy Yard, Brooklyn; and from Fifty-ninth Street, Manhattan, to Long Island City, by way of Blackwell's Island. Furthermore, two tunnels to connect Manhattan with Brooklyn have been planned, one by private railroad companies (also connecting with the New Jersey Shore), and the other by the city through the extension of the subway. The Harlem River is spanned by a number of costly bridges, Washington Bridge being perhaps the finest structure of its kind in the country, and High Bridge, which carries the old Croton Aqueduct at an elevation of over 100 feet, being unequalled among American stone bridges.

NEWSPAPERS. There are forty-eight daily newspapers published in New York City, with ninety-five weekly papers, and seventy-two monthly publications, not including trade organs and religious journals. The oldest of the daily newspapers are the *Commercial Advertiser*, founded in 1797, and the *Evening Post*, founded in 1801, of which William Cullen Bryant was for nearly fifty years the editor. The *Sun*, founded in 1833; the *Herald*, founded in 1835 by James Gordon Bennett; the *Tribune*, founded in 1841 by Horace Greeley; the *Times*, founded in 1850 by Henry J. Raymond; the *World* (1860), the *Journal*, the *Press*, the *Daily News*, and the *Staats-Zeitung* are the most important of the morning newspapers. The *Evening Post*, the *Commercial Advertiser*, the *Mail and Express*, the *Telegram*, the *Evening Sun*, the *Evening World*, and *Evening Journal* are the chief afternoon publications.

COMMERCE AND INDUSTRY. New York did not rise to commercial preëminence until the beginning of the nineteenth century. Its rise is due to its central location on the Atlantic seaboard, and especially to its excellent harbor, which lies at the entrance to the fine natural waterway, the Hudson River and the Mohawk Valley, leading to the highly productive North-Central portion of the United States. The opening of the Erie Canal in 1825 was the most important event in the business history of the city. New York was already far in advance of its rivals before the building of railroads began, a fact which tended to make it a great focal point in their construction. It is difficult to overemphasize the importance of New York as an entrepôt of trade. It is without a rival as the centre of the wholesale dry goods and wholesale grocery business. Not only does it market its own manufactures and the greater part of its imports, but the trade in many varieties of domestic goods, produced outside of the city, centres here.

HARBOR. The harbor proper consists of the lower and upper bays, the former covering about 88 square miles of anchorage, and the latter 14 square miles. Between the two is Staten Island. The principal passage from one to the other is by way of the east channel called the Narrows, which at one point is only a mile in width. Small vessels may pass also on the west side of the island. The harbor is approached from the ocean from two directions, the principal one being from the southeast. The Sandy Hook Bar stretches across this entrance, about 20 miles from the

lower end of Manhattan, the deepest channel having been originally 16 feet at mean low water. In 1884 the National Government provided for dredging this channel to a width of 1000 feet and a depth of 30 feet. In 1899 a provision was made for the dredging of another entrance channel farther to the east, 2000 feet wide and 40 feet deep, requiring an excavation about 7 miles in length. Work upon this channel is still in progress. The other entrance into the harbor is from Long Island Sound. From the Sound, the passage leads through Hell Gate, at Ward's Island, into the East River, which is about half a mile in width. The tide flows very swiftly through the river, especially the ebb-tide. Extensive improvements were begun on this course about 1868 and are still going on. The channel has been made amply deep and safe for coastwise traffic. In 1901 the battleship *Massachusetts*, drawing 27 feet of water, successfully passed through it. The great strength of the ebb-tide current serves to keep the port open in winter, and, in a measure, to prevent the deposit of sediment. The North River (Hudson), which is about one mile in width, does not carry as much sediment as most rivers. Some dredging, however, has been necessary.

The Sandy Hook entrance to the southeast is guarded by elaborate fortifications on Sandy Hook. (See FORT HANCOCK.) The passage through the Narrows is protected by Fort Hamilton on the east (Long Island) shore and by Forts Tompkins and Wadsworth on the west (Staten Island) shore. Besides the works at the east entrance of Long Island Sound, the approach from that direction is defended by fortifications on the closely approaching points, Throggs Neck and Willets Point, within the limits of the city, and on Davids Island, a few miles to the north. Governor's Island, just south of Manhattan, is also fortified.

Almost the entire water front of Manhattan, about 22 miles, is deep enough to admit of heavy shipping, and the total frontage within the limits of the greater city is several times this. The docks already constructed occupy but a small part of the available space. Docks and piers naturally were built first on the lower end of Manhattan, the line gradually being extended northward on both sides of the island. The line is almost unbroken on the west side for a distance of about four miles, and many piers are still farther north. On the east docks are less numerous. In Brooklyn the docks extend along that portion of the shore opposite the lower end of Manhattan and farther south in Gowanus Bay. A part of the water front of Manhattan was acquired by the city from the Crown of England and subsequently State laws added to the portion belonging to the city. The greater part of the entire frontage, including in 1901 170 whole and 12 half piers out of a total of 224, is controlled by the city. The Brooklyn water front is owned mainly by private persons.

TRANSPORTATION. New York City has profited immensely from the advantages of internal transportation afforded by the Hudson River and the Erie Canal. In recent years the canal traffic has decreased. The canal is still of great importance, however, owing to its competition with the railway lines. All the railroads which approach New York from west of the Hudson River have their terminals in New Jersey. These lines are



NEW YORK
THE TOMB OF GEN. U. S. GRANT (UPPER)
THE LIBRARY OF COLUMBIA UNIVERSITY (LOWER)

the Pennsylvania, the West Shore, the Erie, the New York, Ontario and Western, the Lackawanna, the Philadelphia and Reading, the Lehigh Valley, the Central Railroad of New Jersey, and the Baltimore and Ohio. The Pennsylvania Company has projected a tunnel from the New Jersey shore under North and East Rivers to Long Island, with a great station in Manhattan. The lines which approach from the north, the New York Central and Hudson River, and the New York, New Haven and Hartford, have a union passenger station, the Grand Central Station, under the control of the New York Central. The Long Island Railroad maintains terminals in Long Island City and Brooklyn. The daily traffic on all these lines to the suburbs is enormous.

TRADE. The port of New York includes all the municipalities on New York Harbor and the Hudson River. In 1901 64 per cent. of the total imports and 35.60 per cent. of the total exports, or 45.73 per cent. of the total foreign trade of the United States, passed through New York, its commerce being five times that of the next largest American port. The imports for that year were valued at \$527,259,906 and the exports at \$529,592,978. While the trade is rapidly increasing, there has been in recent years a relative decrease, the port in 1882 having had nearly 57 per cent. of the total trade of the country. New York has practically a monopoly in the trade between the European countries and the Great Lake and Northwest region. On the other hand, its location places it at a disadvantage with the more southern Atlantic Coast ports in the trade with the Lower Missouri and the Ohio Valley regions. Some of the leading imports of the country, such as rubber and elastic goods, silk goods and furs, are received almost wholly through New York. It also imports the bulk of manufactured goods generally, including manufactures of cotton, linen, and jute goods, jewelry and precious stones, chemicals, coffee, cocon, and tobacco. It leads in imports of sugar. The relative rank of the city is much lower in respect to the principal exports of the country. It exports less than one-half of the animal products, less than one-fourth of the breadstuffs, corn, wheat, flour, etc., the shipments of the latter class having decreased in recent years, and only about one-tenth of the cotton. It exports a large part of the copper and most of the machinery. In 1901 878 sail and 2945 steam vessels engaged in the foreign trade cleared the port of New York. Their aggregate tonnage was 8,118,427. The volume of the coastwise trade greatly transcends that of the foreign trade. The transfer of freight at the port of New York is done almost wholly through the use of barges, lighters, etc., as there are no railroad tracks along the docks.

MANUFACTURES. The value of the manufactured products of New York is considerably more than 50 per cent. greater than that of any other American city. Manhattan and Bronx alone rank first, Brooklyn alone ranks fourth. Of fifteen industries selected by the census of 1900 for comparison between the great manufacturing centres, New York City held first rank in eight. The total capital invested in manufactures in that year was \$921,876,000, and the value of products aggregated \$1,371,358,000. The industrial prominence of the city is not due to large iron and steel, textile or meat-packing interests—the industries which have been re-

sponsible for the growth of many American cities—but rather to a large group of manufactures peculiar to city life and mainly of local interest. The city's most important industry is the manufacture of clothing. In the census year 1900 the value of women's clothing (factory product) was \$102,711,604, and of men's clothing, \$103,220,201, besides a great amount of custom work and repairing, and dressmaking. The aggregate output of all industries in but two other cities exceeded the value of the clothing product of New York. The abundance of cheap, unskilled labor, in consequence of the large immigrant population, partially explains the growth of this industry. Much of the work is done in tenement houses and small workshops, and comparatively little in large factories. Sugar and molasses refining ranks second in value of the product, which in 1900 was \$88,598,113. In the printing and publishing business, the value of which in 1900 was \$78,736,069, New York ranks far above other American cities. Among other industries are the manufacture of foundry and machine-shop products, malt liquors, tobacco, cigars and cigarettes; the roasting and grinding of coffee and spices; the manufacture of millinery and lace goods, men's furnishing goods, fur goods, shirts, furniture, musical instruments, paints, and electrical apparatus and supplies. New York has hardly a rival in the variety of its highly finished manufactured articles. The sugar and molasses refining industry is confined mainly to Brooklyn. There are also in Brooklyn extensive foundries and machine shops, and establishments for the roasting and grinding of coffee and spices.

GOVERNMENT. The first charter of Greater New York went into effect January 1, 1898. But it was found defective in several important respects, and in 1901 the Legislature made radical changes. Under the amended charter, the Mayor is elected for two years. Much power and responsibility is given him, especially in the appointment and removal of administrative officers. The heads of 14 of the 15 administrative departments—law; police; fire; water supply, gas, and electricity; street-cleaning; bridges; parks; docks and ferries; health; public charities; corrections; education; taxes and assessments; and tenement houses—are appointed by the Mayor, as are also certain other officers, including three civil service commissioners. He may remove any of these officers except members of the board of education, aqueduct commissioners, trustees of the College of the City of New York, trustees of Bellevue and allied hospitals, and judicial officers. Legislation is in the hands of a single body, the board of aldermen, consisting of 73 members elected for two years, the president of the board being elected by the whole city. The aldermanic districts generally coincide with the districts into which the city is divided for the election of members of the State Legislature. The Mayor's veto is final when placed upon grants of franchise, but in other matters it may be overridden. Many interests are provided for through local government, the five boroughs being divided into 25 local improvement districts. In each borough a president is elected, in whom important powers are vested. The borough presidents control such matters as the grading and paving of streets, sewers, public baths, etc., and the presidents of Queens and Richmond have control also of street-clean-

ing. Each borough has a bureau of buildings, the superintendent of which is appointed by the borough president, and is subject to removal by him. In the smaller districts there are local boards of improvement, consisting of the president of the borough as chairman and those members of the board of aldermen who represent the districts within the area subject to improvement. The resolutions of the local board upon certain subjects must be submitted to the Mayor. Most of the offices in the departments are filled in accordance with civil service requirements.

POLICE, FIRE, AND HEALTH DEPARTMENTS. The police commissioner appoints all members of the force from the eligible lists furnished by the civil service commission, and has power of dismissal. He is assisted by three deputies. The department includes also 15 inspectors and one captain to each 50 patrolmen. The total force in February, 1903, of men and officers was 7679. For patrol service the city is divided into 80 precincts, each having its own building with quarters for the men, cells for prisoners, and lodgings for homeless persons. Each precinct is in command of a captain under whom are several sergeants.

On January 1, 1902, the fire department of New York City had an active force of 2602 men. There were 137 engine companies, including 5 fire boats, and 44 hook and ladder companies. The companies constitute battalions, each under the command of a chief of battalion. The chief of department is at the head of the entire force.

The health department is administered by a board of health, consisting of a commissioner appointed by the Mayor, the commissioner of police, and the health officer of the port. The sanitary superintendent is chief executive officer of the board. A corps of medical inspectors is employed for the detection and prevention of disease, the inspection of tenement houses, and the enforcement of the sanitary code. There are also a vaccinating corps, a corps for disinfection, and one for the inspection of milk, meat, and other food products.

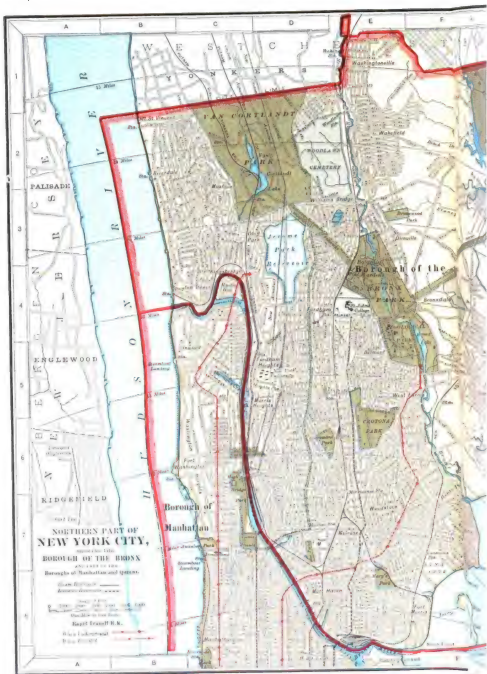
WATER SUPPLY. Manhattan and the Bronx have an excellent water supply, derived from the Croton River (q.v.), supplemented by the Bronx River. The Croton River, which is nearly 40 miles north of the City Hall, includes in its basin a number of small natural lakes and three artificial reservoirs, the largest of the latter being Croton Lake, in the main stream of the river. From this lake the aqueducts lead. There are a small receiving and a large retaining reservoir in Central Park, and a 'high service' reservoir at High Bridge. Another large reservoir is under construction on the site of Jerome Park, and plans have been made for a large distributing reservoir at 135th Street and Tenth Avenue. The storage system has a total capacity of more than 40,000,000,000 gallons. A new dam, the central masonry portion of which is 600 feet long and 260 feet high, is being constructed across the Croton River. This dam will add 21 square miles to the drainage area and increase enormously the storage capacity. There are also three smaller dams in course of construction. The supply reaches the city through two aqueducts, an old one with a capacity of 75,000,000 gallons a day and a new one with a capacity of 318,000,000 gallons a day. The average consumption of water in 1902 was more

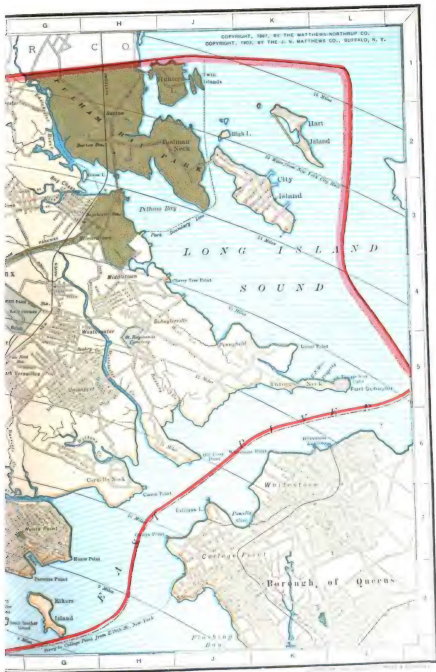
than 250,000,000 gallons a day. The Brooklyn water supply is obtained from small local streams, ponds, and wells. There is a large reservoir in the eastern part of the Borough of Brooklyn and a small one near the entrance to Prospect Park. The daily consumption in this borough is about 100,000,000 gallons.

FINANCE. The budget of New York is considerably more than three times that of any other American city, and greater than that of any other city in the world. The actual income for 1901 was \$118,740,596, including \$1,285,821 received from the State for schools. Of this amount, \$76,886,091 was collected from property taxes; \$5,557,593 from liquor licenses; \$5,048,788 from special assessments; \$8,050,900 from water rates; and \$2,571,584 from docks and wharves. The total expenditures for the same year were \$102,946,573 for maintenance and operation, and \$53,451,000 for construction and capital outlay other than loans repaid. The principal items of expenditure for maintenance and operation were: schools, \$19,731,629; interest on debt, \$13,693,155; police department, \$10,199,206; fire department, \$4,739,993; hospitals, asylums, almshouses, and other charities, \$4,754,380; water-works, \$3,000,990. The principal items for construction were: streets, \$8,109,494; schools, \$5,471,460; ferries and bridges, \$4,458,739; water-works, \$3,450,870; docks and wharves, \$3,322,938. There is a bonded debt of \$426,174,823 and a floating debt of \$6,306,472. Against this indebtedness there is a sinking fund of \$121,340,920. The city's legal borrowing limit (exclusive of the water debt) is 10 per cent. of the assessed valuation. The basis of assessment is legally 100 per cent. of the value of both real and personal property. The valuable franchises which have been granted to private companies return an entirely disproportionate income to the city treasury.

The expenses of Greater New York are much larger than were the combined expenses of the various component municipalities before consolidation. The increase in the first year after consolidation amounted to \$15,000,000. This is due largely to the creation of more salaried offices and to increases in salaries. The salaries paid are the highest prevailing in any city of the world. There is a board of estimate and apportionment, consisting of the Mayor, Comptroller (elected by popular vote), president of the board of aldermen, and the five borough presidents (the presidents of Manhattan and Brooklyn having two votes each), which annually submits the budget to the board of aldermen. The board of aldermen cannot insert new items, increase the amount specified, or vary the stipulated terms and conditions; but there are certain items which it may reduce. The financial department is in charge of the Comptroller, and is divided into five bureaus. All officers in the department except two, one of whom is the city chamberlain, or treasurer, are appointed by the Comptroller.

POPULATION. Greater New York has about twice the population of any other American city, and is exceeded only by London among the cities of the world. This has come about almost wholly in the nineteenth century, during which time the city grew at a rate never equaled. In the colonial period New York ranked below Boston and Philadelphia. In 1790 there was a





population of 33,131; in 1800, 60,515; 1810, 96,373; 1820, 123,706; 1830, 202,589; 1840, 312,710; 1850, 515,477; 1860, 805,658; 1870, 942,292; 1880, 1,206,299; 1890, 1,515,301; and in 1900 (after the creation of a Greater New York), 3,437,202, including 1,850,093 in the Borough of Manhattan, 200,507 in the Borough of the Bronx, 1,166,582 in the Borough of Brooklyn, 152,999 in the Borough of Queens, and 67,021 in the Borough of Richmond. The suburbs on the New Jersey shore of the Hudson (Jersey City, Hoboken, etc.) contain about 300,000 inhabitants. Beyond these immediate suburbs we come to a section of New Jersey embracing Elizabeth, the Oranges, Montclair, Morristown, Plainfield, and many other places which are mainly suburbs of New York, in addition to the two great manufacturing centres of Newark and Paterson, also the homes of great numbers of New York business men. These places have a total population of about half a million. On the northeast the cluster of towns largely inhabited by persons doing business in New York extends beyond the boundary line of Connecticut. Among these may be mentioned New Rochelle, Rye, Portchester, Greenwich, and Stamford. The total population embraced within a radius of 25 miles from the New York City Hall is not far from five millions. As the city grew, the population of New York naturally tended to centre about the lower end of Manhattan, the business district. Inconveniences, too, incident to transportation across the river have aided in confining the population within the narrow limits of Manhattan Island, where the density of population is greater than in any other city whatsoever. The distribution of the population in Brooklyn is more normal. In 1900, 66.70 per cent. of the population of Manhattan and Bronx lived in dwellings containing twenty-one or more persons, while in Brooklyn the corresponding percentage was only 25.70 per cent. In Chicago it was 16.63. The density per acre of New York south of the Harlem River was 129.2. The region of greatest density is the lower East Side, where in the Eighth Assembly District, covering 98 acres of area, there was in 1900 a population of 735.9 to the acre. In the densely populated section, tenement houses having an average height of five or six stories, inadequately lighted and ventilated, and otherwise lacking in sanitary facilities, are the rule. Several large model tenement houses have recently been built, notably those of the City and Suburban Homes Company. The housing problem, therefore, is one of the most difficult with which the city has to deal, and presents phases almost unknown in other large centres of population. A radical tenement house law, which went into effect in 1902, is effecting a great improvement. The problem of congestion is closely related to that arising from the presence in the city of large classes of mostly poor foreigners. The various foreign elements tend to form distinct colonies. In the Eighth District, above mentioned, 67.2 per cent. of the population in 1900 were foreign born, and the greater part of the remainder were children of foreign-born parents. In 1900 the foreign born numbered 1,270,080, or 37 per cent. of the total population of the city. In Manhattan alone, 41.5 per cent. of the total population was foreign born. New York has been always a strikingly cosmopolitan city. During the middle

of the nineteenth century there was a very heavy German and Irish immigration to the city, but before the end of the century the immigration of these nationalities had greatly declined, and there had begun a heavy immigration from the south and east of Europe. According to the census of 1900, the principal foreign countries represented in the immigration to New York City in order of prominence were Germany, Ireland, Italy, Russia, Bohemia, Hungary and Austria, Poland, England, Scotland, and Wales. Few of the many Scandinavian immigrants to the United States have settled in New York. The large immigration from Austria-Hungary, Russia, and Poland consists almost wholly of Jews. Nearly one-fourth of the population of Manhattan are Jews. A large proportion of New York immigrants represent a class of unskilled laborers. The German immigrants, however, have always contained a large class of skilled artisans, who have participated in the more advanced industrial life of the city, and have contributed greatly to its social and artistic life. A much larger percentage of the Irish have been unskilled laborers. The Italians have come mainly from the poorer districts of southern Italy, and almost all are laborers. Most of the coarser labor of the metropolis is done by them. The Jewish immigrants, like the Italians, are extremely poor and mostly unskilled. The majority are employed in the manufacture of clothing; many, however, are small merchants. Both of these elements keep to themselves. It is in the parts of the city occupied by them that the density of population is greatest. The negro population in 1900 numbered 60,666, of whom nearly two-thirds were born outside of New York State. Of the total population of the city, 1,705,705 were males and 1,731,497 females.

HISTORY. Probably the first European to visit the vicinity of New York was Giovanni Verazano, who came in 1524; in 1525 the Spanish navigator Gomez sailed into the harbor; and by 1600 the French seem to have begun an extensive trade with the Indians along the Hudson. In September, 1609, Henry Hudson (q.v.) explored the harbor and the river; in 1613 four trading houses were built on Manhattan Island—"Manhatanis" (meaning 'those who dwell upon an island') being the name applied to the aboriginal Delaware inhabitants; and in 1614 Adrian Block, preparatory to exploring the New England coast, built here his little vessel the *Onrust*, or *Restless*, probably the second ship to be built in America. In 1614 the States General of Holland chartered the United New Netherland Company of Amsterdam, and in 1621 this was succeeded by the West India Company, chartered with power to make treaties, maintain courts, and employ soldiers. In 1623 permanent colonists, sent out by the Dutch West India Company, arrived under Cornelius May as Director-General or Governor. In 1624 May was superseded by Verhulst, who in turn was replaced in 1626 by Peter Minuit. Minuit in this year bought the island from the Indians for goods valued at 60 guilders, or \$24.00 (about \$120.00 in present values), and built near the present Bowling Green a small fort, Fort Amsterdam—the settlement itself, then having a population of 200, being called New Amsterdam. In 1628 a church was organized and the first clergyman, Rev. Jonas Michaelius, arrived at New Amsterdam.

Wouter Van Twiller was Governor of the colony from 1633 to 1638, William Kieft from 1638 to 1647, and Peter Stuyvesant from 1647 to 1664. In 1643 the Dutch, without provocation, massacred 120 Algonquin Indians, who had come to them for protection, and a bloody Indian war ensued, lasting for two years, and almost depopulating the settlement. In 1653 New Amsterdam, with a population of about 800, was incorporated as a city, and in the same year a wall 2340 feet long was built along the site of the present Wall Street as a protection against the English and the Indians.

In March, 1664, Charles II. granted New Netherland to his brother James, Duke of York, and on September 8th Col. Richard Nicolls with an English force took possession of the city and renamed it New York. Nicolls was Governor until 1668, when he was succeeded by Francis Lovelace. On August 9, 1673, the Dutch regained possession, and the province became New Netherland as before, the city becoming New Orange, and Anthony Colve replacing Lovelace as Governor. On November 10, 1674, the Dutch again gave way to the English, Edmund Andros becoming Governor; in 1686 the first city charter, known as the Dongan Charter, from Thomas Dongan, Governor in 1681-88, was issued (though it was never confirmed by James II.); and in 1689, Andros being overthrown, Leisler usurped control and held it until early in 1691, when he was executed for treason. See LEISLER, JACOB.

In 1690 the first intercolonial Congress (called to consider an attack on Canada) was held in New York—Massachusetts, Plymouth, Connecticut, Maryland, and New York being represented—and in the same year the only Mayor elected by the people until after 1832 was chosen. Slavery had been introduced in 1625; in 1712 a negro insurrection was put down with much cruelty, twenty-one negroes being executed (some by burning, others by hanging, and one by breaking on the wheel); and in 1741 the discovery of a supposed plot, 'The Great Negro Plot,' caused a panic, during which four whites were executed, and 154 negroes were arrested, of whom 13 were burned at the stake, 18 were hanged, and 71 were transported. In 1696 William Bradford set up the first printing press in New York; in 1703 the first free school was opened; and in 1725 the first newspaper, the *New York Gazette*, was founded. A city library was organized in 1729, and a classical academy was opened in 1732. In 1731 a new charter, known as the 'Montgomerie Charter,' was granted to the city. In 1732 a monthly stage was established between New York and Boston, the trip taking two weeks each way, and in 1756 a Philadelphia stage, taking 'three days through only,' began running.

John Peter Zenger, who had founded the *Weekly Gazette* in 1733, was arrested and prosecuted for libel by the authorities in 1734, but he was acquitted in the following year after a famous trial—his acquittal being regarded as the greatest vindication in the colonial period of the freedom of the press. See ZENGER, JOHN PETER.

In 1765 the Stamp Act Congress (See STAMP ACT) met in New York, and on January 18, 1770, nearly seven weeks before the Boston Massacre, British soldiers killed one citizen and wounded three in a riot caused by the destruction by the soldiers of a liberty pole set up by the 'Sons of Liberty.' This riot, called the 'Battle of

Golden Hill,' is ranked by some writers as "the first conflict of the War of the American Revolution." In 1774, during the excitement over the tea tax, a ship loaded with tea was sent back to England, and the cargo of another was thrown overboard. When news of the battle of Lexington reached New York, a 'Committee of Safety' assumed control of the city, and Governor Tryon took refuge on a British man-of-war. In the early summer of 1776 a large part of the American troops were quartered in New York. On July 8th, in the presence of Washington, the Declaration of Independence was for the first time publicly read to them, and on the 9th the equestrian statue of George III., erected on Bowling Green in 1770, was torn down. On September 14, 1776, a short time after the battle of Long Island (q.v.), the city was evacuated by the Americans and was occupied on the following day by the British, who held it until November 25, 1783—'Evacuation Day.' On September 15, 1776, a large portion of the city was destroyed by fire. During the British occupation the city was the refuge of Loyalists, who came from all quarters to take advantage of British protection, many of the more wealthy and influential residents joining their ranks. From 1785 to 1790 Congress met in New York in the old City Hall, at the corner of Wall and Nassau streets, and here Washington was inaugurated, April 30, 1789.

In 1785 a manumission society was formed and the Bank of New York was organized. In 1789 the Tammany Society (q.v.) or Columbian Order was organized. During an epidemic of yellow fever, from October, 1794, to July, 1795, more than 600 persons, and during another in 1798 more than 2000 persons, died. In 1790 the population numbered 33,131, and the city limits were extended to the lower line of the present City Hall Park. In 1805 the population was 78,770, and since then, especially after the War of 1812, when immigration greatly increased, the growth has been very rapid. In 1807 Fulton's steamboat, the *Clermont*, began running regularly between New York and Albany. In 1812 a steam ferry to Long Island was opened, and a line of Sound steamers was established in 1818, while in 1819 the *Savannah*, built in New York, successfully crossed the Atlantic. The Erie Canal, begun in 1817, was completed in 1825—the first boat, *Seneca Chief*, reaching New York on November 4th—and gave an extraordinary impetus to the growth of the city. In 1832 an epidemic of cholera caused the death of 4000 persons, and another two years later caused the death of nearly 1000. In 1835, December 16-19, occurred the most disastrous fire in the history of the city, the entire east side below Wall Street, including about 650 stores, the Merchants' Exchange, and the South Dutch Church, being destroyed, with a loss of almost \$10,000,000. The financial panic of 1837 caused many failures, and the great destitution and suffering in the city led to the Bread Riots of that year. From 1820 to 1870 riots were frequent, one of the most serious being the Astor Place Riot (q.v.) of May 10, 1849, in which 141 soldiers were wounded, while 34 rioters were killed and many more were wounded. In the same year more than 5000 persons died of the cholera. Another riot occurred in 1857, growing out of a conflict between two police organizations,

when the Seventh Regiment of militia was called out to preserve the peace. The Croton aqueduct was completed in 1842; and on July 14, 1853, the Crystal Palace Industrial Exhibition was opened on what is now Bryant Square. Another severe financial panic occurred in 1857, followed by suspension of banks and business failures.

On the approach of the Civil War many in the city seemed to favor the South, and in January, 1861, the Mayor, Fernando Wood (q.v.), proclaimed secession to be 'a fixed fact,' and proposed that an independent commonwealth, to be called 'Tri-Insula,' be formed out of Manhattan, Long, and Staten Islands. The city, however, loyally supported the Union during the war, sending to the front 116,382 soldiers at a cost of about \$14,500,000. In July, 1863, occurred the Draft Riots (q.v.), lasting three days, during which business was suspended, property worth more than \$1,500,000 was destroyed, and more than 1000 lives were lost. The city suffered for several years from frauds, perpetrated by the 'Tweed Ring,' which controlled municipal affairs, but in 1871 the 'Ring' was convicted of having robbed the city of more than \$20,000,000, and was effectually broken up. (See *TWEED, WILLIAM M.*) In 1869 a financial panic, caused by the effort to 'corner' gold, culminated on 'Black Friday' (September 24th), gold then being at 162½. The financial panic of 1873 caused the greatest suffering in New York City, although its growth continued unabated. On May 24, 1883, the Brooklyn Bridge was formally opened, and in 1886 the Bartholdi Statue of Liberty was unveiled. New York has been the scene of many imposing processions and celebrations: On the occasion of Lafayette's visit in 1824; the celebration of the opening of the Erie Canal in 1825; the funeral processions of Lincoln, April 25, 1865, and of General Grant, August 8, 1885; the laying of the Atlantic cable, 1858; the opening of the Brooklyn Bridge; the centennial celebration of Washington's inauguration as President of the United States, in 1889 (from April 29th to May 1st); the Columbian celebrations of October, 1892, and April, 1893; the reception to the Santiago fleet in 1898; and the Dewey reception in 1899.

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NEW YORK, COLLEGE OF THE CITY OF. A public institution of learning in New York City,

established by the Board of Education of the city in 1848, and originally known as the Free Academy. Collegiate powers were granted to it in 1858, and in 1866 it assumed its present name. The members of the Board of Education were ex-officio trustees of the college until in 1900 a separate board of trustees was created, composed of nine members appointed by the Mayor, with the president of the college and the president of the Board of Education as ex-officio members. In 1882 the requirement of one year's previous attendance at the public schools of the city was repealed, and the college was thrown open to all young men of the city. In 1900 the length of the course was increased from five years to seven, comprising three years' attendance in the preparatory department and four years of collegiate work. There are five courses of study, leading to the degrees of B.A. or B.S. The M.A. and M.S. degrees are conferred after two years of additional study. Instruction and the use of text-books and apparatus are free to students. The college was one of the first institutions to establish a separate chair of English and to make manual training a part of the curriculum. In 1902 the process of securing a new site for the college, then situated at Lexington Avenue and Twenty-third Street, was completed. The new home of the college is located in the block bounded by 138th and 140th streets, Saint Nicholas Terrace, and Convent Avenue. Ground was broken on March 10, 1903, and the erection of new buildings, estimated to cost \$4,000,000, was begun. In 1903 the collegiate department had an attendance of 817, and the preparatory department 997. The instructors numbered 110. The buildings and grounds on the old site were valued at \$846,500, and the new grounds at \$800,000, the total value of the college property being \$1,646,500, and its income \$299,362. The library contained 34,911 volumes and 2000 pamphlets. During the first half century of the history of the institution there were but two presidents, Horace Webster (1848-69) and Gen. Alexander S. Webb (1869-1901), both graduates of West Point, and the discipline and curriculum have been greatly influenced by that institution. In 1903 John Huston Finley, professor of politics at Princeton University, became president.

NEW YORK ACADEMY OF SCIENCES, THE. An association incorporated in 1818 as *The Lyceum of Natural History in the City of New York*, which was exchanged in 1876 for the present name. In 1902 the Academy was empowered by legislative enactment to obtain funds and erect a building for scientific uses, and to exercise such other powers as appertain to the scope of such institutions. Membership in the Academy consists of four classes: active members, fellows, corresponding members, and honorary members. Fellows are chosen from the active members in virtue of their scientific attainments. The number of corresponding members is limited to two hundred, and honorary members to fifty. The following sections of the Academy are in active operation: astronomy, physics, and chemistry; biology; geology and mineralogy; anthropology and psychology. The Academy publishes *Annals and Memoirs*.

NEW YORK BAT. See RED BAT.

NEW YORK HISTORICAL SOCIETY. A society formed for the collection and preservation of materials relating to the national, civic, or ecclesiastical history of the United States in general, and the State of New York in particular. The idea of such a society was first agitated in Massachusetts in 1789 by John Pintard, but it was not until November 20, 1804, that the New York Historical Society was organized by a number of leading citizens, among them De Witt Clinton, Anthony Bleecker, and Peter G. Stuyvesant. The history of the society since that time has been one of earnest effort in the formation of a library and museum, a gallery of paintings, a department of antiquities, and other features in which it has been eminently successful. The library has a choice and valuable collection of books, lithographs, maps, manuscripts, engravings, etc., besides a collection of works on heraldry. The picture gallery contains 889 paintings, of which about 200 are portraits, and 600 pieces of sculpture, mostly portrait busts and medallions. The collection includes the New York Gallery of Fine Arts, the works of the American Art Union, the Bryan Gallery of Old Masters, the Durr Collection, and the original water colors prepared by Audubon for his work on natural history. In the department of antiquities there is the Abbott collection of Egyptian antiquities, considered one of the greatest in the world. The society spent the first five years of its existence (1804-09) in old Federal Hall, on Wall Street. It occupied rooms in the Government House from 1809 to 1816; in the New York Institution from 1816 to 1832; in Remson's Building, Broadway, from 1832 to 1837; in the Stuyvesant Institute from 1837 to 1841; and in the New York University from 1841 to 1857. Since 1857 it has been installed in the building at 170 Second Avenue.

NEW YORK PUBLIC LIBRARY. The New York Public Library, Astor, Lenox, and Tilden foundations, was formed by the consolidation on May 23, 1895, of the Astor Library, the Lenox Library, and the Tilden Trust.

The Astor Library, incorporated January 18, 1849, was founded by John Jacob Astor, who bequeathed \$400,000 to establish a free public library; gifts from other members of the Astor family trebled its buildings, added largely to its book collections, and increased its endowment to \$941,000 in 1895. Opened February 1, 1854, with about 80,000 volumes, in 1895 it had 267,147 volumes.

The Lenox Library, incorporated January 20, 1870, received from James Lenox his library, art collection, its site and building, and an endowment amounting to \$505,500 in 1895. It was not a general reference library, but an institution for the exhibition and scholarly use of book rarities. In 1895 it contained 86,000 volumes.

The Tilden Trust was incorporated March 26, 1887. To it (before incorporation) Samuel Jones Tilden had bequeathed his private library, 20,000 volumes, and the bulk of his estate, over \$5,000,000, to establish a free public library. The will was contested and the trust provisions declared invalid. By a compromise agreement the executors secured for the trust about \$2,000,000, part of the share of one of the heirs.

The new corporation had an endowment of about \$3,446,500, owned the Astor and Lenox li-

brary sites, and possessed 353,147 volumes and pamphlets. Through an address to the Mayor legislative permission was secured May 19, 1897, for an issue of bonds by the city to construct a building on the reservoir site at Forty-second Street and Fifth Avenue, and to contract with the library for its occupancy. Plans were adopted November 10, 1897, and the corner stone was laid November 10, 1902.

On December 11, 1900, the New York Free Circulating Library offered to consolidate; the offer was accepted and on February 25, 1901, reorganization was completed. The following libraries also came into the system: Saint Agnes Free Library on August 1, 1901; Washington Heights Free Library on December 1, 1901; the New York Free Circulating Library for the Blind on February 21, 1903; and the Aguilar Free Library on February 28, 1903. By these accessions the circulation department consisted on March 1, 1903, of 18 branch libraries, owning 320,816 volumes.

On March 12, 1901, Andrew Carnegie offered to give about \$5,200,000 to erect branch libraries in New York City, if the city would furnish sites and maintain the branch libraries when built. An act passed April 26, 1901, permitted the city to accept such a gift, and in a contract executed July 17, 1901, between the city and the library acting as Carnegie's agent, the city agreed to provide 42 (later increased to 65) sites in Manhattan, Bronx, and Richmond, on which the library agreed to erect buildings with funds provided by Carnegie, the city agreeing to pay annually for their maintenance one-tenth of the sum expended by Carnegie. The first building so erected, on East Seventy-ninth Street, for the Yorkville branch, was opened December 13, 1902; the second, for the Chatham Square branch, was opened in the summer of 1903; four more will be ready by the end of the year.

In the new institution the 500 periodicals received in 1895 have increased to 4500 in 1903; the annual receipts of 12,483 volumes and 2599 pamphlets in 1895 increased to 65,381 volumes and 87,868 pamphlets in 1902; the 94,331 readers consulting 260,694 volumes in 1895 increased to 165,434 readers consulting 410,671 volumes; and the total of 353,147 pieces available to readers in 1895 amounted to 1,131,961 on March 1, 1903.

NEW YORK UNIVERSITY. An institution of higher learning in New York City. It had its inception at a meeting of citizens of high business and professional standing in the rooms of the New York Historical Society, January 4, 1830, when a committee of nine was elected to proceed in the establishment of a new university on a liberal and comprehensive foundation. The committee secured a long list of subscribers to the undertaking and finally merged its existence into that of the first University Council elected by the subscribers, October 16, 1830, and chartered April 18, 1831. The original university building was erected in 1835 on Washington Square. The University College was opened in 1832; the Law School in 1835; the Medical School in 1841; the School of Applied Science (formerly Civil Engineering) in 1862; the Graduate School in 1886; the School of Pedagogy in 1890; the Veterinary College (incorporated with the university) in 1898; and the School of Commerce in 1900. The greatest era of development in the

history of the university was the period between 1890 and 1900. In 1891 the grounds on University Heights overlooking the Harlem River were acquired, and in 1894 the College of Arts and Pure Science and the School of Applied Science were removed to the new site, the schools of Law and Pedagogy and a part of the Graduate School remaining in a new structure on Washington Square. The various schools hitherto loosely connected were now reorganized into one university system. The university in 1902 comprised six faculties besides the School of Commerce, the Woman's Law Class, and the Summer School, having in all 212 professors and instructors, and 2101 students. (1) University College confers the degrees of B.A. and B.S. (2) The University Law School (coeducational) confers the degrees of LL.B., LL.M., and J.D. (3) The Medical College, together with the Veterinary College, confers the degrees of M.D., D.S., and D.V.S. (4) The School of Applied Science confers the degrees of C.E. and M.E. (5) The Graduate School confers the degrees of M.A., M.S., Ph.M., and Ph.D. (6) The School of Pedagogy confers the degrees of Pd.M. and Pd.D. The School of Commerce, Accounts, and Finance confers the degree of B.C.S. (bachelor of commercial science). The Summer School had in 1902 12 instructors and 113 students. The library of the university contained in 1902 over 55,000 volumes, including the Oswald Ottendorfer Collection. The campus covers about 22 acres, and its chief architectural feature is the library building, completed in 1900, at a cost of \$750,000. An open colonnade known as the Hall of Fame (q.v.) extends partly around the library, overlooking the Harlem. The total value of the buildings and grounds in 1902 was \$2,945,342; the endowment was \$2,080,179; the gross income \$407,839, and the total value of the college property \$5,025,522. The government of the university is vested in a Senate consisting of the chancellor, the deans of the several schools, and six professors elected, one from each school, together with advisory members. The chancellors of the university have been James Matthews, Theodore Frelinghuysen, Isaac Ferris, Howard Crosby, John Hall, Henry M. MacCracken.

NEW YORK WEASEL. See WEASEL.

NEW ZEALAND, *zē'land*. A British colony in the South Pacific Ocean, situated between latitudes 34° 25' and 47° 17' S., and between longitudes 166° 26' and 178° 36' E., a little more than 1000 miles southeast of the Australian continent. New Zealand proper consists of two large islands, North Island and South or Middle Island, separated by Cook Strait, from 16 to 100 miles wide, and of a smaller island, Stewart Island, lying 25 miles south of South Island, from which it is separated by Foveaux Strait. Several of the outlying groups, known as the Auckland, Chatham, Cook, Kermadec islands, and other small islets, are also attached to the colony. The area of North Island is 44,468 square miles, of South Island 58,525, and of Stewart Island 665 square miles. The total area of the colony is estimated at 104,471 square miles, being nearly equal to that of Italy, to which peninsula the shape of New Zealand bears a striking resemblance.

TOPOGRAPHY. The surface of North Island is in the main gently undulating, with low hills and table-lands densely forested. There are, however, several volcanic peaks in this island, from 4000

to over 9000 feet high. Of these Tarawera and Tongariro, on the mainland, and Whakari, in the Bay of Plenty, are active volcanoes, while the highest extinct cones are Ruapehu (9715 feet) and Mount Egmont or Taranaki. The latter is a solitary peak standing at the west entrance to Cook Strait. It is 8270 feet high, and its summit is covered with perpetual snow. South Island differs in a marked degree from North Island. It has no volcanoes, but along its whole western coast runs a lofty and rugged mountain range known as the Southern Alps, which rivals the European Alps in its wild mountain scenery. It has a height of from 8000 to over 12,000 feet, Mount Cook, the highest point, being 12,349 feet above the sea. It is deeply cleft, with numerous ravines and precipices, while on the western slope there are great glaciers, in some places reaching within a few hundred feet of the sea. The range is generally covered with forests to the snow line. On the eastern flank of the Alps is a plateau bounded by a lower range running through the centre of the island, from which the land descends in terraced, grassy plains to the eastern coast.

The coast-line of New Zealand measures about 3000 miles, two-thirds of which forms the coast of North Island, which is much indented with bays, two of them almost separating the north-western peninsula from the mainland. Really good harbors, however, are few, as most of the bays are obstructed by bars. The best harbors are those of Auckland and Wellington. The rivers are small and unimportant, the largest being the Waikato, in North Island. The lakes by contrast are interesting. Those in North Island are of volcanic origin. The largest is Lake Taupo, with a diameter of 22 miles and an enormous depth. The region surrounding it is full of hot springs and geysers, among which rose the famous pink and white terraces of siliceous deposits which were destroyed by an eruption in 1886. In South Island, along the eastern slope of the Alps, extends a series of elongated mountain lakes supposed to be, like the deep fiords of the southwest coast, of glacial origin. The largest is Wakatipu, which is said to rival Lake Lucerne in beauty. Though its surface is 1060 feet above sea-level, its bottom is in some places 500 feet below.

CLIMATE. The climate is varied, but in general equable, with no intense heat or cold. The mean temperature for January is 68° in the north and 58° in the south; for June it is 51° in the north and 40° in the south. Frost is almost unknown in North Island. The rainfall varies from 28 inches in the east to over 100 inches on the west coast. The coast districts are very windy, which fact contributes toward rendering the climate healthful.

FLORA. The flora is poor in species, but two-thirds of the indigenous forms are entirely peculiar to the islands, and 26 of its genera are represented nowhere else. The forests as well as the vegetation generally are characterized by a dull monotonous green, there being very few plants with conspicuous flowers. Though the flora is related to that of Australia, as well as to South America and the Antarctic islands, some of the most common Australian genera, such as *Eucalyptus* and *Acacia*, are absent. The ferns, mosses, and hepaticas are especially abundant and characteristic, large tracts of

open land on the lower hills and plateaus being covered with ferns, among which the palm-like tree-ferns, reaching a height of 30 to 40 feet, are prominent. The Nikau palm (*Rhopalostylis sapida*) is found in North Island, this being the extreme southern limit of true palms. One of the most common forest trees is the magnificent kauri pine (*Dammara australis*). It yields fine timber and a valuable gum, and has been recklessly cut by settlers. The output of this gum in 1900 was 11,116 tons, valued at £607,919.

FAUNA. The fauna is, like the flora, characterized by a great paucity of species. There is probably not a single indigenous mammal, the dogs and rats found by the European discoverers having been almost certainly introduced by the natives. There are few reptiles, and no snakes, but several peculiar lizards. Insects are also few, as are the fresh-water fishes; and birds form almost the only group of animals that is well represented. There are about 150 species of birds, most of which are aquatic, and nearly all are peculiar to the islands. They include many beautiful forms, pigeons and parrots being especially numerous. The kiwi, a wingless and tailless bird of the size of a hen, is the sole survivor of a large group of similar birds, including the gigantic moa, which formerly inhabited New Zealand. A considerable number of European forms, both plants and animals, have been introduced, wild pigs being very common.

GEOLOGY AND MINERALS. North Island is essentially volcanic in structure and origin, while South Island consists largely of ancient metamorphic and sedimentary rocks, slates, granites, and Silurian sand and limestones, with small areas of Mesozoic and Tertiary strata. Coal is found under a considerable area in South Island, and to some extent in North Island. Gold exists chiefly under the glacial drift and in the sands along the seashore. Silver, copper, tin, antimony, manganese, and chrome-iron are also found.

MINING. Up to the end of the year 1900 the total mineral product amounted to £75,997,890, of which £57,406,100 was gold. The most productive gold districts are Otago, which yielded over £22,000,000, Westland, nearly £18,000,000, Auckland, and Nelson. As compared with other Australasian States, New Zealand ranks second in the total gold and third in the total mineral output. The most productive period of gold-mining was from 1862 to 1873, in which period nearly one-half of the whole yield was secured. There was some revival in the industry from 1890 to 1900. The gold exported in 1901 amounted to £1,753,784. The mining of gold by the dredging method has developed extensively in the Clutha River bed and other streams of that district. Most of the gold from South Island was secured either from this method or from hydraulic sluicing. Gold from the Auckland district was secured from quartz only, as was also much of the Westland product. The cyanide process is being adopted, thus resulting in a greatly increased per cent. of the ore saved. The next most important mineral mined is coal, the total production of which through 1900 was valued at £7,088,393. The output has increased steadily from 299,923 tons in 1880 to 1,093,999 in 1900. In 1900 the yield of kauri-gum (resin) was 11,116 tons, valued at £607,919. The total yield to the end of 1900 amounted to £10,-

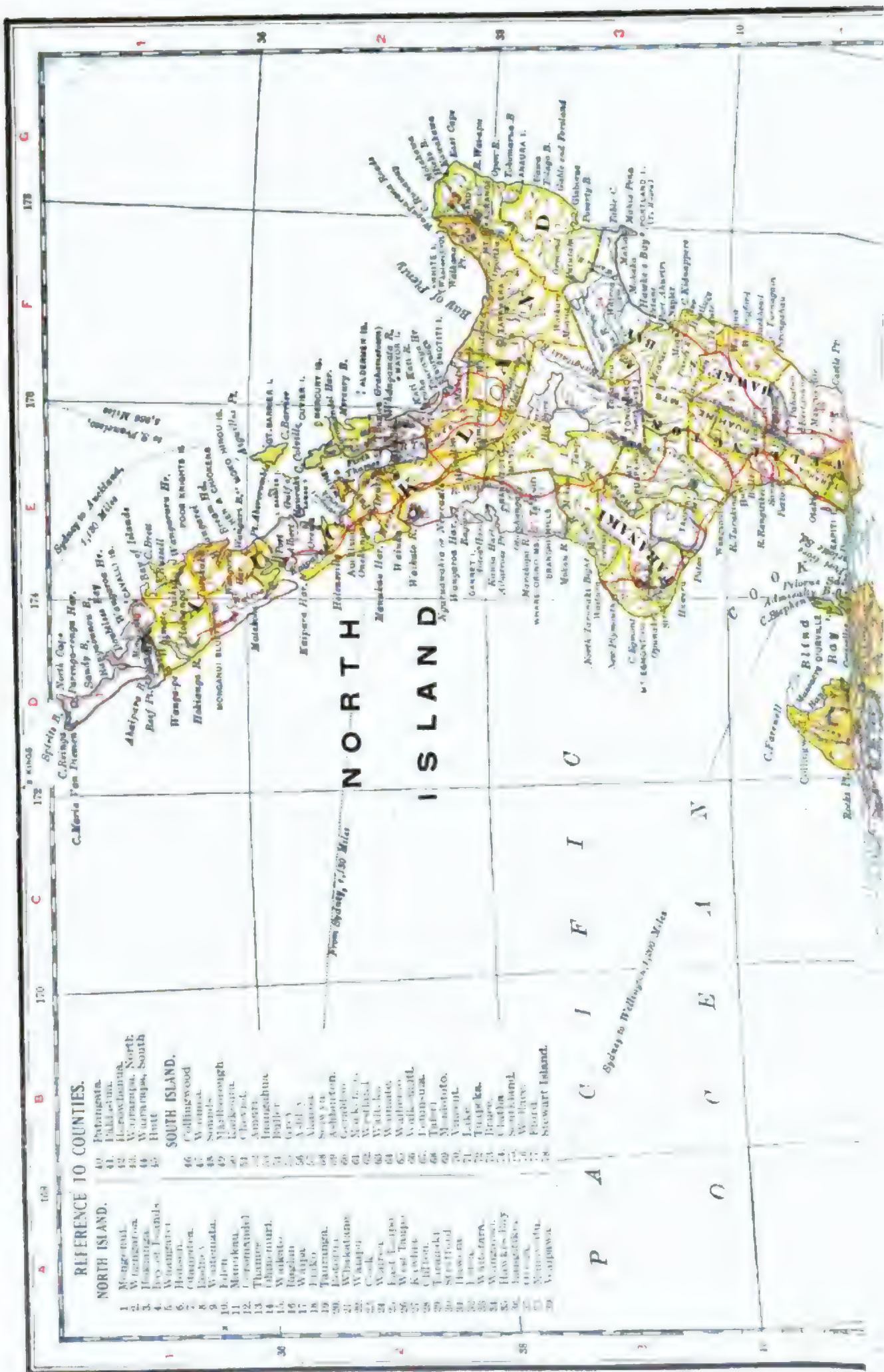
329,831. Small quantities of silver and silver-lead, and a few other minerals also, are mined.

AGRICULTURE. Agriculture together with grazing is the leading occupation. The climatic conditions are more favorable for general agriculture than in any of the States of the Australian Commonwealth. The rainfall is more adequate, and the per acre yield of all crops much greater. The largest farm district is on the east coast of South Island. In 1902 there were in the colony 62,786 agricultural holdings, with a total of 34,911,573 acres occupied (over one-half the total area), of which 26,982,486 acres are under private ownership, the balance being held by the Government. About two-thirds of the total area is supposed to be adaptable to agriculture or grazing. The total area under crops increased from 68,506 acres in 1861 to 1,044,777 in 1891, and to 1,578,958 in 1900-01. Nearly one-half of the acreage is under green crops, mainly turnips and rape. The principal other crops in the last-mentioned year were oats, 449,534 acres; wheat, 206,465; barley, 30,831; hay, 68,023; potatoes, 28,524; and maize, 14,232 acres. English grasses grow much better in New Zealand than in Australia, and the acreage sown in grass—10,244,739 in 1899—was 14 times more than that of the Australian Commonwealth. The per acre yield of the artificial grasses is many times that of the natural grasses in Australia. In 1900 there were in addition to the sown pasture land 21,857,909 acres of improved land in the occupied holdings that were available for stock feeding.

STOCK-RAISING. Probably no other country of similar area equals New Zealand in the extent of its sheep-grazing interests. The number of sheep increased steadily from 2,761,583 in 1861 to 20,230,829 in 1894, and has since remained at a little below this figure. Recent years have shown a rapid increase in the number and a decrease in the size of flocks. Another change has been the tendency to raise sheep for meat rather than for wool exclusively. Both cattle and horses are steadily increasing in number, the former numbering in 1900 1,256,680 and the latter 266,245. In the same year there were 250,975 swine. In recent years dairying has rapidly developed and there is an extensive production of butter and cheese. The industry is carried on by the factory method through the co-operation of small farmers.

MANUFACTURING. The number of hands employed in the manufacturing industry increased from 22,095 in 1885 to 25,633 in 1890, and 27,389 in 1895. The value of the products increased still more rapidly, being £9,549,360 in the last-named year. The largest item in this amount was frozen and preserved meats, followed by the tanning and wool-scouring products, and the products of saw-mills, grain-mills, clothing and boot factories, butter and cheese factories, iron and brass works.

TRANSPORTATION AND COMMERCE. In 1902 there were 2235 miles of railway in operation, the total cost of construction being £18,170,722. The province owns and operates nearly the entire railway system. In 1901-02 the net earnings amounted to £622,349. In 1901-02 there were 7,356,136 passengers carried, or more than twice the number carried in 1891-92. There are tramway systems in all the principal towns. The extensive insular coast line and many harbors afford excellent facilities for water transportation from one



REFERENCE TO COUNTIES.

- | | |
|----------------------|----------------------|
| NORTH ISLAND. | 40 Patangama |
| 1. Mungahau | 41. Fildes Bay |
| 2. Whangaroa | 42. Haurangi |
| 3. Hokianga | 43. Wairarapa, North |
| 4. Bay of Islands | 44. Wairarapa, South |
| 5. Hokianga | 45. Hutt |
| 6. Hokianga | |
| 7. Hokianga | SOUTH ISLAND. |
| 8. Hokianga | 46. Collingwood |
| 9. Hokianga | 47. Wairarapa |
| 10. Hokianga | 48. Sounds |
| 11. Hokianga | 49. Marlborough |
| 12. Hokianga | 50. Canterbury |
| 13. Hokianga | 51. Otago |
| 14. Hokianga | 52. Southland |
| 15. Hokianga | 53. Otago |
| 16. Hokianga | 54. Otago |
| 17. Hokianga | 55. Otago |
| 18. Hokianga | 56. Otago |
| 19. Hokianga | 57. Otago |
| 20. Hokianga | 58. Otago |
| 21. Hokianga | 59. Otago |
| 22. Hokianga | 60. Otago |
| 23. Hokianga | 61. Otago |
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| 25. Hokianga | 63. Otago |
| 26. Hokianga | 64. Otago |
| 27. Hokianga | 65. Otago |
| 28. Hokianga | 66. Otago |
| 29. Hokianga | 67. Otago |
| 30. Hokianga | 68. Otago |
| 31. Hokianga | 69. Otago |
| 32. Hokianga | 70. Otago |
| 33. Hokianga | 71. Otago |
| 34. Hokianga | 72. Otago |
| 35. Hokianga | 73. Otago |
| 36. Hokianga | 74. Otago |
| 37. Hokianga | 75. Otago |
| 38. Hokianga | 76. Otago |
| 39. Hokianga | 77. Otago |
| | 78. Stewart Island. |

part of the country to another. Considering the smallness of the population, the foreign commerce is large. In 1900, 616 vessels entered New Zealand ports, with a tonnage of 854,632. Of these 372 were from the Commonwealth States, 83 from the United Kingdom direct, and 161 from other countries. The total tonnage has more than doubled since 1881. The value of imports increased from £6,260,523 in 1890 to £10,646,096 in 1900, and the value of exports increased during the same period from £9,811,720 to £13,246,161. Almost the whole of the imports is for home consumption and the domestic exports are of domestic origin. Nearly three-quarters of the total exports are contributed by the agricultural and pastoral industries, wool being the largest item, followed by frozen meat, butter and cheese, and grain. The export of frozen meat began in 1882 and increased steadily until 1900, when it was estimated at £2,123,881, almost the whole of which went to England. Gold and kauri-gum are also important exports. About three-fifths of the imports are from the United Kingdom, and over three-fourths of the exports are to that country. In the trade of the colony the Australian States rank second and the United States third. The imports from the United States are much in excess of the exports to the United States. Auckland, Wellington, Bluff Harbor, Littleton, and Dunedin are the largest ports.

BANKS. Owing to the active participation of the colonial Government in the economic life of the community, the field of private banking is a comparatively limited one. In 1890 there were five commercial banks, and in 1900 the same number. The deposits have increased from £343,316 in 1857 to £15,570,610 in 1900. Of the five banks two are New Zealand institutions proper and the other three are branches of the Australian banks. The Bank of New Zealand is the most important institution and is semi-governmental in its nature. Four out of the six directors are (according to the act of 1898) appointed by the Government, which is both a heavy shareholder and depositor. Of the total deposits this bank has almost 50 per cent. The whole amount of loans made by all five banks in 1900 was £12,084,744, of which 30 per cent. were made by the Bank of New Zealand. These five banks are also banks of issue. Their notes are not legal tenders, but can be made so for a limited time by a proclamation of the Governor. In 1866 there were six private savings banks. These still existed in 1900, with 31,475 depositors and £855,792 deposits; but the law of 1867, which established the postal savings system, prohibited the organization of other private savings banks.

Forty-six banks were established under the postal system in 1867, and in 1900 there were 445. The number of accounts increased from 2156 in 1867 to 197,408 in 1900, and the sum of deposits from £71,197 to £5,809,552. Nearly every family has an account. The public trustee does the work usually done in the United States by the private trust companies. Also, the land registration offices compete with the private banks in holding real estate mortgages. The high development of the coöperative spirit in New Zealand has also made the building societies and friendly societies successful. The governmental insurance system attracts a considerable amount of the people's savings.

GOVERNMENT. The Parliament is composed of

two bodies, the Legislative Council and the House of Representatives. The former consists (1902) of 44 and the latter of 80 members. They hold office for seven years except such as were elected prior to September, 1891, who hold for life, as all members did before that date. There are 80 members in the other House. They are elected for three years. All registered adults of either sex who have resided in the colony one year and three months in the electoral district can vote. There are four native Maoris in the Lower House, elected by the adult (male and female) native population. The administrative function is in the hands of a Governor, appointed by the Crown, and the Ministry of eight members. The Governor has the power of veto over bills or can submit bills for consideration. He summons, prorogues, and dissolves Parliament. For purposes of local government the country is divided into counties and boroughs, road districts and town districts.

FINANCE. The participation of the Government in industrial activities resulted in large annual receipts and expenditures and in a heavy debt. The receipts from taxation increased from £1,755,414 in 1880-81 to £3,042,890 in 1900-01, and receipts from other sources increased during the same period from £1,529,628 to £2,864,026. In the fiscal year ending in 1901 the receipts from the customs amounted to £2,180,862, being the most important single source of revenue. In the same year the receipts from the railroads were £1,720,641; from stamps, including post and telegraph, £903,935; from land tax, £294,584; and from the income tax, £173,809. The total expenditure increased meanwhile from £4,019,850 to £5,479,704, and the public debt from £28,185,711 to £49,591,245. There was a sinking fund in 1901 of £1,033,494. The largest items of expenditure are the public debt charges, £1,745,616, and railways, £1,144,832. Other important items are education, £481,087; post and telegraph, £416,364; and the constabulary and defense, £347,448. The rate of increase of the debt of the colony has not been nearly so rapid as that of its wealth.

DEFENSE. All the principal ports are strongly defended by means of batteries, torpedo-boats, and submarine mines. All males between seventeen and forty years and unmarried men between seventeen and forty-five are liable to military service. In 1901 there was a volunteer force of 17,000 men.

STATE ACTIVITIES. New Zealand has become well known because of the various ways in which the functions of the State have been extended. The tendency in this direction was well developed prior to 1890, but became especially marked about that time. The movement has been the outgrowth largely of the influence exerted by organized labor upon legislation. The power of this element has been exercised through the existing political parties, and not through the agency of any politico-socialistic organizations such as have generally sought to advance radical movements in other countries. The experiment, for instance, has been made of preventing strikes and lockouts and adjusting questions at issue between labor and capital by compulsory conciliation and arbitration. Provisions are made by which either employers or trade unions may bring the dispute before a board of conciliation, and if a satisfactory agreement is not reached the question can be carried to the central court of arbitration. The decision made

by this court is final and is enforced, the award against an association, however, being subject to a maximum limit of £500. In practice the plan has accomplished the purpose intended, strikes and lockouts having been wholly prevented. A number of other measures affecting labor have been carried into effect, such as factory inspection, prevention of child labor, specification of hours of labor, and the occurrence of holidays. A system of old-age pension provides that all persons of good character who are over sixty-five years of age and have been twenty-five years in the colony may be pensioned if their income falls below specified limits.

Another phase of State activity receiving much attention has been the public land policy. The attempt is being made to secure and retain the public ownership of the land, and freehold is gradually giving way to perpetual lease. The policy of compulsory purchase has resulted in the breaking up of many large holdings held largely for speculative purposes, and has secured a genuine settlement upon such lands. Ordinarily purchases are affected by friendly negotiations, and compulsion is not often necessary. Prior to March, 1902, £2,117,352 had been paid for 107 estates. In order to make a settlement and improvement of the land possible by persons of small means, the Government advances loans to the settlers. The interest charged is 5 per cent. Over £3,000,000 has been lent in this way. Lands that are leased are leased for 999 years subject to certain conditions of residence and improvements. The annual rental is fixed at 4 per cent. on the cash price or 'prairie value' of the land, and there is at no time a right to purchase the freehold. District land boards have charge of the transfer of lands. The State has assumed the ownership of a number of utilities, including railroads, telegraphs, and telephones, and engages in the life insurance and the banking business. The results have been generally satisfactory to the advocates of the system. The colony has also taken an advanced position in regard to taxation. The colonial property tax consists solely of a progressive land tax. The system exempts small farmers entirely. Local communities have the privilege also of restricting tax levies to their land values. There is a progressive income tax. New Zealand has created the office of public trustee, whose incumbent has care of intestate estates, certain private trust estates, etc. Any property-owner has the right of appointing him executor. A local option law provides that licensed liquor houses may be abolished by a vote of three to two in any district, and that the number of them must be reduced if demanded by a majority of the electors. The question is voted upon every three years.

POPULATION. The population of New Zealand (exclusive of Maoris) increased from 79,711 in 1860 to 626,050 in 1890, and to 772,719 in 1901, the density of population being 7.39 to the square mile. The males numbered 405,992, females 366,727. Since 1841 the per cent. of increase has exceeded that of Australia for every decade except 1881-91. In the decade 1891-1900 the excess of arrivals over departures was 27,211. The population of North Island slightly outnumbers that of South Island. The population is quite homogeneous, being almost wholly from the United Kingdom. There are,

however, not a few Germans and Scandinavians. The immigration of colored races has been checked by restrictive governmental measures. The Chinese have decreased in number and were only 2792 in 1901. The Maoris have decreased from 70,000 (estimated) in 1840 to 46,518 in 1901, including 5762 half-castes, but the decrease seems to have been checked. The natives are allowed, within limitations, to manage and dispose of their land (about 5,000,000 acres), and they have a measure of local self-government. They welcome the advantages of education for their children and engage to some extent in agriculture. The population of the largest cities in 1901 was as follows: Auckland, 34,213, with suburbs, 67,226; Wellington, the capital, 43,638, with suburbs, 49,344; Christchurch, 17,538, with suburbs, 57,041; Dunedin, 24,879, with suburbs, 52,390.

RELIGION. The principal churches are the Church of England, predominating in Canterbury; the Presbyterian, which dominates in Otago and Southland; the Wesleyan and the Roman Catholic.

EDUCATION. The public system of education is in charge of a Government department, with a minister at its head. School attendance is compulsory between the ages of seven and thirteen. The schools are secular and the primary grades are free, small fees being charged for secondary courses. In 1900 there were 132,897 pupils enrolled at the State schools. Of them, 107,912 were in average attendance. There were in the same year 15,550 pupils enrolled in private schools, mainly Roman Catholic. The Government maintains 85 village schools, which had an attendance of 3109. Besides a number of art schools, there are mining, agricultural, and engineering institutions. In 1900-01 the Government expended £481,087 on education. The New Zealand University is an examining body, which has five affiliated colleges located respectively at Dunedin, Christchurch, Auckland, Wellington, and Canterbury. Each of these has the advantage of land grants, the income from which is annually supplemented by colonial grants.

HISTORY. New Zealand was discovered by Tasman in December, 1642. In October, 1769, Captain Cook landed at Poverty Bay, and in 1773 and 1777 explored the shores of the islands. The period before European colonization was characterized by fierce wars among the native tribes, marked by extensive conquests on the part of the celebrated chieftain Hongi (1820-28). In 1814 Rev. Samuel Marsden established a mission in the Bay of Islands. Other missionaries rapidly followed, and the natives were speedily converted to the outward forms of Christianity. A British resident was appointed at the Bay of Islands in 1833, and in the following year British troops were employed against the natives. In September, 1839, an expedition, under the auspices of the New Zealand Company, arrived at Port Nicholson, the first body of immigrants reaching that place in January of the following year. In February a number of native chiefs, in the Treaty of Waitangi, placed themselves under the authority of the British Government, and in May the sovereignty of Great Britain over the islands was proclaimed. Colonization was rapid and the alienation of the Maori lands proceeded steadily. In 1850 the New Zealand Company surrendered all of its interests in the colony to

the British Government, and in 1853 a constitutional act was promulgated for the colony, the first representative assembly being opened in 1855. From 1860 to 1866 there were formidable native uprisings, and spasmodic outbreaks did not cease until about 1870. Since that date the relations with the native population have been almost uniformly peaceful, and the Maoris have made rapid strides in civilization, attaining even a share in the government. In 1870 an act was passed establishing the New Zealand University. About this time, too, occurs the first beginnings of the policy of State participation in economic affairs, with the commencement of railway construction under public supervision in 1871, and the establishment of a Public Trust Office in 1872. An educational act providing for the free and compulsory instruction of all children was passed in 1876. In 1879 a measure was enacted looking toward the establishment of manhood suffrage, although the one-man one-vote principle was not in complete operation until 1890. In September, 1893, the franchise was extended to women.

The movement toward State socialism came prominently to the front in 1890, in which year the labor element exercised an important influence on the elections to the General Assembly. Since that year the progress in that direction has been rapid. Numerous labor laws have been passed, looking toward the amelioration of the condition of the working classes, while land legislation has been carried on with a view of bringing the soil into the possession of small owners. Thus, in accordance with an act of 1892, large areas of Government land have been leased in perpetuity to small tenants, the right of purchase being denied. In the same year the Government was authorized to acquire land for the purpose of settlement, and in 1894 this power of the Government was made compulsory. In the same year an act was passed authorizing Government loans to farmers on mortgage; in 1895 a Family Homes Protection Act prohibited homesteads from being mortgaged or sold for debt. As early as 1891 the property tax had been repealed, and a graduated tax on incomes and unimproved land values substituted, the income tax not being levied on incomes derived from land. Labor legislation culminated in the Industrial Conciliation and Arbitration Act of August 31, 1894, by which disputes between employers and employees were subjected to the decision of State tribunals. In 1898 an Old Age Pensions Bill was passed. In 1900 a form of workmen's accident insurance was adopted. New Zealand rendered loyal support to the British Empire in the South African War, its mounted contingents constituting a very useful part of the British forces.

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NEW ZEALAND FLAX. See FLAX, NEW ZEALAND.

NEW ZEALAND SUBREGION. In the Sclater-Wallace system of zoögeography, a subregion of the Australian Province, including New Zealand and all the surrounding islands south of New Caledonia. Its faunal characteristics are delineated in the article NEW ZEALAND, paragraph *Fauna*. Other views have been held in regard to the faunal relations of this isolated archipelago. Huxley made it a primary subdivision of his hemispherical region 'Notogaea' (q.v.). Recent zoölogists have been inclined to consider its features so distinct as to elevate it to primary rank and make it a full 'region,' co-ordinate with the Australian and other 'provinces.' See DISTRIBUTION OF ANIMALS.

NEXT FRIEND. An adult person, other than a guardian *ad litem*, who represents in an action another person who, by reason of infancy or other disability, is not legally competent to maintain the suit in his own behalf. The practice of permitting an incompetent person to sue by his next friend originated in England, where it was first authorized by the 'Statute of Westminster' passed in the reign of Edward I. Previous to that time an action in favor of an infant or other incompetent person could only be conducted by his regularly appointed guardian. The Norman-French term *prochein ami*, of which 'next friend' is the English equivalent, was employed in the above statute, and continues in use in many jurisdictions to-day. There is very little difference between the functions of a guardian *ad litem* and a person who sues as next friend, except that the latter usually represents a plaintiff, and in some jurisdictions the former is only appointed to represent a defendant.

A next friend is not a party to an action, but acts solely in a representative and advisory capacity. It follows, therefore, that most of the rules governing parties, as that the admissions of a party bind him, etc., do not apply to a next friend. He is, however, subject to such rules as relate to the conduct of the case. A next friend is considered as an officer of the court where he is appointed to protect the interests of an incompetent defendant. In some States where an infant is otherwise represented by a guardian, he may sue by a next friend to compel an accounting by the guardian where there is reason to believe that the latter is guilty of a breach of trust. In a few jurisdictions married women and persons of unsound mind may sue by a next friend. Usually, however, lunatics and

those who are mentally incompetent are represented by committees or guardians. An action commenced by a next friend cannot be discontinued or settled without the consent of the court. A next friend only represents the incompetent during the litigation, which, however, is not considered as ended until an appeal is determined or the right to appeal has expired. See COMMITTEE; GUARDIAN; INFANT; LUNATIC; MARRIED WOMEN; PARTIES; and authorities where referred to under these titles.

NEY, nā, MICHEL, Duke of Elchingen and Prince of the Moskva (1769-1815). One of Napoleon's most celebrated marshals. He was born January 10, 1769, at Saarlouis, the son of a poor cooper. He had but little education and worked as clerk to a notary and as foreman in a mine until 1788, when he joined a hussar regiment at Metz. He made the campaign of 1792 with the Army of the North and rose to be lieutenant. In April, 1794, he became captain in the Army of the Sambre and Meuse, and distinguished himself by his energy and his cool intrepidity. He was wounded at the siege of Mainz, fought bravely in 1795 at Altenkirchen, and for his services in storming the citadel of Würzburg and forcing the passage of the Rednitz was made in 1796 brigadier-general. His capture of Mannheim (March 28, 1799) gained him the rank of general of division, and after being severely wounded at Winterthur in May, he was placed in September in temporary command over the Army of the Rhine, and carried on a skillful game of strategy against the Archduke Charles of Austria, whom he prevented from uniting with Suvaroff against Masséna. He fought subsequently under Lecourbe and Moreau at Engen, Mösskirch, and Hohenlinden. Ney's republican principles could not withstand the blandishments of Napoleon, who persuaded him to marry, in 1802, Mlle. Auguié, a friend of Hortense Beauharnais, made him inspector-general of cavalry, and sent him on a diplomatic mission to Switzerland, where he brought about the Act of Mediation of February, 1803. In the same year he was given command of the Sixth Corps of the Grand Army raised for the invasion of England, but soon to be turned against Austria. In 1804 he was made a marshal of the Empire. In the following year he defeated the Austrians at Günzburg (October 9th) and by his successful assault on the intrenchments of Elchingen brought about the capitulation of Ulm and gained for himself the ducal title (conferred in 1808). He fought at Jena in 1806, reduced the cities of Erfurt, Magdeburg, and Thorn, and by his timely arrival on the battlefield of Eylau (q.v.) prevented a possible defeat for the French. On June 14, 1807, Ney took the village of Friedland from the Russians after a bloody combat, and thus decided the outcome of the battle. He now became the idol of the army, while Napoleon bestowed on him the title of *Brave des braves*. In 1808 he was sent with the Sixth Corps to Spain. He overran Galicia, maintained an energetic warfare against the Spanish guerrillas, and added to his reputation for audacity and skill. In 1810 he was placed under the command of Masséna, to whom was intrusted the invasion of Portugal. Ney resented what he conceived a slight toward himself, and, though he fought with splendid courage on the retreat from Torres Vedras as commander of the rear guard (one of the greatest

incidents in his career), he was guilty of gross insubordination, and in March, 1811, returned to France in semi-disgrace. His talents, however, made him invaluable, and in the Russian campaign (1812) he held command of the Third Corps. He distinguished himself at Smolensk and commanded the centre at Borodino (q.v.), where his efforts achieved the victory, his services being rewarded with the title of Prince of the Moskva. He commanded the rear guard on the retreat from Moscow, and by vigorous discipline and devoted heroism saved the remnants of the Grand Army from utter disorganization, notably at the disastrous passage of the Bérésina. In the campaign of 1813 he won a victory over the Allies at Weissenfels (May 1, 1813), fought at Lützen and Bautzen in May, but was defeated by Bülow at Dennewitz (September 6th). He held the left of the French line in the battles around Leipzig and was with Napoleon in the defensive campaign of 1814 in France. After the taking of Paris by the Allies he insisted on Napoleon's abdication and hastened to offer his services to the Bourbons. He was made a peer of France, and a member of the council of war, and was placed in charge of the sixth military division. On news of Napoleon's return from Elba he was ordered to Besançon to resist the Emperor's advance, but on the night of March 13th he went over to Napoleon, summoning his troops to follow him, and on the 17th he joined the Emperor at Auxerre, moved to this act, no doubt, by the magic influence of his old commander, but influenced too by the humiliations to which he had been subjected by the returned nobles of the old régime. At the head of the First and Second Corps of the new army raised by Napoleon, he fought on June 16th at Quatrebras (q.v.), and led the last charge of the Old Guard at Waterloo. After the battle he returned to Paris and advocated the recall of the Bourbons. Proscribed on July 24th, he remained in hiding in the country till August 5th, when he was discovered and brought to Paris and arraigned (December 5th) before a court-martial containing many of his old companions in arms. The court declared Ney out of its jurisdiction as a peer of France, and handed him over to the Chamber of Peers, which on December 6, 1815, by 139 votes against 17 found him guilty of treason and condemned him to death. He was shot the following day in the gardens of the Luxembourg. Consult: Dumoulin, *Histoire complète du procès du maréchal Ney* (Paris, 1815); Rouval, *Vie du maréchal Ney* (ib., 1833); Welschinger, *Le maréchal Ney, 1815* (ib., 1893).

NEZHIN, nyé'zhén, or **NEJIN**. A town in the Government of Tchernigov, Little Russia, situated on the Oster, about 80 miles northeast of Kiev. It has a philological institute, a gymnasium, and a Greek school. It is noted for the tobacco cultivated in its vicinity. Vegetables and fruit are also important products. The trade, formerly of great extent, has decreased since the rise of Taganrog and Rostov-on-the-Don. It was under Chmielnicki, in the seventeenth century, that Greek merchants settled at Nezhin, where they were granted special privileges. Population, in 1897, 32,100, including a number of Greeks.

NEZ PERCÉ, nā pār'sā'. The leading tribe of Shahaptian stock (q.v.). They call them-

selves *Shaptin*, whence the stock name, but they were known as *Chopunnish* to some of the neighboring tribes, and were called *Nez-percé*, 'Pierced Nose,' by the French, in allusion to their former custom of wearing nose pendants. They formerly claimed a large territory in eastern Washington and Oregon and central Idaho, bounded on the east by the main divide of the Bitter Root Mountains and including the lower Grande Ronde and Salmon rivers, with a large part of the Snake and all of the Clearwater River districts.

Lewis and Clark traversed their country in 1805. In 1832 they sent a delegation to Saint Louis to ask for Christian missionaries and teachers. In response to their request a Protestant mission was established among them at Lapwai, Idaho, in 1837. Soon afterwards they entered into governmental relations, and they made their first treaty with the United States in 1855. By this they ceded the greater portion of their territory and were confirmed in the possession of a reservation including Wallowa Valley in Oregon. On the discovery of gold in the country, however, the miners rushed in, and in consequence a new treaty was forced upon the Indians by which they agreed to surrender all but a reservation at Lapwai in Idaho. Joseph, who occupied Wallowa Valley with his band, refused to recognize the treaty or remove to Lapwai. This refusal led to the Nez Percé War in 1877, in which, under Joseph's leadership, several severe defeats were inflicted upon successive detachments of regular troops. Joseph finally almost accomplished a masterly retreat toward Canada through Idaho and Montana, which was frustrated only by the arrival of Colonel (General) Miles, when the Indians were within 50 miles of the British line. Joseph surrendered on assurance of being allowed to return to his own country, but the promise was not kept. He and his band were deported to the Indian Territory, where in seven years they were reduced by disease from about 450 to 280. Their condition compelled attention, and in 1884 they were returned to the north, not however, to their old country, but to the Colville reservation in northern Washington, where they now reside. From an estimated total population of 2800 in 1863 the tribe has decreased to less than 1700, of whom about 1570 are on the (allotted) Lapwai agency, in northwestern Idaho, the rest under Joseph being at Colville, Wash. The general report of conditions in either band is not encouraging. Consult Mooney, "Ghost Dance Religion," in *Fourteenth Annual Report of the Bureau of Ethnology* (Washington, 1896). See Plate of American Indians, under INDIANS.

NGAMI, n'gä'mé, LAKE. A lake in South-Central Africa, situated in Western Rhodesia, north of the Kalahari Desert (Map: Africa, G 7). It is one of the last remnants of the great inland sea which formerly seems to have occupied the vast lacustrine basin of which the Kalahari is a part. A gradual desiccation is still going on in this region, and Lake Ngami has diminished considerably since it was discovered by Livingstone in 1849. It is now little more than a marsh in the dry season, while during floods it may reach the dimensions of 10 by 30 miles. It receives the waters of the Kubanga, and discharges periodically eastward into the Makarikari Salt Basin.

NGAN-HWEI, n'gän'hwa'ë (Chin., peace, plenty). One of the eastern provinces of China, bounded on the north by the Province of Kiang-su, on the east by Kiang-su and Che-kiang, on the south by Kiang-si, and on the west by Hu-peh and Ho-nan (Map: China, E 5). Its area is estimated at from 53,000 to 55,000 square miles. It is divided into three parts, the hilly region in the south around Hwei-chow and Ning-kwoh with the Tsien-tang River, the central plain of the Yang-tse, and the northern part, drained by the River Hwai. The southern districts are famed for climate, fertility, and productions. The staples are fruits, cotton, hemp, silk, and iron. The numerous streams are used for navigation and for irrigation, their control showing great engineering ability. The province contains some of the most productive and beautiful parts of the Empire and is under a high state of cultivation. It suffered greatly in the Tai-ping rebellion, losing nearly half its population. Its present population is estimated at over 20,000,000. Capital, Ngan-king-fu (q.v.).

NGAN-KING-FU, n'gän'king'föw'. The capital of the Province of Ngan-hwei (q.v.), China, situated on the Yang-tse river, about 175 miles east of Hankow (Map: China, E 3). It still shows traces of its occupation during the Tai-ping Rebellion. It was opened to foreign trade in 1897. Its population is estimated at 40,000.

NGORNU, n'gôr'nöö, or **ANGORNU**, äng-gôr'nöö. A town of Bornu (q.v.), Central Africa, on the southwest bank of Lake Chad, 15 miles southeast of Kuka. Owing to its low position, the town is occasionally flooded by the rising waters of the lake. Ngornu is an important commercial place and through its fairs an extensive trade is carried on in cotton, amber, and metals. Its population is estimated at from 20,000 to 50,000.

NIAGARA, BATTLE OF. See LUNDY'S LAKE, BATTLE OF.

NIAGARA FALLS. See NIAGARA RIVER AND FALLS.

NIAGARA FALLS. A city in Niagara County, N. Y., 22 miles north by west of Buffalo; on the Niagara River, and on the Erie, the Michigan Central, the Lehigh Valley, the New York Central and Hudson River, the West Shore, the Grand Trunk, and the Wabash railroads (Map: New York, B 2). It is the seat of Niagara University (Roman Catholic), opened in 1856, and De Veaux College (Protestant Episcopal), and has a public library, for which a \$50,000 building was given by Andrew Carnegie. The New York State Reservation here, which includes Prospect Park, is 107 acres in extent; and there are three notable bridges connecting with Canada, one cantilever and two steel arch bridges. (See BRIDGE.) The vicinity possesses much of historic interest. Niagara Falls has long been noted as the foremost scenic resort of America. It is developing also into an important manufacturing centre, its growth being due to the utilization of the extraordinary power of the Niagara River and Falls (q.v.). Among the industrial establishments are flour and paper mills, planing mills, a foundry and machine-shop, a plant for the production of wheat biscuit, aluminum, carbide, and carborundum works, and electro-chemical works. Niagara Falls was chartered as a city in 1892, the former villages of Niagara Falls

and Suspension Bridge being consolidated. The government, under the original charter, is vested in a mayor, elected biennially, and a common council, and in administrative officers who are appointed by the mayor. The water-works are owned and operated by the municipality. Population, in 1900, 19,457.

NIAGARA FALLS, formerly CLIFTON, or SUSPENSION BRIDGE. A town of Welland County, Ontario, Can., on the west bank of Niagara River, below the falls, 20 miles northwest of Buffalo. It is opposite Niagara Falls City, U. S., with which it is connected by three bridges and electric railways, and is the junction of the main lines of railways entering that city with the Grand Trunk Line of Canada. Its chief features are Wesley Park and Queen Victoria Niagara Falls Park, which covers an area of 154 acres, extends along the river for two and a half miles, and commands the finest views of the falls. Extensive works similar to those on the United States side are in course of construction to utilize the water power. Population, in 1901, 4244.

NIAGARA-ON-THE-LAKE. A town in Lincoln County, Ontario, Can., on Lake Ontario, at the mouth of the River Niagara, 36 miles distant by water from Toronto (Map: Ontario, D 4). Burned down in December, 1813, by the American General McClure on his retreat, it was rebuilt, and is known as a summer and pleasure resort with good bathing, boating, and fishing. Population, in 1901, 1258.

NIAGARA RIVER AND FALLS (Iroquois *Jorakare*, thundering water). The Niagara River flows from Lake Erie to Lake Ontario, and is the outlet for the whole drainage of lakes Superior, Huron, Michigan, Saint Clair, and Erie. The surface of Erie, where the river begins, is 326 feet higher than the level of Ontario, where it ends. The water is clear and pure. The river is 33 miles long, its general direction is from south to north, and it forms the boundary between New York State and the Canadian Province of Ontario. The volume of water which enters Niagara is 280,000 cubic feet a second. In its upper course it is very wide (below Grand Island from 2½ to 3 miles); just above Niagara Falls it is less than a mile in width, and below the falls it rushes headlong through a deep and narrow gorge to the cliff at Lewiston, where it emerges on the plain of Lake Ontario, and is again a broad and peaceful river.

As it emerges from Lake Erie and enters the plain, it is crossed by a low ridge of rock, in passing which the river is swift and troubled for about two miles. Then it is smooth again, flows slowly over the plateau, has an average depth of 25 feet, and its surface is interspersed with many small islands. For nearly three-fourths of its length it cannot be said to have a valley, for it flows upon the surface of the plateau, and its fall from the lake to the rapids above the cataract is only 20 feet. Then a sudden and complete change in its aspect occurs. It is dropped by the short rapids beginning a little above Goat Island 52 feet, which is the prelude to the fall over the majestic cataract, where it plunges 160 feet down into the plain, a total descent of 212 feet from the head of the rapids. At the foot of the American Falls there is no great depth of water, massive and broken rock in the bed having prevented the deep excavation

that would otherwise occur; but the enormous mass of water, 20 feet deep at the centre and about nine-tenths of the whole volume, which thunders over the Canadian or Horseshoe Falls, has excavated a basin extending from shore to shore for 1½ miles below the falls that is fully as deep as the height of the falls. The effect of this deep basin or reservoir is to retard and smooth the waters so far that rowboats cross the river and the little steamer *Maid of the Mist* is able to approach the cataract. The basin is succeeded by the narrow gorge which continues to Lewiston, its width rarely equaling one-fourth of a mile, and its depth to the bottom of the river varying from 200 to 500 feet. Its walls are so steep that they can be climbed only at a few places, and they reveal the geologic structure of the plateau—the bedded rocks of limestone, shale, and sandstone lying almost horizontally. The fall of the river in the gorge, seven miles long, is about 100 feet. The confined waters pour tumultuously along at an estimated speed of 30 miles an hour, and the terrific onrush and battle of the waters make a spectacle that is equal to that of the falls themselves. About midway in the gorge the channel makes an abrupt, short turn to the left, and here the onslaught of the torrent has worn out a vast circular basin forming the celebrated Whirlpool. From the Whirlpool the channel is broader and less steep. The plateau ends abruptly at Lewiston, and its edge, where it steeply descends to the littoral plain of Ontario, is marked by a long escarpment parallel with the shores of the lake, known to geologists as the Niagara Escarpment, which rises to about 250 feet above the level of Ontario. The last seven miles of the journey is over the littoral plain with a fall of only about three feet.

The position of Niagara Falls marks the present extension of the work of the river in cutting this great gorge. It is not known by what channel or channels Lake Erie may have discharged its waters in pre-glacial times; but geologists have proved that the Niagara River began its existence during the final retreat of the great ice sheet; in other words, most students of glacial geology agree that the history of the river covers only a small part of the period since the beginning of the age of ice.

The great work of the river has been in excavating the gorge from Lewiston back to the present position of the cataract. The falls first poured over the edge of the escarpment at Lewiston and began to dig their way back through hard limestone and sandstone, interbedded with a coherent though softer shale, and for a part of the distance the material was incoherent drift. The process of excavation may be observed at the falls. The rocks lie in layers and the upper covering of loose drift yields readily to the wash of the waters. Under the drift is hard limestone, called the Niagara limestone, 80 feet in thickness; beneath the limestone lies the softer Niagara shale, with a thickness of 50 feet; then for 35 feet is the Clinton group, an alternation of limestone, shale, and sandstone, the whole resting upon a bed several hundred feet in thickness of soft sandy shale, which is not known to be interrupted except by a single hard layer of sandstone from 10 to 20 feet thick. These shales and sandstone are called the Medina formation. The hard top layer of limestone



NIAGARA FALLS
FROM THE AMERICAN SIDE

projects like a shelf over the edge of the falls so that the water leaps from it and strikes the surface of the pool below. Now and then large blocks of the upper limestone break away and fall into the pool, due doubtless to the erosion of the softer shale beneath, the limestone thus being deprived of its support. Just how the shale is eroded, and how the harder rock beneath it is affected, is in doubt. It is observed in the Cave of the Winds, where visitors may pass behind one of the thinner segments of the falls, that spray and water are constantly dashing against the shale and probably wear it away. The shale is also calcareous, and this element in it being soluble, it is likely that solution has a part in the work of destruction. As the water contains no sediment, the Niagara River cannot use this agency, as most rivers do, to scour out its bed; but the broken pieces of rock that fall into the river below the cataract are undoubtedly potent in digging out and deepening the channel. Government engineers have discovered depths of 200 feet a half mile below the falls, and Gilbert and other geologists assume that the falls are scouring the river bed as deeply now as they did when they were situated farther down the stream. This is occurring in front of the Horseshoe Falls, but not at the American Falls, where the volume of water is comparatively small. The broken rock here piles up as a talus at the foot of the fall, and upon it the force of the descending water is spent.

The edge of the American Falls is retreating much less rapidly than that of the Horseshoe Falls. The average annual recession on the American side has been only about a half foot for the past fifty years; but the Horseshoe Falls have receded in fifty-two years from 150 to 230 feet along the western half of its edge, and 270 feet at the apex of its curve, making a recession of from four to six feet a year. If this rate of recession were constant, the proof would be conclusive that the gorge, from the Niagara escarpment to the falls of to-day, had been excavated in about 7000 years. But the thickness of the resistant bed at the crest of the falls is far from uniform; and there is evidence that at one period after the retreat of the ice the upper lakes found outlets through other rivers, and only Lake Erie was drained by the Niagara, whose small volume of water then must have been greatly inferior to that of to-day in its ability to excavate the gorge. The assured fact is that the gorge is gradually being cut back toward Lake Erie.

About a half mile above the brink of the falls, Goat Island divides the river into two unequal streams, the one on the American side being comparatively shallow and narrow, and discharging over the American Falls, while most of the river swings around to the left of Goat Island and discharges over the Horseshoe or Canadian Falls. The resemblance of the outline of these falls to a horseshoe has been destroyed by the more rapid recession of the central part of the cataract edge. The American Falls are 1060 feet wide, and the water is very shallow as it plunges over the edge, falling 167 feet. The Horseshoe Falls have a total width of 3010 feet, measured along the curve, or 1230 across the chord, a maximum estimated depth of 20 feet, and a vertical height of 158 feet. As the water is derived from the immense reservoirs of the

lakes, there is little variation in the quantity, the differences in volume depending not so much upon precipitation as upon the strong winds which slightly retard or accelerate the movement of the surface waters of Lake Erie to the mouth of the river. The normal flow pouring over the cataract is about 500,000 tons a minute.

The falls, being one of the great scenic attractions of the world, are visited every year by many thousands of tourists. From the time when Father Hennepin discovered them in 1678, and wildly estimated that they were over 500 feet in height, they have never been adequately described. A realizing sense of the grandeur of this prodigious green flood pouring into an abyss where it is half lost in the masses of ascending mist can be obtained only by personal observation. Sightseeing has been greatly facilitated, and visitors protected from imposition since 1885, by the conversion of the land on both sides of the falls into public parks. The New York State Reservation contains 107 acres, and the Queen Victoria Niagara Falls Park on the Canadian side 154 acres. Since these banks became Government properties, the mean industrial structures that marred them have been torn down, and the wonderful spectacle may now be enjoyed at leisure from shady avenues, artificial platforms, and other advantageous points of view. Trains on the Canadian side wait for a few minutes to give the passengers a glimpse of the vast sheet of water curving over the Horseshoe Falls. An electric trolley line has been built through the gorge along the brink of the river on the American side and connects by the Queens-town bridge with the electric line skirting the Canadian heights along the gorge and extending past the Horseshoe Falls to Chippawa; a railroad also skirts the United States edge of the gorge, so that visitors may see its entire length and take in the terrific features of the rapids and the whirlpool. Many visitors enter the Cave of the Winds, approach the falls on the steamer *Maid of the Mist*, or enjoy the superb general view from the middle of the upper suspension bridge or the high terrace below the Horseshoe Falls on the Canadian side. Several days are required even for a cursory examination of all the attractions of the place. The three bridges thrown across the river below the falls were long regarded as wonders of engineering. The upper suspension bridge for pedestrians and carriages, built of steel about 250 yards below the American Falls, has a span of 821 feet, and is 260 feet above the water; the cantilever, 910 feet long, spanning the gorge some distance above the Whirlpool, was the first bridge of the kind to be built in America; the railroad suspension bridge, 300 feet below the cantilever, has a carriageway below the track.

It is only in recent years that important attempts have been made to utilize the energy of Niagara Falls for industrial purposes. The largest plant is that of a power company which generates electricity by leading water through a canal from above the falls to a wheel pit in which are turbines, the water discharging through a tunnel into the river below the falls. Many industries at the falls are using the electricity, and Buffalo, 22 miles distant, takes it for its city railroads and other power purposes. Over three-fourths of the power generated, however, is consumed in the neighborhood of the falls.

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NIAGARA SERIES. The lowest division of the Upper Silurian (or Silurian) system of rocks. It is made up of a series of sandstones, limestones, and shales, which are grouped together under the Medina, Clinton, and Niagara stages. The rocks of the Niagara series are found in central and eastern New York, and extend southward through Ohio, Pennsylvania, Virginia, eastern Kentucky, and Tennessee, and westward through Illinois, Missouri, and Iowa. They are also known westward in Illinois, Wisconsin, and Indiana. Many of the beds are very persistent. The Oneida conglomerate at the base forms the bold scenery of the Shawangunk Mountains, in New York; the Clinton division carries a bed of red hematite iron ore which is found from New York to Birmingham, Ala., where it forms the basis of a large steel industry. The limestone and shale of the Niagara epoch are seen at Niagara Falls, where it is the undermining of the limestone, due to the wearing away of the shale, which has caused the falls. Fossils are found in great abundance in most of the rocks. See **SILURIAN SYSTEM**; **CLINTON STAGE**.

NIAM NIAM, nè-âm' nè-âm', or **ZANDEH**. A numerous people of Negro-Hamite blood on the Nile-Congo-Tchad water-shed north of the Welle River, Southeastern Sudan, between 4° and 7° north latitude and 25° and 29° east longitude. They are negroes, brachycephalic, muscular, of medium height, and brown color. They are noted for their cannibalism. Their houses are conical, with clay walls and thatched roofs; the kitchen hut and sleeping hut for boys form part of the dwelling group. They are hunters and agriculturists, excel in textile work and handicraft in clay, wood, and iron, and play on a five-stringed harp. They fight with throwing knives, swords, assegais, clubs, and shields. Numbering over two millions, they are divided into small sovereignties, partly independent, partly under the Congo Free State. Consult: Stanford, *Africa* (London, 1895); Deniker, *Races of Man* (London, 1900).

NIANTIC, or **NEHANTIC**. A small Algonquian tribe, formerly occupying the southwestern coast of Rhode Island, adjoining the Narraganset (q.v.), who claimed dominion over them. Their principal village was at Fort Neck, on the Great Pond in Charlestown. By refusing to join the hostiles in King Philip's War of 1675-76, they were able to preserve their territory and tribal organization, and at the close of the war the Narraganset who submitted to the English were settled with the Niantic, and the whole body thenceforth took the name of Narraganset. A detached body, supposed to have been cut off from the main tribe by an invasion

of the Pequot, resided on Niantic Bay, in Connecticut. They were subject to the Pequot, and with them were nearly destroyed in the war of 1637, the few survivors gradually wasting away by emigration and disease until none were left in the original territory. The present Narraganset of Rhode Island are chiefly of Niantic descent, so far as their Indian blood is concerned.

NIAS, nè'äs'. An island in the Indian Ocean, belonging to the Netherlands, and situated 65 miles from the west coast of Sumatra (Map: Australasia, B 2). It is 65 miles long, 20 miles wide, and has an area of about 1800 square miles. It is mountainous and surrounded by coral reefs, and the soil is very fertile, the chief products being rice, sugar, and pepper, the latter amounting to over 100,000 pounds annually. The inhabitants, whose number is estimated at 200,000, are a Malay people closely akin to the Battaks. They are somewhat lighter in color of skin than many of the Malayan tribes, and are sometimes classed as Indonesians. In head-form they tend toward dolichocephaly. The island has suffered much from intertribal wars, and the slave trade continued here with unusual persistency. Consult: Modigliano, *Un viaggio a Nias* (Milan, 1890); Sundermann, "Kleine niassische Chrestomathie," in *Bijdragen voor de taal- land- en volkenkunde van Nederlandsch Indie*, ser. v., vol. vii. ('sGravenhage, 1892); id., *Kurzgefasste niassische Grammatik* (Mörs, 1892); id., *Deutsch-Niassisches Wörterbuch* (ib., 1892).

NIATA, nyä'tä, or **NATA**, nä'tä. A breed of deformed cattle, long existent in Argentina, but now very rare. These animals greatly interested Darwin as an example of a variation, believed to have originated early in the eighteenth century among the Patagonian Indians, and to have remained constant for a long period. They have very short, broad foreheads, upturned noses, lips withdrawn, showing the teeth, and a ludicrous facial resemblance to pug dogs. They are remarkable for 'breeding true,' and the amount of influence exerted on the hybrid offspring when crossed with other cattle. Consult Darwin, *A Naturalist's Voyage* (London, 3d ed., 1860; New York reprint, 1899). Compare **PREPOTENCY**.

NIBELUNGEN, RING DES. See **RING DES NIBELUNGEN**.

NIBELUNGENLIED, nè'be-lung'en-lēt' (Ger., Song of the Nibelungs). A great German epic, composed by an unknown poet on the basis of earlier German songs, traditions, and possibly Latin poems, at the beginning of the thirteenth century. The original form of the poem is probably in none of the ten complete MSS., but that known as B seems closest to the original. A seems an abridgment, C an enlargement of B, and to one of these three types all the MSS. and fragments belong. The song falls into two parts, the first dealing with the wooing, marriage, and murder of Siegfried, the second with the vengeance of his widow, Kriemhild. The scene of the former is the Burgundian court of Gunther and his wife, Brunhilda, at Worms, of the latter the Hunnish court of Etzel or Attila; but both parts appear to have got their present form among the Franks, whence the legends spread over Germany and to Scandinavia, where we find them much modified in the *Edda* and the *Thidreksaga*. The outline of

the story is this: Siegfried, King of the Nibelungs in Nether Germany, woos Kriemhild, sister of the Burgundian King Gunther, for whom he procures to wife Brunhilda, Queen of Iceland, by wearing a magic cloak, and is rewarded with Kriemhild's hand. Brunhilda discovers the deception and procures the murder of Siegfried by Hagen. To avenge herself, Kriemhild accepts the suit of Etzel and invites Gunther with his brothers and courtiers to visit her. Hagen perceives her intent, buries the Nibelungen treasure in the Rhine, and, after vain efforts to dissuade the King, accompanies him. The Burgundians are attacked in a hall and all are finally killed, not without loss to Etzel of Kriemhild, of their son, and of all his warriors, save only Dietrich von Bern (Theodoric of Verona) and his companion, Hildebrand, hero of the *Hildebrandslied*. Then follows in all MSS. a *Lament* (*Die Klage*) older than the *Song* and also anonymous. The historical substratum of the legend is the defeat of the Burgundian King Gundahari by Attila in 437. Kriemhild seems identical with the girl Ildico (Hilde), who was with him at his death, according to Jordanes, but the actual Theodoric belongs to a later period, and if Siegfried be, as many have thought, identical with Arminius (q.v.), he is more than four centuries earlier. Others regard Siegfried, with Brunhilda, as mythical. The poem derives such unity as it has from various forms of the conflicting claims of double allegiance. In Kriemhild there is the conflict between wife, sister, and mother; in Siegfried between husband and vassal; in Hagen between chivalric honor and allegiance; and in Rüdiger, Etzel's great vassal, between hospitality and loyalty. Thus in one form or another that faithfulness (*Treue*) that Heine said was the strongest characteristic of the German nation is the mainspring of tragic action. But the *Song* lacks unity of inner structure. Passages of deep feeling and pathos alternate not alone with those of fierce, rugged strength, but with others trivial, grotesque, or even, as in Gunther's wedding, downright burlesque. The episodes, too, are so inartistically welded that a school of critics, Lachmann at their head, even thought they could distinguish the elements of compilation; but this position is now generally abandoned. The history of the Nibelungenlied is not without interest. For centuries it was quite forgotten. Bodmer (q.v.) printed fragments of it in 1757, but it was received with indifference by scholars and with contempt by King Frederick II. The national spirit roused by the War of Liberation was more favorable to the legend. A soldiers' edition was printed in 1815, and in the next year Karl Lachmann published his epoch-making study. Since then the Nibelungenlied has grown steadily in scholastic and popular favor till its contents have become part of German literary consciousness. It has been the subject of critical studies by the Grimms, Müllenhoff, Zarneke, Bartsch, and Scherer; has been edited several times in its three versions, and well translated into modern German by Simrock, Bartsch, and Freytag. There are English versions by Lettsom (1850), Foster-Barham (1887), and Birch (1887).

BIBLIOGRAPHY. The history of the Nibelungen controversy is told in Fischer, *Die Forschungen über das Nibelungenlied seit K. Lachmann* (Leipzig, 1874). Consult, also, Muth, *Einlei-*

tung (Paderborn, 1877); Willmanns, *Beiträge zur Erklärung und Geschichte des Nibelungenlied* (Halle, 1877); Henning, *Nibelungenstudien* (ib., 1883); W. Grimm, *Die deutsche Heldensage*, 3d ed., by Steig (Gütersloh, 1890); Heinzel, *Ueber die Nibelungensage* (Vienna, 1885); Müller, *Mythologie der deutschen Heldensage* (Heilbronn, 1886); Lichtenberger, *Le poème et la légende des Nibelungen* (Paris, 1891); and Gaston Paris, in *Poèmes et légendes du moyen âge* (ib., 1901). There is a poetical analysis in Carlyle's *Miscellaneous Essays*. The Nibelungenlied has furnished Jordan the material for his epic, *Die Nibelungen*, and Wagner the subject for the *Nibelungen Trilogy*, which has, however, more Norse than German elements. Siegfried plays a prominent part in other Middle High German epics, e.g. *Bitrolf* and *Der Rosengarten*.

NIBLO'S GARDEN. A former New York theatre on Broadway, near Prince Street, established in 1828 under the name of the Sans Souci, and later the property of William Niblo. It was famous as the home of the spectacular drama during the second half of the nineteenth century. It was twice burned and rebuilt, and was finally torn down in 1900.

NICÆA, ní-sé'á, or **NICE**, nēs (Gk. *Nίκη*, *Nikē*, *Nikala*, *Nikaia*, city of victory). A city of Bithynia, in Asia Minor, situated at the eastern end of Lake Ascania. It was built on the site of an older town by Antigonos (B.C. 316) and received the name of Antigoneia, which Lysimachus changed to Nicæa, in honor of his wife. It was a handsome town and of great importance in the time of the Roman and Byzantine emperors; all the streets crossed each other at right angles, and from a magnificent monument in the centre the four gates of the city were visible. It was early the residence of a Christian bishop, later of an archbishop. In 1078 it was captured by the Seljuks. In 1097 it was taken by the Crusaders. Theodore Lascaris (q.v.) made it the capital of his dominions in Asia Minor in 1206, and it remained the seat of an independent Greek State until 1261, when Michael Palæologus, Emperor of Nicæa, restored the Byzantine Empire. It fell into the power of the Osmanlis in 1326. Nicæa's chief importance in history is in connection with the two church councils held there. (See **NICÆA, COUNCILS OF**.) At the present time it is a small and ruinous village called İsnik, with many interesting ruins. The church in which the council is said to have been held is now a mosque.

NICÆA, COUNCILS OF. Two ecumenical councils of the Christian Church, held at Nicæa in Bithynia. (1) The first was convened by the Emperor Constantine in 325 to settle the Arian controversy. Of some 1800 bishops in the Empire, 318 attended the council. The total number of delegates, including presbyters and others, was probably more than 1500. The eastern provinces were largely represented. Many of the members were venerable and illustrious men, among whom were Eusebius of Cæsarea, eminent for learning; Athanasius, then only a young deacon, attendant on the Bishop of Alexandria, small and insignificant in person, but conspicuous for intellect, eloquence, and zeal; Arius, a parish priest of Alexandria, 60 years old, tall and emaciated in person, wild, sometimes almost to madness, in manner ascetic, and negligent in dress, yet having a

sweet voice, and fascinating speech; Paphnutius, a martyr of the Upper Thebaid, whose right eye had been dug out with a sword, and the empty socket seared with a hot iron; Paul of Neo-Cæsarea, also a martyr, scarred by the brand of hot iron which had crippled both his hands; Jacob of Nisibis, who had spent years as a hermit in forests and caves, subsisting on plants and roots; Spiridion of Cyrus, continuing, even after his ordination, a literal shepherd; Hosius of Cordova, the ablest and best of the Western delegates; two Roman presbyters, influential as representing Pope Sylvester, who was kept at home by the infirmities of age; a Persian bishop from the eastern frontier, and a Gothic bishop from the north. Constantine's object in convening the council, as announced in his opening address, was to heal the divisions in the Church. At the opening of the discussions on the nature of Christ there seemed little prospect that the Emperor's prayer for harmony among the delegates would be answered. Accusations and recriminations were bandied to and fro without regard to his presence. The first sessions were devoted chiefly to a discussion of the Arian views, accompanied with an examination of Arius himself. He maintained that the Son of God was a creature, though indeed the most exalted of all; that He had been made out of nothing; that there was a time when He did not exist; and that, in His own free will, He was capable of right and wrong. The first attempt to reach a decision was made by producing an ancient creed of Palestine, the basis of that which was ultimately adopted, but opposed at first by the orthodox—the more violently because the Arians were willing to adopt it. A letter having been read from Eusebius of Nicomedia, in which he declared that to assert the Son to be uncreated would be to say that He was of one substance (*ὁμοούσιος*) with the Father, the expression was laid hold of as furnishing the very test for which they were seeking. For the confession of faith adopted at the end of the deliberations, see NICEÆ CREED.

Another controversy determined had reference to the time for observing Easter. The question was, Ought the Christian passover to be celebrated on the same day as the Jewish—the 14th day of the month Nisan—or on the following Sunday? On the one side were the apostolic traditions, and on the other the Catholic spirit seeking separation from Jewish ideas. At the date of the council the Judaic time was observed by the principal Eastern churches, and the Christian time by the Western churches, with a part of the Eastern. The decision was in favor of the Christian time. Some smaller matters also were decided by the council, and 20 canons passed on various subjects pertaining to morality and religion. For a minute and picturesque description of this council, consult: Stanley, *History of the Eastern Church* (London, 1861); also Boyle, *A Historical View of the Council of Nice, with a Translation of Documents*, in Cruse's translation of Eusebius (New York, 1856).

(2) The second council of Nicæa was convened in 786 by the Empress Irene and her son Constantine, dissolved because of the tumults raised by the image-breaking party, and reassembled the following year. Three hundred and seventy-five bishops attended from Greece, Thrace, the isles of the Archipelago, Sicily, and Italy. The council was occasioned by the Emperor's ill-

judged severity in forbidding the use of images for any purpose, and causing them everywhere to be removed and destroyed; and by the violent opposition to his course. For the history of this controversy, see IMAGE-WORSHIP.

NICANDER (Lat., from Gk. *Nikandros*, *Nikandros*). A Greek physician and poet, born at Colophon, in Asia, about B.C. 150. Of his numerous works only two poems are extant: the *Θηριακά* (nearly one thousand hexameter lines), on remedies against the wounds inflicted by venomous animals; and *Ἀλεξίφάρμακα* (more than six hundred hexameter lines), on poisons and their antidotes. Among his lost works was the *Ἐρερσιόμενα*, which is said to have been one of Ovid's sources for his *Metamorphoses*. He is frequently quoted by Pliny, Galen, and other ancient writers as an authority on all matters relating to toxicology. Consult the edition by Schneider, revised by Keil (Leipzig, 1856).

NICANDER, *nê-kân'dër*, KARL AUGUST (1799-1839). A Swedish poet, born at Strengnäs. He studied at the University of Upsala. A prize from the Swedish Academy for his poem *Tasso's död* (1826) gave him an opportunity to go to Italy (1827). After his return he lived in want almost to the day of his death. His earliest important poem was *Runcavärde* (1821); this was followed by a collection of poems and tales, *Hesperider*, and the poem *Minnen från Söderu* (1831), containing his recollections of Italy, a land which appealed strongly to his imagination. His best poem, *Lejonet i öknen* (1838), is a eulogy of Napoleon. A collection of his poems appeared at Stockholm in 1839-41 (4 vols.; 5th ed. 1883).

NICARAGUA, *nê-kâ-râ'gwâ* (from *Niquirao*, *Nicarao*, a Nahuatl tribe inhabiting the country in the sixteenth century). The largest of the Central American republics excepting Guatemala. It is bounded on the north by Honduras and on the south by Costa Rica. Its frontage on the Caribbean Sea is about 300 miles; that on the Pacific, 200 miles. It extends between latitudes 10° 41' and 15° N. and longitudes 83° 15' and 87° 40' W. Civilization is centred in the western third of the country. The settlements extend scarcely 100 miles inland from the Pacific. The wide Caribbean slope has no towns of importance excepting Bluefields and Greytown (San Juan del Norte). The physical conditions explain these facts. The low and hot Caribbean plain is under the influence of the moist trade winds which nurture the most luxuriant tropical vegetation. Almost impassable virgin forests, inhabited by scattered bands of Indians, spread from the western mountains to the Caribbean; but though this larger part of the country is rich in valuable timber and its higher lands contain the centres of gold-mining, it is the home of few white men. The higher and drier regions of the western mountain ranges with the plain between them are, on the other hand, adapted for planting and other industries, and have attained considerable development. The estimated area is about 49,000 square miles, about the same as that of Louisiana.

TOPOGRAPHY. The Caribbean coast is low and poorly supplied with harbors. It has three ports, none of them adapted for large ships. Greytown, in the delta of the San Juan River, formerly had a splendid harbor with 30 feet of water at low tide, but during a flood in 1855 the river

widened and deepened the Colorado branch of the delta so that most of the river now discharges south of Greytown in Costa Rica, leaving Greytown harbor, which has also been silted by the sea, very shallow. The port of Gracias a Dios is also shallow. Bluefields, on a large lagoon, is the most important east-coast port. The Pacific coast is high, and the water is deep close to the shore. The harbor of Corinto is one of the best-protected ports on the Pacific, and San Juan del Sur has a small but deep and safe harbor. Saint Andrews, Old Providence, and Great and Little Corn islands, near the Caribbean coast, are centres of banana and cocoanut growing.

Geographically Nicaragua is divided into distinct zones by two chains of mountains, which, more or less broken, and with numerous flanking spurs, traverse the Republic in a north-west and southeast direction parallel with the Pacific coast. The western or coast range is a part of the mountain system extending through most of Central America. In Nicaragua it is only ten to twenty miles from the Pacific, and its nearness to the ocean accounts for the fact that no considerable streams discharge from that slope into the Pacific. This western range, with the depressed plain lying between it and the eastern range, forms the principal line of volcanic energy and is marked by a number of extinct and active volcanoes built up by outpouring lava. None of them reaches 7000 feet above sea-level. Masaya (2972 feet) was violently active at different periods from the time of the Spanish Conquest until 1772, when a vast mass of lava was ejected from its crater, covering a tract of land eight miles long by two wide. It was dormant between 1861 and May, 1902, when it resumed activity. Cosaguina (over 3000 feet) had a terrific eruption period in 1835, but has since been inactive. The Spaniards founded the city of Leon Viejo at the foot of Momotombo, but the eruption of 1609 so alarmed the citizens that they removed en masse 23 miles from the town they had founded and established new Leon on its present site. In recent years this volcano has ejected dust and scoria without inflicting damage. Other well-known volcanic summits are Telica, Las Pilas, Mombacho, Zapatera, Ometepe, etc. The severe earthquakes recorded in Nicaragua are associated with its volcanic phenomena.

The eastern range enters Nicaragua from Honduras and extends in a general southeastern direction to the coast north of the San Juan River, about 50 miles from its mouth. It sends out numerous spurs toward the Caribbean, between which flow the many rivers of the country. Between the eastern and western ranges lies the great interior basin, about 300 miles long and 100 miles wide, where the population and industries are in great part centred, chiefly near the west shores, or a little to the north and west of the two great lakes of the country. The dominating topographic features are thus the wide, low, rolling plain of the east, interspersed with mountains and spurs, and, toward the northwest, with highlands; the two cordilleras; the depressed plain between them with its two large lakes; and the steep, narrow Pacific slope.

HYDROGRAPHY. In the plain or basin between the ranges are two large lakes, Managua and Nicaragua, connected by the river Tipitapa and collecting the drainage of the basin, which has

an area of about 12,000 square miles. The larger lake, Nicaragua, comprises over 3000 square miles, and is 110 miles long. Its longer axis is parallel with the Pacific, from which it is only eleven miles distant at the nearest point. It is from 12 to 200 feet deep, with its surface about 106 feet above the sea-level. It receives the waters of the shallower Lake Managua (32 miles long by 16 wide). The waters of these lakes are carried to the Caribbean by the San Juan River, which has an average width of 1500 feet, and a minimum discharge of about 10,000 cubic feet per second. Its course is 120 miles, and it is navigable for small-draught steamers except at a few rapids, which offer obstruction in the dry season. The river has recently played little part in the commerce of the country, but in the construction of the Nicaragua Canal it was proposed to use its waters for many miles. The other rivers are mainly to the north of the San Juan, east of the mountain ranges, and drain the wide, forested plain. Most important among them are the Segovia or Wanks, about 300 miles in length, but with a narrow drainage basin, which does not carry a volume of water proportionate to its length; the Rio Grande, about 230 miles long, navigable for small vessels for 100 miles from the sea if a channel were cut through its bar; and the Bluefields River, navigable for 65 miles, its banks lined with banana plantations, whose crop is carried on the river to Bluefields for shipment to the United States. The Pacific coast rivers are unimportant.

CLIMATE. The climate is very warm, but not unhealthful, the prevailing trade winds mitigating the discomforts of the temperature, which varies little, seldom rising above 85° or falling below 70°. The seasons are divided into the wet and the dry, but on the Caribbean side they are not well defined, as rain falls nearly every day in the year. The precipitation at Greytown is 200-250 inches annually, while in the west, among the higher land, the precipitation is only 65-80 inches. The soil is very productive. On the Caribbean slope it is mainly reddish clay covered by leaf humus, and the cultivated regions of the west have a deep, black soil, in which fertilizing lavas and volcanic dust are large constituents.

FLORA. The eastern plain is covered with trees of great size, beneath which is a thick growth of bushes and vines. There are 54 varieties of trees suitable for hardwood lumber; 40 varieties supplying industrial or medicinal gums, balsams, resins, fibres, oils, extracts, food, drink, and spices; and 74 varieties of fruit trees, of which 17 are wild and 57 cultivated. Rubber abounds, but the supply has been depleted by ruinous methods of collection. For this reason rubber-collecting, except in the Bluefields district, has been prohibited until 1907, though it may be gathered from cultivated trees on rubber plantations which are now being opened. It is believed that the cultivation of rubber will be successful. The resources of the forest are enormous, but as yet are little utilized. Citrus fruits flourish, especially in the western part of the country. The cultivation of most tropical crops is considerably developed and has a great future.

FAUNA. Animal life is very rich and varied, particularly in the moist eastern regions. The principal mammals are the jaguar, cougar, wild swine, deer, monkeys, squirrels, and opos-

sums. Alligators are found in the rivers and along their shores, and turtles, snakes, some very poisonous, and insect life are superabundant.

GEOLOGY AND MINERAL RESOURCES. The Caribbean plain is alluvial. Far inland behind the plain are the highlands of Segovia, Matagalpa, and Chontales, composed of Paleozoic and Mesozoic strata, with granite and basalt intrusions. The gold diggings are found chiefly in these highlands. The broad depression between the mountains extending from near the Gulf of Fonseca to the lakes and the valley of the San Juan is mainly Paleozoic, with a deep covering of volcanic dust and tufa. The country west of the lakes is formed to a great depth of matter ejected from the line of volcanic fissures and cones, which pass through or appear above it. On this erupted mass are situated most of the larger towns, and here is the dwelling place of over seven-tenths of the population. American and British companies do most of the mining. At present only gold mines are worked in Nicaragua, though silver-mining yielded great returns in the sixteenth and seventeenth centuries. The gold mines, about 50 in number, have contributed largely to the wealth of the Republic. Those of Chontales yield from one-fourth of an ounce to two ounces of gold to the ton of ore; those of Nueva Segovia from one and a half ounces to three ounces. The total production in the past ten years has been from 20,000 to 70,000 ounces a year. Tin, nickel, antimony, arsenic, and other metals and minerals have been located, but as yet are not economically important.

AGRICULTURE. The rich farming regions of the west are capable of vastly greater development than has yet been attained. The coffee plantations (many of them belonging to Germans) yield the principal crop, the berry being grown throughout the highlands of the north and northwest. The largest crop was produced in 1902—30,000,000 pounds. Cocoa is of superior quality, but not enough is produced for the home market. The sugar industry is extending. Sugar-cane supplies the coarse brown sugar made at home and is used in the manufacture of aguardiente, a kind of rum. Cotton is indigenous, and of excellent quality, but is grown wholly for home consumption. Three crops of maize a year are raised on the same ground. Large areas, well adapted for tobacco farming, are still untilled. The rubber industry has latterly been waning. Rice is important, and the yam and sweet potato are the principal farinaceous crops. Bread fruit grows to perfection, and is an important article of diet. The banana industry is large and increasing. The cocoanut and black beans are produced abundantly, and the vegetables of the temperate zone thrive in the more elevated districts. Cattle-raising, particularly in the northwestern provinces, is one of the chief sources of wealth. Large haciendas are devoted to this industry, and many hides are exported.

MANUFACTURES. Manufacturing enterprises are little developed. Coarse cotton fabrics are made, and most of the house furniture is supplied by local factories. Large quantities of cigars are produced and also roofing tiles and other forms of pottery. The Indian industries include the making of hammocks, superior straw hats, jewelry of gold and silver, potteries and carvings. The country depends for its manufactures chiefly upon imports.

COMMERCE. Trade statistics are not published, but the consular reports give an approximate idea of the volume of foreign commerce. The imports in 1901 were approximately \$3,240,000; the exports, \$2,736,000. Of the former, the leading items are cotton, food materials, and their products; of the latter, the leading items are coffee, bananas, gold, cattle, and woods. In 1901, 60 per cent. of the imports came from the United States, and 60 per cent. of the exports went to the United States. Great Britain and then Germany came next in the trade. In 1902 the imports from Nicaragua to the United States were about \$2,000,000; the exports to Nicaragua, \$1,350,000.

TRANSPORTATION. About two-thirds of the foreign trade passes through Corinto. The Government has planned for regular direct steamship connection with New Orleans and Europe. Nineteen small vessels, including one steamship owned by Nicaraguans, are in the merchant trade, and four steamers ply on Lake Managua. There are very few good roads. The railroads are confined to the Pacific coast, and with the completion of the Central Division of the system in November, 1902, there is now a continuous railroad line from Corinto on the Pacific to Granada on Lake Nicaragua, with a branch to Diriamba in the coffee region. The total system in operation is about 200 miles, and practically all belongs to the Government. The latest addition to the service greatly improves the facilities for shipping coffee.

BANKING. The Bank of London and Central America and the Agriculture and Mercantile Bank at Leon have branches in all the important cities, and transact most of the banking business, though many private capitalists also carry on banking.

GOVERNMENT. Nicaragua has a republican form of government. The Constitution (adopted in 1894 and amended in 1896) vests the law-making power in a Congress of one House, with forty members, elected for two years. The session of Congress is ninety days, opening without special convocation at the beginning of August. The President and Vice-President must be at least twenty-five years of age, and citizens of Nicaragua or of one of the Central American republics. They are elected for four years by direct suffrage. The President exercises administrative functions through a council of ministers, composed of the heads of the five departments of the Interior (Justice, Police, and Religion), War and Marine, Foreign Affairs, Finance, and Public Works. The Republic is divided into 13 departments, 2 comarcas, and 3 districts, each of which is under a Governor, who is also commander of the military forces in his department or district. There are a Supreme Court of Justice and two courts of second instance. The military forces comprise the active army, the reserve, and the national guard. The number of active troops varies; in 1900 the number was 2000; in time of war it may be 20,000.

FINANCE. The Government derives most of its revenue from the customs, in addition to which the liquor and tobacco duties yield a considerable amount. The largest items in expenditure are for the Departments of War and Marine, and of Fomento (exploitation). In 1902 the estimated revenues and expenditures each

amounted to about \$2,125,000. The foreign debt, incurred chiefly in the development of the railroad system, was about \$1,312,000 in July, 1902. It is held in Great Britain, and is in arrears. The internal debt at the beginning of 1901 was about \$3,300,000. Metric weights and measures and also the old Spanish denominations are employed. The system of money is the same as in Mexico, silver being the standard value. The silver peso was worth 36.1 cents in United States coin on January 1, 1903.

POPULATION. The census returns are largely estimates, the census of 1900 giving a total of 500,000, which is 80,000 more than the estimate for 1895, and may be exaggerated. Managua is the capital, with 30,000 inhabitants. Other large towns are Leon (45,000), Granada (25,000), Masaya (20,000), and Chinandega (20,000). The number of descendants of Spanish settlers is only about 17,000, the great mass of the population consisting of Indians, negroes, and mixed bloods. The Indians supply most of the labor and are docile and industrious. Most of the country people live in villages, many of them traveling several miles to their fields. The efforts to induce immigration have not been successful.

EDUCATION AND RELIGION. Education is in a very backward condition, and the majority of the people are illiterate. Less than 20,000 pupils attend the elementary schools. The universities at Leon and Granada, with instruction in law and medicine, have been consolidated. There are ten colleges. The only public library is supported by the Government at Managua, and is free to the public. A National Industrial, Commercial, and Scientific Museum has also been established there. The Roman Catholic faith is recognized in the Constitution as the State religion, but other forms of faith are not molested.

HISTORY. The coast of Nicaragua was first seen by Columbus in 1502 or 1503. In 1522 Gil González Dávila discovered Lake Nicaragua, and in 1526 Pedrarias Dávila led an expedition into the country. It was organized as an intendencia of the Captain-Generalcy of Guatemala in 1528. In 1821 Nicaragua, in common with the other Central American States, revolted from Spain, and was annexed to the Mexican Empire of Iturbide. Upon the downfall of that leader Nicaragua became an independent State, but joined the Confederation of Central America in 1823. That federation dissolved in 1839, and Nicaragua became once more independent. The strife of parties, however, and the play of personal ambition gave the country little peace. In 1841 a dispute arose with Great Britain concerning the rights of a native chief on the Mosquito Coast. This threatened at one time to lead to hostilities, but the matter was finally settled by a clause inserted in the Clayton-Bulwer Treaty of 1850 and by a separate treaty, in which Great Britain ceded all rights of a protectorate over the disputed territory to Nicaragua. The year 1855 was signalized by the famous filibustering expedition of William Walker (q.v.), whose attempt to establish a slaveholding State in Central America for once impelled the different States to common action. Walker was driven out in 1856, and upon his renewing his attempt was captured and shot (1860). There followed for Nicaragua a long period of peace, broken in 1893 by a struggle for the Presidency, which in

turn led to war with Honduras, owing to the unwarrantable interference of that State. Under the energetic administration of President Zelaya Nicaragua proceeded to annex the Mosquito Territory in 1894, and entered thereby into strained relations with Great Britain, which demanded compensation for its subjects. In 1895 Nicaragua, Salvador, and Honduras united to form the Greater Republic of Central America, with provisions for the subsequent admission of Guatemala and Costa Rica. A constitution was adopted and went into effect on November 1, 1898; but one month later, owing to the dissatisfaction of Honduras, the union was dissolved.

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NICARAGUA, LAKE. The largest lake of the American continent between Lake Michigan in the north and Lake Titicaca in the south. It lies in the southwestern part of the Republic of Nicaragua, and is separated from the Pacific coast by an isthmus 11 miles wide at its narrowest point (Map: Central America, E 5). The lake is oval in shape, with a length of 110 miles, a maximum width of 45 miles, and an area of over 3000 square miles. Its depth is from 50 to 120 feet; its greatest depth is about 200 feet. It discharges southeastward into the Caribbean Sea through the San Juan River, and receives the water of Lake Managua through the Tipitapa River. The mean elevation of its surface above the sea is now about 106 feet, but seemingly it was considerably greater 70-100 years ago. Ancient beaches show that in past ages it was continuous with Lake Managua, and discharged into the Pacific Ocean through the Gulf of Fonseca. The shores of the lake are lined with densely wooded mountain ranges, and the lake itself is studded with hundreds of islands, the largest of which, Ometepe, has two active volcanoes. For the proposed interoceanic waterway through Lake Nicaragua, see NICARAGUA CANAL.

NICARAGUA CANAL. A proposed ship canal across the territory of Nicaragua, by way of Lake Nicaragua, connecting the Atlantic and Pacific Oceans. The question of interoceanic communication across Central America first began to occupy the attention of the United States shortly after the establishment of the inde-

pendence of the Spanish American republics. It formed one of the proposed subjects of discussion at the Panama Congress (q.v.) of 1826, Henry Clay, then Secretary of State, instructing the Commissioners from the United States to investigate "the practicability and the probable expense of the undertaking on the routes which offer the greatest facilities." In March, 1835, the Senate instructed the President to open negotiations with the governments of Central America and New Granada with a view to affording protection to any individuals or companies that should undertake to construct a canal connecting the Atlantic and Pacific oceans, and for insuring the free and equal navigation of the canal by all nations. During the administrations of Presidents Jackson and Van Buren commissioners for the purpose were successively appointed, one of whom reported in favor of the Nicaragua route. The interest of the United States in the project was increased by the establishment of a British protectorate over the Mosquito Coast (q.v.) and the acquisition of California and the subsequent discovery of gold there. In 1849 the Government of Nicaragua granted to a company, of which Cornelius Vanderbilt was the chief member, the right to construct a ship canal across the territory of that State. This concession lapsed in 1856 on account of the non-fulfillment of the conditions. In the same year in which the Vanderbilt concession was granted, Mr. Hise, the chargé d'affaires of the United States at Nicaragua, concluded, without authority from his Government, a treaty with Nicaragua, by which the United States was granted a perpetual and exclusive right of way for the construction of a canal across the Isthmus, and with full jurisdiction over the same, in spite of the British claim to the Mosquito Coast. In return the United States agreed to guarantee the integrity of Nicaragua and forever protect her in the exercise of all her sovereign rights. The treaty did not meet with the approval of President Taylor, and accordingly was not submitted to the Senate, although it was held for a time as a means of influencing the action of Great Britain in the negotiations then in progress for settlement of the controversy in regard to the Mosquito protectorate.

It was now generally believed that the Nicaragua route was the most feasible for the construction of a ship canal, but the claim of Great Britain to the territory around the mouth of the San Juan River, the proposed eastern terminus, was an obstacle to the United States. It was felt to be too serious an undertaking to dislodge her from this position, and it was therefore resolved to negotiate with a view to securing her coöperation in guaranteeing the neutrality of the proposed canal. This was accomplished by the so-called Clayton-Bulwer Treaty (q.v.) of 1850. (For the abrogation of this treaty in 1901, see HAY-PAUNCEFOTE TREATY and PANAMA CANAL.) In the same year Orville Childs, a civil engineer, completed the survey of a route for the proposed ship canal, and made a favorable report on the feasibility of the undertaking. The Vanderbilt Company in the meantime had secured a new concession for the construction of a canal in accordance with the survey made by Colonel Childs; but this was soon revoked by the Government of Nicaragua, chiefly on account

of the Walker filibustering expedition, which had for its object the conquest of Central America. The outbreak of the Civil War arrested further progress toward the construction of the canal, but in 1867 the project was again taken up, and in June a treaty was concluded between the governments of the United States and Nicaragua, by which the citizens of the United States were granted the right of free transit over any canal constructed under the authority of the Government of Nicaragua, but the right of the United States or its citizens to construct the canal was not conceded. During the ten years following 1872 almost every possible route across the Isthmus was carefully surveyed by officers and engineers of the United States Navy. In March, 1872, President Grant appointed, in compliance with a resolution of the Senate, a commission of three eminent military and naval engineers to investigate the subject of an Isthmian canal, and these unanimously reported, February 7, 1876, in favor of the Nicaraguan route, by way of the San Juan River from Greytown and Lake Nicaragua, terminating at Brito on the Pacific coast.

In May, 1879, an international congress was held at Paris to determine the location of the interoceanic canal. The merits of the Nicaraguan route were ably advocated by the delegates from the United States, but the Congress decided in favor of the Panama route. (See PANAMA CANAL.) In 1884 a treaty was concluded between the United States and Nicaragua, by which the United States agreed to build a canal to be owned jointly by the two powers, the United States agreeing furthermore to 'protect' the integrity of Nicaragua. When Cleveland became President, the treaty was still unratified, and he withdrew it from further consideration by the Senate. He declined to resubmit it on the ground that the construction and ownership of the canal under such circumstances would be "inconsistent with its dedication to universal and neutral use" and would "entail measures for its realization beyond the scope of our national polity or present means." In the meantime a scheme had been set on foot, chiefly by leading capitalists of New York, to construct by private enterprise a canal through Nicaragua. In April, 1887, under the name of the Nicaragua Canal Association, they secured from the Government of Nicaragua a concession granting the exclusive privilege of constructing and operating the canal. Surveys were at once begun by a corps of competent engineers, and the final location of the route was soon determined upon. In February, 1889, the company was granted a charter of incorporation by Congress with a capital of \$100,000,000, with authority to increase the amount to \$200,000,000. In June, 1889, the preliminary work of construction was begun at Greytown, and in the following October the actual work of excavation began. The route finally determined upon was to begin at Greytown on the Atlantic and end at Brito on the Pacific coast, about 170 miles distant. The company erected large storehouses, hospitals, and other buildings at Greytown, established the necessary railroad and telegraph service, and landed large quantities of machinery, tools, lumber, and other materials. Within a period of about one year \$2,000,000 had been expended. In 1893 the company ceased operations owing to lack of funds, a fruitless effort having

been made to induce Congress to guarantee the principal and interest at 4 per cent. of an issue of \$100,000,000 of canal company bonds, to be issued for construction purposes. In 1895 Congress provided for the appointment of three engineers, namely, Colonel Wm. Ludlow, U. S. A.; M. F. Endicott, C.E.; and Alfred Noble, collectively known as the Ludlow Commission, to investigate and report upon the feasibility and cost of completing the work already begun by the company. They reported in favor of the feasibility of the project, estimating the cost at \$133,472,893, as against the company's estimate of about half that amount. In view of the small appropriation made by Congress, and the consequent impossibility of making an exhaustive investigation, the commission advised a more thorough investigation with a view to the possible discovery of a more advantageous route.

Congress then provided for a new commission, popularly known as the Walker Commission, to continue the investigation, with a view of making complete plans for the entire work of constructing the canal. The members selected were Rear-Admiral John G. Walker, U. S. N.; Prof. Lewis M. Haupt, C.E.; and Col. P. C. Hains, U.S.A. With a large corps of engineers, geologists, and other experts, the commission visited Nicaragua in December, 1897, and made a full examination of the topographical, geological, and hydrographic conditions of the country, reporting in May, 1899, that in their judgment the cost of constructing the canal from Greytown to Brito, by way of the Lull route east of the lake and by way of the Childs route west of it, would not exceed \$118,113,790. Colonel Hains, who concurred in the report, estimated the cost at \$134,818,308. In the meantime, interest in the old Panama canal project having been aroused on account of the favorable report of an international commission of experts, it was decided that nothing further should be done toward the construction of a canal by way of the Nicaraguan route until the whole question of canal possibilities had been investigated by a larger commission of experts. Congress accordingly, in March, 1899, provided for a new commission to undertake the task of 'finding the route.' The members appointed by President McKinley were Rear-Admiral Walker, Colonel Hains, and Professor Haupt of the Nicaragua Commission; ex-Senator Pasco of Florida, Alfred Noble, C.E., George S. Morrison of New York, Prof. W. H. Burr of Columbia University, Lieut.-Col. O. H. Ernst, U.S.A., and Prof. Emory R. Johnson of Pennsylvania. After an exhaustive investigation of all the proposed routes on the entire Isthmus from Nicaragua to Colombia, the commission reported, November, 1901, unanimously in favor of the Nicaraguan route as "the most practicable and feasible," chiefly on account of the financial difficulties in the way of acquiring the property and franchises of the Panama Canal Company. The Panama Company now removed this difficulty by offering to sell its property and franchises to the United States for \$40,000,000, the valuation which the Canal Commission had placed upon the work already done on the Panama route. The commission thereupon in a supplementary report recommended the acceptance of the offer. Already in May, 1900, the House of Representatives had by a vote of 225 to 35 passed a bill for the construction of a canal by way of the Nicara-

guan route, which, however, the Senate had refused to accept. In January, 1902, the House repassed this bill by a vote of 307 to 2. Shortly thereafter came the supplementary report of the Canal Commission recommending the purchase of the Panama Company's property and franchises. This led the Senate to hold up the House bill for further consideration of the Panama scheme. Finally it refused to accept the Nicaragua plan, and after three months of debate the two Houses, largely influenced by the volcanic occurrences in the Caribbean region, agreed upon the Panama route, with the understanding that the Nicaraguan route should be reverted to in case a satisfactory title could not be secured to the Panama property and the necessary territory from the Government of Colombia. In such case the President was authorized to begin negotiations with the Government of Nicaragua for the necessary concessions, and to construct the canal at a cost not exceeding \$180,000,000.

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NICARIA, nē'kâ-rē'â, or **ICARIA**. A Turkish island, situated off the western coast of Asiatic Turkey, a short distance west of Samos (Map: Balkan Peninsula, F 6). Area, about 53 square miles. It is mostly mountainous, rising over 3000 feet above the sea. Wood is one of the chief products. The inhabitants, who number about 8000, are chiefly engaged in the production of charcoal and in sponge fishing.

NICASTRO, nē-kâ'strō. A city in the Province of Catanzaro, Italy, beautifully situated near the sea, 16 miles west-northwest of Catanzaro (Map: Italy, L 9). It is the see of a bishop. It has the ruins of a mediæval castle. The town has a trade in wine and oil. There are hot springs in the vicinity. Population (commune), 1901, 17,524.

NICCOLINI, nīk'kō-lē'nē, GIOVANNI BATTISTA (1782-1861). An Italian poet, born at San Giuliano, near Pisa, October, 1782. He studied at Florence and took his degree in law at the University of Pisa. In 1802 he took a Government clerkship; from 1804 to 1807 he was in the office of the Archivio delle Riformazioni, and from 1807 until his death he was professor of history and mythology, secretary and librarian in the Accademia di Belle Arti at Florence, and for a while also librarian of the Palatine Library. His critical and historical treatises, many of them produced in connection with his academic labors, constitute the less important part of his work. As a poet he attained to greatest excellence in tragedy, but he also revealed no little force in his lyrics (*Poesie nazionali*, 1859; *Pensieri poetici*, 1860; *Canzoniere nazionale e Poesie varie*, 1863; *Canzoniere civile*, 1884; *Versi inediti*, 1888), and in his translations from Æschylus, Euripides, and Ovid. In his original dramas of the earlier period he adhered to the classic Greek model, wherein we find the norm of his *Polissena*, *Ino e Temisto*, *Edipo*, and *Medea*. The *Nabucco*

(1816; published at London 1819) was his first political drama, and it assailed absolute power of all kinds. Another manifesto against absolute power is the *Antonio Foscarini* (performed in 1827), the most popular of his tragedies. The plays of his second period show his tendencies to romanticism. His *Beatrice Cenci* is based on that of Shelley. The *Giovanni da Procida* (1817; performed in 1830) was a protest against the anti-Italian sentiments of the French dramatist Casimir Delavigne, and, like the *Lodovico Sforza* (1834), advocated the unity and independence of Italy. There is no political intention discernible in the *Rosmunda d'Inghilterra* (performed in 1838), but his masterpiece, the *Arnaldo da Brescia* (1843), again proclaims the sovereignty of the people over imperial and ecclesiastical power, and attacks especially the temporal power of the Pope. The fundamental ideas of the *Arnaldo* reappear in *Filippo Strozzi* (1847). His plays, with all their merits, are rather lyric than genuinely dramatic in spirit. Consult the edition of his *Opere* prepared by himself and first published at Florence, 1844; also the *Opere edite e inedite*, an ed. by Gargioli (Milan, 10 vols., 1863-1880); Vannucci, *Ricordi della vita e delle opere di Giovanni Battista Niccolini* (Florence, 1866).

NICCOLÒ DE' NICCOLI, nèk'kò-lŏ' dā nèk'-kò-lè (or, more often, NICCOLI NICCOLÒ) (1363-1437). An Italian scholar, born in Florence. He was a collector of coins, and particularly of Greek and Latin manuscripts. These he procured from every possible source, and often copied them with his own hand. In his fine house in Florence he entertained the élite of the literary and artistic society of the day, as well as humble students, and was looked upon as the supreme authority in all matters of letters. Even the most famous scholars feared his caustic tongue. After his death, Cosimo de' Medici bought his manuscripts, and made them the foundation of the present Laurentian Library of Florence.

NICCOLÒ OF AREZZO, à-rèt'sò (also called NICCOLÒ LAMBERTI, and NICCOLÒ DI PIEBO) (1350-1417). An Italian sculptor and architect, born at Arezzo. His master was probably Moccio of Siena. He was first employed in Florence on minor works in the cathedral. After the plague (1383) he returned to Florence and executed two statues, believed to be those of Saint Gregory and Saint Augustine, for the Campanile. He also did some decorative carving on the northern door of the Duomo, and at Or San Michele. These, like his other carvings, show a marked gain in freedom and elegance over the work of former sculptors. He executed a relief of the Virgin on the façade of the Santa Maria della Misericordia, Arezzo, and the mausoleum of Pope Alexander V. in the Certosa, Bologna; and was employed as architect on the Castle of Sant' Angelo, Rome, and to restore the walls of Borgo San Sepolcro.

NICE, nēs. A city in Bithynia. See NICAËA.

NICE. The capital of the Department of Alpes-Maritimes, France, situated on the Mediterranean, at the foot of the Alps, and at the western extremity of the Riviera, 140 miles by rail east-northeast of Marseilles, and 640 miles from Paris (Map: France, O 8). Nice is far-famed as a place of sojourn for health-seekers, some 15,000 of whom visit it yearly. The city and its bay are protected by the mountains on the north.

The climate is dry, mild, and invigorating. It is warm in winter and not hot in summer. Mean annual temperature 58.6° F.—January 45.4°, July 73.8°. Frost and snow are rare. The rainy period is in the fall. The fashionable season begins soon after January 1st and lasts till June 1st. The situation of Nice, where the small Paglione empties into the sea, is splendid. There is a circle of forts in the rear, and the city is important strategically to France. On the left bank of the covered-over stream is the little old town, with narrow, crooked streets. In this section a mixture of Provençal and Italian is spoken. Along the sea front here extends a fine boulevard. At its east end rises Castle Hill, on which runs a promenade, whence an immense and admirable view of the coast may be had. Beyond the hill lies the city's small harbor, called Limpia.

On the western bank of the Paglione is the more important foreigners' quarter, where French is the universal language. In this section the avenues are spacious and beautiful, with plane trees and eucalypti, and the city presents the delightful appearance of a southern sea resort. The centre of life in this part is the Square Masséna, on which stands the bronze statue to Masséna, who was born in Nice. Adjacent is the Casino, an attractive modern municipal structure, containing gaming rooms, a theatre, and an entertainment garden. From the Casino the Public Garden, exceptionally attractive with its palm, pepper, myrtle, and laurel trees, reaches to the sea, and terminates in the splendid iron and glass pier promenade. From this point west along the bay for a distance of over two miles is the wide, magnificent Promenade des Anglais, flanked by villas and spacious hotels, and having gardens of orange and lemon trees and acres of flowers. Among the objects of interest in the city are a marble cross, commemorating the meeting here of Francis I. and Charles V. in 1538; the modern centenary obelisk in honor of the union of Nice with France in 1792; a pyramid to the memory of Garibaldi, a native of Nice; also a statue of him, and a bust of President Carnot.

The public library has nearly 100,000 volumes. The Museum of Natural History is noteworthy for its collection of mushrooms. The municipal museum contains mediocre works of modern French artists. Nice has a nunnery, a lyceum, a priests' and a teachers' seminary, a charity hospital, and an important astronomical observatory (on Mont Gros), with one of the largest refractors in the world. The municipal theatre has good opera in the season. The carnival—an elaborate fête of flowers, confetti, and Moccoletti—is an annual occurrence which attracts pleasure-seekers from all countries. To the north of Nice lies Cimiez, with its interesting Roman remains. Nice exports oranges, lemons, flowers (for which it is celebrated), perfumes, olives, oils, and liquors. It also manufactures ivory goods, furniture, silk, dyes, etc. Some marble is quarried near. The city shows a marked increase in commercial importance and in population. Its inhabitants numbered 105,109 in 1901.

Nice was the Nicæa of the ancients, and dates from the fourth century B.C., when it was settled by Phocæans from Marseilles. It suffered in many wars and at the hands of many races. It belonged in the late Middle Ages to Provence, and

finally passed to Savoy. The French took it in 1792; it was given back to Sardinia after the fall of Napoleon, and became again a part of France in 1860. It suffered severely from an earthquake in 1877. Consult: Hole, *Nice and Her Neighbors* (London, 1881); Lee, *Nice and Its Climate* (ib., 1854); Moris, *Nice* (Paris, 1899).

NICE, COUNCILS OF. See NICÆA, COUNCILS OF.

NICENE CREED, THE. Frequently called the NICÆNO-CONSTANTINOPOLITAN CREED. The most important ancient formula of the Christian faith, and the only one which approaches ecumenical authority. Since the fifth century it has commonly been believed that this creed was adopted at the Council of Nicæa (325), and reaffirmed at Constantinople (381); but this view is certainly wrong. The creed in question is practically identical with one given by Epiphanius, in his *Anchoratus* (374), which in turn draws its material from Cyril of Jerusalem (*Catechetical Lectures*, 347), and from the symbol actually adopted at Nicæa. This original Nicene formula was drawn up to combat Arianism (q.v.), and was based upon a creed which had long been used in Cæsarea. Its leading characteristic was that, in defining the orthodox doctrine of the Trinity, it asserts the consubstantiality of the Son with the Father, i.e. that both are of the same essence or substance. (See HOMOUSION.) Our so-called Nicene Creed is longer and more symmetrical in construction than the one actually adopted at Nicæa. In the article on the Holy Spirit, the Eastern Church has always used the form which reads "And [I believe] in the Holy Ghost, . . . who proceedeth from the Father," whereas the Western Church says, "Who proceedeth from the Father and the Son." This difference has proved a prolific source of controversy. (See FILIOQUE.) The Nicene Creed finds a place in the liturgies of the Greek, Roman, and Anglican churches, and its doctrinal teaching has been accepted by most Protestants.

Consult: Hahn, *Bibliothek der Symbole* (3d ed., Breslau, 1897); Schaff, *Creeds of Christendom* (New York, 1877); Hort, *Two Dissertations* (London, 1876); Swainson, *The Nicene and Apostles' Creeds* (ib., 1875); Hefele, *History of the Councils*, vol. i. (Edinburgh, 1871); Bindley, *Ecumenical Documents of the Faith* (London, 1899).

NICEPHORUS (Lat., from Gk. Νικηφόρος, *Nikēphoros*) (c.758-c.828). Patriarch of Constantinople. He was born in Constantinople, the son of Theodore, Imperial secretary of Constantius Copronymus. He first held high office at court. In 787 he was present as Imperial commissioner at the Nicene Council, where, in defense of image-worship, he opposed the iconoclasts. This zeal for image-worship he inherited from his father. Soon after his return to the capital he retired to a convent, whence in 806 he was called to be Patriarch of Constantinople. Leo the Armenian, who became Emperor in 813, passed an edict in 814 against the worship of images. But neither menaces nor entreaties could induce Nicephorus to assent to it. He became unpopular at court, and in the ensuing year was deposed, and withdrew to the convent of Saint Theodore, which he himself had founded,

and remained there till his death in 826 (or 828). He published several valuable ecclesiastical works, characterized by great beauty of style, and historical productions distinguished for accuracy, discernment, and erudition. The most important are *Breviarium Historicum*, an historical abridgment, and *Chronographia Brevis*, a short chronicle of events from the beginning of the world to the author's time, with the series of kings, emperors, patriarchs, bishops, etc. The best edition of both treatises is by De Boor, *Nicephori Constantinopolitani Opuscula Historica* (Leipzig, 1880). Nicephorus is numbered among the saints in both the Greek and the Roman Catholic churches.

NICEPHORUS I. (died 811). Byzantine Emperor from 802 to 811. He overthrew the Empress Irene, whose minister of finance he had been. He was cruel and tyrannical, and the heavy taxes he imposed made him unpopular. He waged war against Harun al-Rashid, but was unsuccessful, and had to conclude a disgraceful peace in 806. He also tried to check the Bulgarians, and though successful at first, was finally defeated and slain at Marcellae on July 25th, 811. Consult Gibbon, *Decline and Fall of the Roman Empire*, ed. by Bury (London, 1896-1900).

NICEPHORUS II. PHOCAS (c.913-969). Byzantine Emperor from 963 to 969. He was the descendant of an illustrious race, and distinguished himself during the reigns of Constantine VII. and Romanus II. In 961 he recaptured Crete from the Saracens, and after the death of Romanus was proclaimed Emperor and married Theophano, the widow of his predecessor. As Emperor, Nicephorus waged successful war against the Mohammedans, and in 969 captured Antioch, and brought home as a trophy the sword of Mohammed. He was also successful against the Bulgarians. The numerous wars, however, necessitated increased taxes, and Nicephorus speedily became unpopular. He was finally murdered by his wife's lover, John Zimisces, who ascended the throne. It was during this reign that Liudprand (q.v.) came to Constantinople on an embassy from Otho I. Consult: Schlumberger, *Un empereur byzantin au dixième siècle. Nicéphore Phocas* (Paris, 1870); Gibbon, *Decline and Fall of the Roman Empire*, ed. by Bury (London, 1896-1900).

NICEPHORUS III. BOTANIATES (died 1081). Byzantine Emperor from 1078 to 1081. He belonged to the same family as Nicephorus II., and had distinguished himself as general under Constantine X. (XI.), Ducas and Romanus IV. When during the reign of the weak Michael VII. Nicephorus Bryennius was proclaimed Emperor by the European legions, Nicephorus Botaniates immediately had himself nominated as Emperor by the Asiatic troops. The latter was successful, through the aid of the Sultan Solyman, and was crowned on April 3, 1078. His reign was fairly successful, but he quarreled with his general, Alexius, and in consequence he had to abdicate and retire to a monastery in April, 1081, where he died a few months later. Consult Gibbon, *Decline and Fall of the Roman Empire*, ed. by Bury (London, 1896-1900).

NICETAS CHONIATES, kō'nī-ā'tēs (Lat., from Gk. Νικήτας Χωνιάτης, *Nikētas Chōniatēs*), or ACOMINATUS (c.1145-1215). A Byzantine

historian, born at Chonæ, the ancient Colossæ. He held high office under the Byzantine emperors during the last years of the twelfth century. Nicetas was in Constantinople when the city was captured by the Latins (1204) and escaped to Nicæa. His history of the Greek emperors from 1118 to 1206 completes Zonaras, and is an excellent authority. It is best edited by Bekker (Bonn, 1835). A valuable description of the statues in Constantinople destroyed by the Latins may have been originally composed by Nicetas; in its present state it seems to have suffered additions by a later author. It was edited by Wilken (Leipzig, 1830).

NICHE, nich (Fr. *niche*, from It. *nicchia*, niche in a wall like the hollow of a shell, from *nicchio*, shell, niche, from Lat. *mitulus*, *mytilus*, *mytilus*, mussel, from Gk. *μυτίλος*, *mytilos*, *μύτιλος*, *mitylos*, mussel, from *μῦς*, *mys*, mouse). A recess formed in a wall, commonly for the purpose of containing a statue or some ornamental figure or piece of furniture. In classical architecture, the niches are generally square recesses with canopies formed by small pediments. In Gothic architecture, the niche is one of the most frequent and characteristic features, the doorways, buttresses, and every part of the buildings being in many instances ornamented with niches and statues in endless variety, the openings being arched and decorated with colonnettes, gables, pinnacles, and intricately detailed ornament. In the Mohammedan mosque the direction of Mecca (called Kiblah), the sacred city, is marked by a niche called *Mihrab*. In early and mediæval churches niches were frequently built to receive pieces of ecclesiastical furniture.

NICHIREN, nich'i-rën (1222-82). A Japanese religious teacher, and the founder of an influential sect of Buddhists, the Hokkes. He was born in Kominato, the Province of Awa. He was devoted to the priesthood from his birth, for his mother had dreamed that the sun had entered her body. He completed the prescribed studies at an early age, was admitted to the priesthood and became a violent and bitter sectarian. So severe were his attacks upon all other forms of Buddhism that he was banished for a time, and later was condemned to death on the charge of teaching doctrines subversive of the Government. His life was saved by a miracle, but he was again banished. Possessed, as it is said, of miraculous powers, he gained large numbers of followers, and founded the sect which is popularly known by his name. He added nothing to the doctrinal development of Buddhism, being dependent upon Chinese sources for his ideas. But he brought to Buddhism a spirit of intolerance and bitter persecution far other than the spirit of its founder. The sacred book of the sect is the Sanskrit *Saddharma Pundarika*, which has been translated into English by Kern in Müller, *Sacred Books of the East*, vol. xxi. (Oxford, 1884).

NICHOL, nik'ol, JOHN (1833-94). An English scholar, son of John Pringle Nichol, the astronomer. He was born in Montrose, Scotland, and educated at the University of Glasgow (1848-55), and at Balliol College, Oxford (1855-59). In 1865 he visited the United States, where he became acquainted personally with Emerson and Longfellow. He was made LL.D. by Saint Andrews (1873); professor of English literature at Glasgow

(1861-89); he lectured in Scotland and England; advocated broad Church doctrines, and took the side of the North in the American Civil War. He died October 11, 1894. Nichol contributed to the *Westminster*, *North British*, and other reviews; was one of the writers on the *Encyclopædia Britannica*; and published *Fragments of Criticism*, a volume of essays (1860); *Hannibal*, a classical drama (1872); *Byron*, in the "English Men of Letters" Series (1880); *American Literature: An Historical Review* (1882); *Landmarks of English Literature* (1882); *Lord Bacon's Life and Philosophy* (1887-89); and several educational treatises. Consult the *Memoir* by Knight (Glasgow, 1896).

NICHOL, JOHN PRINGLE (1804-59). A Scottish astronomer, born at Huntly Hill, near Brechin, in Forfarshire. He received his education at King's College, Aberdeen, where he highly distinguished himself in mathematics and physics. He engaged in preaching before he was of age, but his fondness for scientific studies led him to give up the ministry. He was for some time editor of the *Fife Herald*, and later headmaster of Cupar Academy, which position he resigned to become rector of Montrose Academy (1827). Having declined the chair of political economy in the Collège de France, Paris, he was appointed, in 1836, regius professor of astronomy in the University of Glasgow. In this capacity he effected the equipment and transference of the Glasgow Observatory to its present site on Dowanhill. His astronomical work was directed chiefly to the physical features of the moon, and to the nebular theory. In one of his works he made the earliest suggestions for the study of sun-spots by photography. He visited the United States in 1848 and lectured publicly on scientific subjects. He was a fellow of the Royal Astronomical Society and a member of the Royal Society. Among his works may be mentioned: *Views of the Architecture of the Heavens* (1838 and nine subsequent editions); *Contemplations on the Solar System* (1844); *Exposition and History of the Planet Neptune* (1848); *The Stellar Universe* (1848); *The Planetary System, Its Order and Physical Structure* (1851); *A Cyclopædia of the Physical Sciences* (1857). Consult Maclellan's *Hundred Glasgow Men*, and Stewart's *University of Glasgow, Old and New*.

NICHOLAS, nik'ô-las. The name of five popes. **NICHOLAS I.**, Saint, Pope 858-67. He was of a noble Roman family, and was employed in important affairs by Benedict III., whom he succeeded, being crowned—the first recorded instance of the coronation of a pope—in the presence of the Emperor Louis II. The most important events of his pontificate are those connected with his conflict with Photius, who had been illegally intruded into the See of Constantinople. (See **PHOTIUS**; **GREEK CHURCH**.) Throughout his reign he was one of the most uncompromising upholders of the claims of the Roman See to universal jurisdiction. A prolonged contest in practical matters with a Western prelate of great power and individuality, Hinemar, Archbishop of Rheims, was terminated by Hinemar's submission. The matrimonial affairs of the German princes also gave him much trouble; and his firmness in upholding the sanctity of the marriage tie brought him into conflict with the Emperor, who marched upon Rome and held the Pope a prisoner without food

for two days in the Castle of Sant' Angelo, until, terrified by a sudden illness and by some fatalities which befell his followers, he drew off his forces and made peace. Nicholas brought the new Slavonic Church, just growing up through the preaching of Cyril and Methodius (q.v.), under the control of the Papacy. Altogether he was one of the most vigorous of the early popes, one who laid the foundations upon which Gregory VII. could build; an impressive figure, who may stand with Charlemagne to close the centuries of formation and preparation, and open the Middle Ages. Consult: Leroy, *Saint Nicholas I.* (Paris, 1898; Eng. trans., London, 1901); Hergenröther, *Photius, Patriarch von Constantinopel* (Regensburg, 1867); Lämmer, *Papst Nikolaus I. und die byzantinische Staatskirche seiner Zeit* (Berlin, 1857); Schrörs, *Hincmar, Erzbischof von Reims* (Freiburg, 1884).

NICHOLAS II., Pope 1059-61, Gerhard by name, a Burgundian by birth. He was a canon of Liège, and in 1046 became Bishop of Florence. When, on the death of Stephen X. in 1058, the so-called Tusculan faction of the Roman nobility chose the Bishop of Velletri Pope under the name of Benedict X., Hildebrand induced an assembly at Siena in December to elect Gerhard. The Empress Agnes espoused his cause, and he entered Rome in January. Hildebrand became archdeacon of the Roman Church in the latter part of the same year (1059), and was the soul of the entire Pontificate of Nicholas. (See GREGORY VII.) Under his influence and that of Peter Damiani stringent measures were enforced against simony and concubinage; the Papal election was also definitely restricted to the college of cardinals, and the whole tendency of Nicholas's administration was to free the Church from the invasion of external influences. He died in Florence, July 19, 1061, and was buried in his former cathedral.

NICHOLAS III., Pope 1277-80, Giovanni Gaetano degli Orsini. He was made cardinal by Innocent IV. in 1244, and employed by several popes in important diplomatic missions. On the death of John XXI., he was elected at Viterbo after a prolonged division in the conclave, which was only terminated by the citizens locking the cardinals up in the town hall. He had already acted as mediator between Charles of Anjou and Rudolf of Hapsburg, and now employed his influence with them to strengthen materially the temporal power of the Church in Italy. He is described as a man of strict morals and considerable learning, though the reproach of nepotism is brought against him.

NICHOLAS IV., Pope 1288-92, Geronimo by name. He entered the Franciscan Order at an early age, and in 1272 was sent to Constantinople to invite the Greeks to the Council of Lyons. Two years later, on the death of Saint Bonaventura, he was elected general of his Order. Nicholas III. made him a cardinal, and Martin IV. Bishop of Palestrina. After nearly a year's interregnum he was chosen to succeed Honorius IV., and was the first Franciscan Pope. In his time Acre, the last stronghold of the Christians in the East, fell into the hands of the Moslems; and he made vigorous attempts to stir up Christendom to renewed efforts against them, also making strenuous endeavors to convert the Tatars.

NICHOLAS V., Pope 1447-55, Tommaso Paren-

tucelli. Born probably at Sarzana, near Pisa, in 1397, he was educated at Bologna and Florence. In 1426 he came to Rome and was employed in the ecclesiastical service. In 1444 he was made Bishop of Bologna and cardinal two years afterwards in recognition of his skill in conducting difficult negotiations in Germany. On succeeding three months later to the Papal throne, he addressed himself first to the settlement of the troubles growing out of the Council of Basel, and prevailed upon the Antipope Felix V. to resign his claims, thus securing universal recognition in 1449 and restoring peace to the Church. In 1452 he crowned Frederick III. as Emperor—the last Imperial coronation to take place in Rome. He sought to stir up Christendom to oppose the advance of the Turks. He reproached the Greeks with their dilatory postponement of the agreements made at the Council of Florence, and upon the Greek Emperor finally accepting his conditions, sent Cardinal Isidore to Constantinople with troops and money. The submission of the Greeks was, however, only feigned; and on May 29, 1453, Constantinople fell into the hands of the Mohammedans. In the revival of classical learning which preceded and followed that event Nicholas was actively concerned. He dispatched agents in all directions, east and west, to purchase or to copy every important Greek and Latin manuscript. The number collected by him was about 5000. He remodeled and may almost be said to have founded the Vatican library. He caused translations to be made of the Greek classics, both sacred and profane. He invited to Rome the most eminent scholars of the world, and extended his special patronage to the Greeks who were driven from Constantinople; in short, he did all in his power to make Rome the centre of the world, both in art and letters.—The name of **NICHOLAS V.** was also assumed by the Antipope set up by Louis of Bavaria against Pope John XXII. in 1328, the Franciscan Pietro Rainalducci di Corbana, who finally made his submission and died at Rome in 1333.

NICHOLAS I. (1844—), Prince of Montenegro. He was educated in Cetinje, Trieste, and Paris, returning to Cetinje when about twenty years old. His uncle, Prince Danilo, was assassinated in August, 1860, and Nicholas was immediately proclaimed Prince. In the same year he married Milona, daughter of Peter Valssetitch, president of the Council of State. Danilo Alexander, his eldest son, was born June 29, 1871. Helena, one of his six daughters, became the wife of the Prince of Naples, now Victor Emmanuel III. of Italy. He has introduced many reforms in education, the civil administrations, and the army. The period of Nicholas's reign has been one of much moment for Montenegro, which obtained from the European Powers recognition of its independence in the treaty of Berlin (1878). He has shown himself on the whole a capable ruler, using for the good of his people the almost absolute power he holds. See MONTENEGRO.

NICHOLAS I., PAVLOVITCH (1796-1855). Emperor of Russia from 1825 to 1855. He was the third son of Paul I., and was born at Saint Petersburg July 6 (old style June 25), 1796. His early education was under the direction of his mother, a princess of Württemberg. His later studies were principally in the fields of economics and military science, but he evinced no especial abil-

ity in these branches. He traveled in England and on the Continent in 1816, and also made a tour through the Russian provinces. On July 13, 1817, he married Charlotte, the eldest daughter of Frederick William III. of Prussia. The death of Alexander I., in December, 1825, and the previous renunciation by his elder brother, the Grand Duke Constantine (q.v.), of his claims to the throne (1822), made Nicholas Emperor, but he was obliged to meet at the outset a military conspiracy, which was stamped out with ruthless severity—the celebrated rising of the Decembrists. (See RUSSIA.) Capital punishment, abolished by the Empress Elizabeth, was revived, for the purpose of inflicting it upon the leaders of the insurrection. Nicholas, like other czars, showed at the beginning of his reign some zeal for reform; but the spirit died out, giving place to the old despotism, and he became the embodiment of the reactionary spirit of the Holy Alliance. Nevertheless, his first great measure, the codification of Russian law, commenced in 1827, was continued and completed in 1846. A war with Persia began soon after his accession, and was concluded on February 28, 1828, by the peace of Turkmanchah, which gave Persian Armenia to Russia. Close upon this followed a successful but costly war with Turkey, concluded by the Peace of Adrianople (q.v.) which obtained for Russia another increase of territory, the free navigation of the Danube, the right of free passage between the Black and Mediterranean seas, and the protectorate over Moldavia and Wallachia. The revolutionary agitation of 1830 communicated itself to Russian Poland, where there was a national rising, suppressed after a contest of nine months, which taxed the military resources of the Empire. Nicholas converted the Kingdom of Poland into a Russian province, and began the process of Russification, which has since been in progress. Russia, which had been approaching more closely the standards of Western Europe, gradually lost its newer aspect. The press was placed under a strict censorship, and education was directed, not to the development of the people, but to preparation for the work of the State. The process, begun in Poland, was to be carried out all over the Empire, until all the foreign elements were completely Russianized and unified in people and religion. The independence of the mountaineers of the Caucasus was inconsistent with the Emperor's schemes, and war was waged against them with the greatest energy and perseverance, but at the cost of immense sacrifices both of money and lives. Nicholas sought to check the advance of British influence in Central Asia, and to counteract it tried various means, among which was the expedition for the conquest of Khiva in 1839, which ended in disaster. Between 1844 and 1846 he visited England, Austria, and Italy. When the Revolution of 1848 broke upon Europe, Nicholas refrained from interference until, by aiding in the suppression of the Hungarian national uprising against Austria, he was able to win Austria's gratitude and strike a blow at the Magyars, who interfered with Pan Slavism. Nicholas was intent on carrying into effect the hereditary Russian designs upon Constantinople, and in 1853 provoked a war with the Sultan; but the opposition of Great Britain and France plunged Nicholas into a much more terrible struggle than he had anticipated. (See CRIMEAN WAR.) In the course of the war

he died at Saint Petersburg, March 2, 1855, his death having undoubtedly been hastened by chagrin at the repeated defeats which his arms sustained, and the excessive labor he underwent to repair his losses. He was remarkable for temperance, frugality, and patriotism, but equally so for vanity and ostentation. Consult: Smucker, *Nicholas I.* (Philadelphia, 1860); Balleydier, *Histoire de l'empereur Nicolas* (Paris, 1857); Lacroix, *Histoire de Nicolas I.* (ib., 1864-73); Edwards, *The Romanoffs* (London, 1890).

NICHOLAS II. (1868—). Emperor of Russia from 1894. He was born at Saint Petersburg, May 18 (old style May 6), 1868, the eldest son of Emperor Alexander III. and Maria Feodorovna (Princess Dagmar, daughter of Christian IX. of Denmark). In 1890-91 he traveled extensively in the East, and while in Japan narrowly escaped assassination at the hands of a maniac. He traversed the length and breadth of the Russian Empire and went through Siberia by the old conveyances along the route of the Siberian railway, thus obtaining an adequate appreciation of the importance to Russia of that gigantic undertaking. On the death of his father, Alexander III. (November 1, 1894), he succeeded to the throne. Although regarded prior to his accession as a mild and somewhat indefinite character, his administrative acts exhibited energy and decision. He brought into his service some of the ablest statesmen of Russia. The Empire in the reign of Alexander III. was influenced politically by the reaction from liberal agitation caused by the assassination of the Liberator Czar; the conservative national Russian party had become dominant, and this was not changed through the accession of Nicholas. The process of Russification went on uninterruptedly in Poland and the Baltic Provinces, and even extended to Finland (q.v.), which by all previous czars had been allowed to retain its national existence. The great object of the internal policy of the Government has been to consolidate Russian nationality and to develop the strength and resources of the Empire. Nicholas and his advisers were apparently inclined to believe that in the present state of civilization among the Russian people this can best be done under the autocracy. Under him Russia steadily advanced its interests in the far East, won by its diplomacy open harbors on the Pacific, developed a great railway system on strategic lines through the whole Empire, and accomplished much in the upbuilding of its own industries. Perhaps the most notable act of the Czar was the peace rescript of 1898, looking to a reduction of national armaments, the result of which was the peace conference at The Hague. (See HAGUE PEACE CONFERENCE.) Nicholas married, November 26 (14), 1894, Princess Alexander Alix, daughter of the Grand Duke of Hesse. Consult: Leudet, *Nicholas II. intime* (Paris, 1899); Prince Ukhtomski, *Voyage en Orient, Grèce, Egypte, Inde, 1890-91, de son altesse impériale le Césarévitch* (French translation by Léger, with preface by A. Leroy-Beaulieu (ib., 1893).

NICHOLAS, Sir EDWARD (1593-1669). A minister of Charles I. of England. He was born at Winterbourne Earls, Wiltshire. He was a member of Parliament in 1620-21, 1623-24, and 1627-28, and in 1641 was made Secretary of State and Privy Councilor. When the Royalist cause was lost, Nicholas went to live in Normandy, but was

nominally the secretary of Charles I. until his execution, and tried to serve Charles II. as faithfully, but the jealousy of Queen Henrietta Maria prevented him from holding the position, except in name. He returned to England at the Restoration, but retired in 1662.

NICHOLAS, GEORGE (c.1755-99). An American soldier and politician. He was born in Hanover, Va., and graduated at William and Mary College in 1772. He took the patriot side in the Revolution, became captain of the Second Virginia Regiment in October in 1775, major of the Eleventh Virginia Regiment in November in 1776, lieutenant-colonel of the same regiment in September, 1777, and resigned from the service in the following November. In 1781, as a member of the Virginia Assembly, he introduced articles of impeachment, founded on charges of incompetency, against Governor Jefferson, but they were not adopted. In 1788 he did much in the Virginia Convention to secure the ratification of the Federal Constitution. He removed to Kentucky in 1790, took the leading part in framing the State Constitution of 1792, and became the first Attorney-General of the State.

NICHOLAS, SAINT (†326). A highly popular saint of the Roman Catholic Church, revered with still greater devotion by the Russian Church. Of his personal history hardly anything is known with certainty. He is said to have been Bishop of Myra in Lycia and to have taken part in the Council of Nicæa. With more probability, however, he is referred to a later date, but he certainly lived prior to the reign of Justinian, in whose time several of the churches of Constantinople were dedicated to Saint Nicholas. The great popularity of Saint Nicholas rests mainly on the traditions, both in the West and in the East, of the many miracles wrought through his intercession. He is regarded in Catholic countries as the special patron of the young, and particularly of scholars; also parish clerks, travelers, sailors, and pawnbrokers. As his protection was implored against robbers, these persons came to be called 'Clerks of Saint Nicholas.' In England his feast was celebrated in ancient times with great solemnity in the public schools and elsewhere; the supposed day of his death, December 6, is still observed with curious popular ceremonies in Germany. The nearness of his feast to that of Christmas Day led to the confounding of the two, so that we are told that Santa Klaus, a Dutch corruption of the name Saint Nicholas, gives the presents of Christmas. In art Saint Nicholas is represented as clad in episcopal robes and carrying three purses, three different stories, illustrating the saint's charity. The supposed relics of Saint Nicholas were conveyed from the East to Bari, in the Kingdom of Naples, May 9, 1087, and in the Russian Church the anniversary of this translation is still observed as a festival.

NICHOLAS, WILSON CARY (c.1757-1820). An American legislator, the son of Judge Robert Carter Nicholas. He was born at Hanover, Va., graduated at William and Mary College in 1774, and at the outbreak of the Revolutionary War enlisted in the Continental Army, serving for the greater part of the war as an officer of Washington's 'Life Guards.' In 1788 he was a member of the Virginia convention that ratified the Federal Constitution, and was himself a supporter of that

instrument. In 1799 he became a Republican member of the United States Senate, but resigned in December, 1804, to become collector of customs for Norfolk and Portsmouth. From 1807 to 1811 he was a member of Congress, and from 1814 to 1817 was Governor of Virginia.

NICHOLAS NICKLEBY, nîk'î-bl. A novel by Charles Dickens. It appeared as a serial in 1838 and 1839. The hero began his career as a teacher in Squeers's school, Dotheboys Hall, Yorkshire, of which Dickens gives a terrible picture, showing the evils of cheap schools of that time. After a struggle as secretary, actor, and clerk, Nicholas became a member of the firm of Cheeryble Brothers. The leading characters are Ralph Nickleby, his son, the miserable Smike, the Squeerses, and the Mantalins.

NICHOLAS OF CLÉMANGES, klá'mānz'h'. See CLÉMANGES.

NICHOLAS OF CUSA. See CUSA.

NICHOLAS OF LYRA (c.1270-1340). An eminent biblical scholar. He was born at Lyra (Lyre) in Normandy; entered the Franciscan College at Verneuil in 1291, and afterwards studied in Paris; became a doctor of theology, and a successful teacher; held some of the most important posts of his Order, among which was that of Provincial for Burgundy, and was eminent as a lecturer on biblical interpretation. His works were approved by the Reformers and used by them to support their arguments. In his system of interpretation he gave preference to the literal, as being the one on which all the other methods—mystical, allegorical, and spiritual—were based. His chief work, *Postillæ Perpetuæ in Universa Biblia*, has been regarded as marking the beginning of a school of natural exegesis. He also wrote on the coming of the Messiah, in reply to Jewish critics (*Tractatus Fratris Nicholai de Messia Ejusque Adventu Una cum Responsione ad Judæorum Argumenta Quatuordecim contra Veritatem Evangeliorum*, 1309); and a work on the Sacrament (*Tractatus de Idoneo Ministrante et Suscipiente Sancti Altaris Sacramentum*). An edition of his works in five volumes was published at Rome (1471-72), and one in six volumes at Antwerp (1634). Consult: Davidson, *Sacred Hermeneutics* (London, 1843); Graetz, *Geschichte der Juden* (11 vols., Leipzig, 1853-70); and for different editions, Graesse, *Trésors des livres rares et précieux* (Dresden, 1859-69).

NICHOLASVILLE, nîk'ô-las-vîl'. A city and the county-seat of Jessamine County, Ky., 83 miles east-southeast of Louisville, on the Cincinnati Southern and other railroads (Map: Kentucky, G 3). It is the seat of the Jessamine Female Institute, opened in 1854, and is an important tobacco market and the centre of extensive horse-breeding interests. The chief industrial plants are a large sawmill and wheel works. Nicholasville was settled in 1799, and was first incorporated in 1835. Population, 1890, 2157; 1900, 2393.

NICHOLL, nîk'ol, HORACE WADHAM (1848—). An Anglo-American musician, born at Tipton, near Birmingham, Eng. He was educated under native teachers, the most famous of whom was Samuel Prince, and after holding one or two local organ appointments moved to America and settled in Pittsburg. After 1878 he made his

home in New York. His compositions include: *Cloister Scene* (1874); symphonic poem *Tartarus* (1888); *Mass in E Flat*; and many other smaller orchestral and instrumental numbers. His most important work, a cycle of four oratorios, has remained in manuscript, the component works of which are named respectively *Adam*, *Abraham*, *Isaac*, *Jacob*.

NICHOLLS, nik'olz, FRANCIS TILLON (1834—). An American politician and soldier, born at Donaldsonville, La. He graduated at West Point in 1855 and took part in the Seminole War, but resigned from the army in 1857 and returned to his native State, where he began the practice of law. At the outbreak of the Civil War he entered the Confederate service as a captain and rose to the rank of brigadier-general. In 1876 he was elected Governor of Louisiana, and was again elected in 1888. During his second administration occurred the suppression of the Louisiana Lottery. The lottery company succeeded in getting a bill granting it a new charter through both branches of the Legislature, but Governor Nicholls vetoed the measure, whereupon the company appealed to the people and met with final defeat. In 1892 he became Chief Justice of the State Supreme Court.

NICHOLLS, RHODA (HOLMES) (?—). An English water-color painter and illustrator, born in Coventry, England. She was a pupil of the Bloomsbury School of Art in London and won the Queen's scholarship. In 1884 she removed to the United States, and afterwards settled in New York City, where she became a prominent member of the New York Water Color Club. Her work is strong, brilliant, and individual, and her figure and flower studies are particularly well known.

NICHOLS, nik'olz, EDWARD LEAMINGTON (1854—). An American physicist. He was born at Leamington, England, and was educated at Cornell University, graduating in 1875. After studying at Leipzig, Berlin, and Göttingen, where he took the degree of Ph.D. in 1879, he was appointed fellow in physics at Johns Hopkins. He then spent some time in the Edison laboratory at Menlo Park, N. J., and in 1881 became professor of physics and chemistry in the Central University of Kentucky. In 1883 he was called to the chair of physics and astronomy at the University of Kansas, and in 1887 he was appointed professor of physics at Cornell University. He became editor of the *Physical Review* and prepared many papers on electricity and other branches of experimental physics as well as text-books dealing with these subjects.

NICHOLS, ERNEST FOX (1869—). An American physicist, born at Leavenworth, Kan. He graduated at the Kansas Agricultural College in 1888, and pursued graduate studies at Cornell University and Berlin University. He was professor of physics at Colgate University in 1892-98 and at Dartmouth College from 1898 to 1903, when he was made professor of experimental physics at Columbia University. His work in physics includes the remodeling and improvement of the Crookes radiometer; with H. Robens, the discovery and measurement of heat waves four times as long as any hitherto known; the measurement of the heat radiation from the stars Arcturus and Vega and the planets Jupiter and Saturn; and,

with G. F. Hall, the measurement of pressure due to radiation.

NICHOLS, JOHN (1745-1826). The last of the learned printers, born near London, February 2, 1745. He was apprenticed to William Bowyer (q.v.), and was taken into partnership (1766). On the death of his patron (1777) he succeeded to the business. He died November 26, 1826. For nearly fifty years Nichols devoted himself to writing, editing, and publishing valuable books. Among them are *A Supplement to Swift's Works* (1776, 1779); *Biographical and Literary Anecdotes of W. Bowyer* (1782); *The Progresses of Queen Elizabeth* (1778, with additions in 1805 and 1821); and *Literary Anecdotes of the Eighteenth Century* (1812-15). His son, JOHN BOWYER NICHOLS (1779-1863), was also a well-known printer and antiquary.

NICHOLSON, nik'ol-son, EDWARD WILLIAMS BYRON (1849—). An English librarian and author, born at Saint Helier, Jersey, and educated at Oxford. He was librarian and superintendent at the London Institution from 1873 until 1882, when he became librarian at the Bodleian Library in Oxford. His publications include Gospel commentaries, *The Christ-Child and Other Poems* (1877); *The Rights of an Animal* (1879); *New Homeric Researches* (1883); *The Pedigree of Jack* (1892); *The Vernacular Inscriptions of the Ancient Kingdom of Alban* (1896); *Golspie* (1897); *The Man with Two Souls and Other Stories* (1898); and *The Language of the Continental Picts* (1900).

NICHOLSON, Sir FRANCIS (1660-1728). A British colonial governor and soldier in America. He was born in England, and in 1678 entered the army as an ensign. In 1684 he became a lieutenant and was sent to America, where in 1687 he was appointed deputy for New York of Sir Edmund Andros. Nicholson's administration of affairs in New York was weak and vacillating. In the spring of 1689, at the time of the Leisler rebellion (see LEISLER, JACOB), he was turned out of office, and returned to England, a new commission from William III. as Governor of the colony arriving soon after his departure. From 1690 to 1694 he was Lieutenant-Governor of Virginia, and administered the affairs of the colony with great ability. Although himself a dissolute rake, he endeavored, with considerable success, to improve the moral and intellectual condition of the people. He gave his attention to bettering the character and condition of the clergy, established for the first time a regular system of schools, and founded William and Mary College, to which he himself donated the sum of £300. In 1694 Lord Howard of Effingham, under whom Nicholson served as deputy, died, and when Andros was appointed to succeed him Nicholson, disappointed, resigned. He was pacified with the appointment to the Governorship of Maryland, where his failure to get along with the colonists was as conspicuous as his success in Virginia had been. In 1698 he returned to Virginia as Governor, but his second term was far less successful than the first. He caused considerable irritation and ill-feeling by his removal of the capital from Jamestown to Williamsburg. He was recalled in 1705. In 1709 and 1711 he made ineffectual attempts to invade Canada by leading an army northward from Albany by way of Lake Champlain. In 1710 he planned and commanded the expedition

which resulted in the capture of Port Royal, and in 1713 became Governor of Acadia. In 1719, the proprietary charter of South Carolina having been declared forfeited, Nicholson was appointed royal Governor. He was knighted in the following year, and remained in South Carolina until 1725. In the same year he attained the rank of lieutenant-general. He published an interesting account of the capture of Port Royal, entitled *Journal of an Expedition for the Reduction of Port Royal* (1711), reprinted by the Nova Scotia Historical Society in 1879; and *An Apology or Vindication of Sir Francis Nicholson, Governor of South Carolina* (1724).

NICHOLSON, JAMES (1737-1804). An American naval officer, born at Chestertown, Md. He was present at the capture of Havana in 1762, lived in New York from 1763 to 1771, then returned to Maryland, and in 1775 became captain of the American ship *Defense*. In March, 1776, he captured several British prizes; in June he was put in command of a twenty-eight-gun ship, the *Virginia*; and in October he was made ranking captain of the American navy. His vessel was confined for some time to Chesapeake Bay by a strict blockade, and during this period he and his crew took part as volunteers in the battle of Trenton. In January, 1777, he succeeded Commodore Esek Hopkins as commander-in-chief of the American navy, in which position he remained until the close of the war. Early in 1778, while he was attempting to leave Chesapeake Bay, his vessel ran aground and was captured, but he, with most of his crew, managed to escape. On June 2, 1780, in command of the *Trumbull*, of 38 guns, he fought a drawn battle with the British ship *Wyatt*, and in 1781, off the Delaware capes, after a stubborn resistance, he was captured by the *Iris* and *General Monk*. He was released at the close of the war, and returned to New York City, where he was appointed commissioner of loans.

NICHOLSON, JAMES WILLIAM AUGUSTUS (1821-87). An American naval officer. He was born in Dedham, Mass., entered the United States Navy as a midshipman in 1838, became a lieutenant in 1852, and in 1853-55 served on the *Vandalia* in Commodore M. C. Perry's Japan expedition. During the Civil War he commanded the steamer *Isaac Smith*, of the South Atlantic blockading squadron, in the battle of Hilton Head at Port Royal (November 7, 1861); was promoted to the rank of commander in 1862; was in the action with the Confederate flotilla on the Savannah River in the same year; commanded the monitor *Manhattan*, under Admiral Farragut, in the battle of Mobile Bay, and soon afterwards participated in the bombardment of Fort Morgan. In 1865-66 he commanded the steamer *Mohican* in the Pacific Squadron; in 1873 was promoted to be commander; and from 1876 to 1880 was commandant of the Brooklyn Navy Yard. He became a rear-admiral in 1881, was placed in command of the European station in the same year; was present at the bombardment of Alexandria, Egypt, by an English fleet in 1882, and by his prompt and energetic measures did much to restore order thereafter. In 1883, having reached the age of sixty-two, he was retired from service.

NICHOLSON, JOHN (1821-57). A British general and administrator in India. He was born

in Dublin, December 11, 1821. At eighteen he received a cadetship in the Bengal infantry. In 1841 he fought heroically to defend Ghazni against the Afghans, but was taken prisoner and cruelly treated. His escape was followed by a period of inactivity, during which he was stationed at Meerut, doing duty as adjutant of his regiment. On the breaking out of the Sikh War in 1845, he served in the campaign on the Sutlej, and was present at the battle of Ferozshah, though he had no opportunity to distinguish himself. After the war, through the recommendation of Colonel Lawrence, Nicholson, now a lieutenant, was appointed assistant to the Resident at the conquered capital, Lahore, and thus fairly transferred to the political branch of the service, in which most of his future life was passed. But with the outbreak of the Sikh rebellion in 1848 came an interlude of military activity, in which he greatly distinguished himself. At the battles of Chillianwalla and Gujerat he earned the approval of Lord Gough, to whom he was immediately attached.

When the Punjab finally became a British province, Captain Nicholson was appointed deputy commissioner under the Lahore Board, of which Sir Henry Lawrence was president. During a furlough, 1850 to 1851, he studied military affairs in the great European capitals. For five years after his return to India he was engaged in administrative duties among the savage tribes of the Punjab. His success in bringing them under thorough subjection to law and order was very great; and such was the impression of fear and reverence wrought by the force and personality of the man, that he became among these rude populations, under the title of 'Nikkul Seyn,' the object of a curious kind of hero-worship. In the great mutiny of 1857 he did noble service for England in helping save the Punjab. When everything was safe behind him, he marched to reinforce the army of General Wilson, engaged in the siege of Delhi. His presence and counsels gave new life to the operations, and in every way he strove to expedite the delayed assault. When the attack on the city was at last ordered, General Nicholson, as he was now, led the first column. As the troops forced their way into the city, Nicholson exposed himself fearlessly to animate his men. Conspicuous by his great stature, he became the mark of the enemy's bullets and fell, shot through the body. After great suffering he died September 23, 1857. Consult: Kaye, *Lives of Indian Officers* (London, 1867); id., *History of the Sepoy War in India* (ib., 1867); Malleon, *History of the Indian Mutiny* (ib., 1897); Trotter, *Life of John Nicholson, Soldier and Administrator, Based on Private and Hitherto Unpublished Documents* (ib., 1897).

NICHOLSON, JOSEPH SHIELD (1850—). An English economist, born in Lincolnshire. He studied at the universities of Edinburgh, Cambridge, and Heidelberg. He was private tutor at Cambridge, 1876-1880, and became professor of political economy at the University of Edinburgh in 1880. His writings represent a compromise between the methods of the historical school of German economics and those of the English deductive school. In his principal work, *Principles of Political Economy* (3 vols., 1893-1901), he closely follows the great work of John Stuart Mill in his selection of material, but employs sta-

tistical and historical discussion instead of the abstract reasoning from simple assumption which characterizes Mill's works. His other important works on economic subjects are: *Effects of Machinery on Wages* (1878); *Tenants' Gain Not Landlord's Loss* (1883); *The Silver Question* (1886); *Money and Monetary Problems* (1888); *Historical Progress and Ideal Socialism* (1894); *Strikes and Social Problems* (1896). He is also author of three romances: *Thoth* (1888); *Dream of Dreams* (1889); and *Tozar* (1890).

NICHOLSON, LOUISE MARGARET. An American singer, better known by her professional name, Louise Nikita (q.v.).

NICHOLSON, WILLIAM (1872—). An English painter and wood engraver, born at Newark-upon-Trent. He studied with Herkomer and under Bouguereau and Constant in Paris, but these masters had little influence upon him. After his return to London, he and his brother-in-law, James Pryde, began to design posters under the name of the Beggarstaff Brothers. The technical skill shown in these works, their originality and boldness, attracted considerable attention. They are done in black and white with usually a dash of color. His publications include: *An Alphabet* (1898); *An Almanac of Twelve Sports* (with Rudyard Kipling, 1898); *London Types* (with W. E. Henley, 1898); and *Characters of Romance* (1900). In portraiture he is particularly successful. His best cuts are Queen Victoria, Whistler, Bernhardt, Kipling, and Earl Roberts.

NICIAS, nish'i-as (Lat., from Gk. *Nikias*, *Nikias*). A famous Athenian statesman and general during the Peloponnesian War. He was the son of Niceratus, a very wealthy citizen, who had acquired his fortune by working the silver mines at Laurium. Nicias belonged to the aristocratic party, and after the death of Pericles presented himself as the opponent of Cleon, the great popular or demagogic leader. The opposite in character to Alcibiades, he was wary, cautious, obstinate, and irresolute. He was generally successful in his enterprises against the Spartans and their allies. In B.C. 427 he captured the island of Minoa; in the following year he ravaged the island of Melos and the coasts of Locris; and in B.C. 424 he captured the island of Cythera and ravaged the coast of Laconia. After the death of Cleon he brought about a peace between the Spartans and Athenians, B.C. 421, called the Peace of Nicias. Six years afterwards the Athenians, at the instigation of Alcibiades, resolved on a great naval expedition against Sicily. Nicias was appointed one of the commanders, although he had strongly protested against the undertaking. In the autumn of B.C. 415 he laid siege to Syracuse, and was at first successful, but subsequently experienced a series of disasters; his fleet was destroyed, and his troops began a retreat toward the interior of Sicily. They were speedily forced to surrender, and Nicias was put to death, B.C. 413. Consult the *History of Greece* by Grote, Curtius, Holm, Beloch, and Eduard Meyer; also Plutarch's *Life of Nicias*.

NICKEL (Swed. *nickel*, connected perhaps with Ger. *Nickel*, devil, cf. the etymology of *cobalt*; according to others connected with Icel. *hnikill*, ball, lump). A metallic element discovered by Cronstedt in 1751. It was first men-

tioned in 1694 by Hiarni, who called it *kopparnickel*, signifying false copper, because, while its ores resembled those of copper, that metal could not be extracted from them. Cronstedt successfully isolated the metal, but it was not until Bergman in 1774 corroborated his investigations that its distinct nature was recognized. Nickel is a constituent of all meteoric irons, and it has been detected spectroscopically in the atmosphere of the sun. On the earth it occurs, usually associated with cobalt, in *niccolite*, *gersdorffite*, *millerite*, *garnierite*, and certain other minerals. The wide distribution of the sulpharsenide ores led to their extensive working in Saxony, Norway, Sweden, Austria, Spain, Russia, Great Britain, and the United States, but since the discovery of garnierite in New Caledonia in 1873, and the development of the nickeliferous pyrrhotite in Sudbury, Ontario, Can., subsequent to 1887, these two localities have become the principal sources of nickel.

Nickel (symbol, Ni; atomic weight, 58.69) is a silver-white lustrous metal that is magnetic at ordinary temperatures, is ductile, hard, and tenacious, has a specific gravity of from 8.97 to 9.26, and a melting-point of about 1450° C. Next to manganese it is the hardest of the metals, and it is capable of taking a fine polish. Fleitman has found that on adding a small quantity of magnesium to fused nickel the latter can be rolled into very thin sheets and welded on to sheet iron or steel so as to permit its use for the manufacture of culinary or other utensils. Nickel thus treated may be drawn into wire and also cast or forged. The chief use of nickel is in the manufacture of alloys, including German silver. There is an important alloy of nickel and steel which is used for armor plate and other heavy forgings. Nickel is also employed as a material for making coins in Switzerland, Belgium, Germany, the United States, and other countries. Nickel combines with oxygen to form two oxides. The monoxide, NiO, is a grayish-green substance found native as bunsenite. It may be made by strongly heating the hydroxide, carbonate, or nitrate. The sesquioxide of nickel, Ni₂O₃, is a black substance obtained by heating the nitrate or carbonate in the air. The most important commercial salt of nickel is ammonium-nickel sulphate, which is obtained by dissolving either metallic nickel or its protoxide in sulphuric acid and adding ammonium sulphate to the concentrated acid solution, which is then evaporated to crystallization. The crystals, which are of a bright green color, may be further purified by recrystallization and find their chief use in nickel plating. The carbonate may also be used for electro-plating. Nickel salts, when hydrated or in solution, have a fine emerald green color, but are yellow when anhydrous. In 1889, 252,663 pounds of nickel, valued at \$151,598, were produced from ores mined in the United States. In 1902 there was no nickel mined, the ore smelted being derived entirely from Canada and New Caledonia.

METALLURGY. When nickeliferous ores of lead, cobalt, copper, or silver containing arsenic are smelted, the nickel combines with the arsenic to form *speiss*; should arsenic not be present, the nickel enters the various intermediate products of the smelting process, such as *matte*, *blister copper*, *tough pitch copper*, and *dyes*. From all these

metallurgical products nickel may be extracted as well as from the ores. The principal ores from which nickel is extracted are the sulphur compounds and the silicates. The chief sulphur compounds are the nickel pyrites of iron and copper, of which one of the most notable deposits is at Sudbury, Canada. The Sudbury ores are the principal source of the world's nickel supply.

The extraction of nickel is performed by (1) the dry method, (2) the wet method, and (3) electro-metallurgically. The dry method is the one chiefly used to extract the metal from the ores, the use of the wet method and electro-metallurgical processes being confined almost entirely to extraction from metallurgical products and the matte and speiss resulting from the dry processes. Most attention will therefore be given to the dry method of extraction as applied to the principal ore of nickel; that is, the combined nickel, iron, and copper pyrites. In smelting these ores in the dry way, after getting rid of the gangue, the metallurgist is chiefly concerned with the separation of the nickel from the sulphur, iron, and, in most cases, from the copper also. When no copper is present the process becomes simple. Considering first ores free from copper, the task is to get rid of the iron and sulphur. The first operation consists in roasting the ore, which converts the metallic sulphides into a mixture of oxides, sulphates, and undecomposed sulphides. The roasted ore is then smelted in a shaft furnace with coal and siliceous matter, which removes the great bulk of the iron as slag, leaving a matte consisting of sulphide of nickel mixed with a small proportion of iron sulphide. Generally, to get a matte rich enough in nickel for the succeeding operations, these roasting and smelting processes are repeated one or more times. The raw nickel matte is next submitted to an oxidizing fusion in hearths, reverberatory furnaces, or converters to remove the remaining iron, leaving nickel sulphide. When copper is present in the ores as well as iron, the iron is removed exactly as before, the result being, however, a matte of nickel sulphide and copper sulphide mixed. This matte may be oxidized by roasting and then smelted to produce a nickel-copper alloy, or to secure nickel alone the matte is smelted with a flux, which removes the copper, or is treated with chemicals, which permit the separation of the copper. This latter method is the chief use made of the wet method of reduction, which, as previously stated, is used mostly for reducing the mattes, speiss, and slags resulting from the smelting process. As in wet methods of extraction generally, the process in the case of nickel consists in dissolving the metals from the matte, etc., by acids, and then in precipitating separately the various metals from this solution. The nickel compounds resulting from the processes mentioned are reduced to metallic nickel by smelting in crucibles with carbon. See Dr. Carl Schnable's *Handbook of Metallurgy* (New York, 1898).

NICOBAR (nik'ô-bâr') **ISLANDS.** A group of islands in the Indian Ocean beginning 130 miles northwest of Sumatra and stretching northwestward for 200 miles (Map: French Indo-China, B 6). They form with the Andaman Islands to the north of them the northern extension of the great chain of islands of which

Sumatra and Java are the principal members. The group consists of 19 islands, of which 12 are inhabited, the largest being Great and Little Nicobar in the south, Camorta in the centre, and Car Nicobar in the north. The area of Great Nicobar, the largest, is 337, and of the whole group 684 square miles. The southern islands are mountainous and covered with dense forests; those in the north are low, less fertile, but supporting large numbers of cocoa-palms. The climate is hot, humid, and very unhealthful for Europeans. The Nicobarese are classed with the Selungs of the Mergui Archipelago as Indonesians. The inhabitants of the smaller islands and of the coast of Great Nicobar have intermixed with Malays. In all probability they belong originally to one of the primitive stocks of Farther India (proto-Malay?) with Negrito and Malay admixtures. The northern Nicobarese are monogamous and value chastity very highly. In 1901 the inhabitants numbered 6310. They are chiefly supported by their large trade in cocoanuts and copra. Formerly they were engaged in piracy and wrecking, but have been peaceful since the British occupation. The islands are, together with the Andamans, governed by a British chief commissioner. The British Government agent resides at Nancowry Harbor, where there is a fine land-locked harbor between Camorta and Nancowry islands. The Nicobar Islands were settled by Denmark in 1756, but her attempts at colonization were unsuccessful, and she abandoned them in 1848. In 1809 they were annexed by Great Britain.

NICOBAR PIGEON. A large and very beautiful ground-feeding pigeon of the East Indies (*Calenas Nicobarica*), which is remarkable for the elongated feathers that mantle the neck, and for its very wide distribution over the Polynesian region. Consult Wallace, *Malay Archipelago* (New York, 1869).

NICODEMUS (Lat., from Gk. Νικόδημος, *Nikodēmos*). A Jew described in the Gospel of John as a Pharisee and member of the Sanhedrin, who came to Jesus secretly and by night at Jerusalem (John iii. 1 sqq.). He put in a plea for a hearing for Jesus when the Pharisees would have condemned Him without allowing Him to plead (John vii. 50); and he bore a part with Joseph of Arimathea in burying the body of Jesus (John xix. 39). He disappears from the New Testament after the burial. In an apocryphal book, the Gospel of Nicodemus, or Acts of Pilate, the few facts recorded in the Gospels are elaborated and commented on at considerable length, evidently with no basis of historic truth behind them. See APOCRYPHA.

NICOL, nik'ol, ERKDINE (1825—). A Scotch painter, born at Leith, near Edinburgh. He studied at the Trustees' Academy, Edinburgh, and then went to Dublin, where he taught and painted portraits. In 1859 he was elected associate of the Royal Academy, and in 1863 went to live in London. His works are genre, generally of Irish subjects, and many of them are well known in the United States through engravings. Among the best known are "Paddy's Mark," in the Corcoran Gallery, Washington; "Paying the Rent," in the Vanderbilt Collection, New York.

NICOLA, LEWIS (1717-c.1807). An American soldier, born in Dublin, Ireland. He became

ensign in the British army in 1740, and afterwards major. He resigned and came to Philadelphia about 1766, and was employed in civil engineering. In 1776 he was made barracks-master of the city and aided in preparing for defense. In December, 1776, he was made town major with State rank, and he held this place until 1782. He presented to Congress a plan for an invalid regiment, which should serve both as a home guard and a training school, was made the colonel in June, 1777, and was brevetted brigadier-general in 1783. He was an original member of the Pennsylvania branch of the Society of the Cincinnati and wrote to Washington for the army officers the famous letter suggesting that the latter become King of the country. He published *A Treatise of Military Exercise Calculated for the Use of Americans* (1776).

NICOLAI, nik'ô-li, CHRISTOPH FRIEDRICH (1733-1811). A well-known German littérateur, born in Berlin. From 1752 he directed a publishing and bookselling establishment, which he made one of the largest in Berlin. He became (1754) a member of a literary circle which included Lessing and Moses Mendelssohn, with the latter of whom he established at Berlin in 1757 the *Bibliothek der schönen Wissenschaften* (conducted from vol. v., 1760, by C. F. Weisse at Leipzig), designed as an independent critical journal. He also collaborated with Mendelssohn and Lessing (whose place was later taken by Thomas Abbt) in the *Briefe die neueste Litteratur betreffend* (1761-67), a literary review presented as letters addressed to a supposititious officer, wounded in the Seven Years' War. Another periodical, the *Allgemeine Deutsche Bibliothek* (106 vols., 1765-91; with a continuation, in all 162 vols., 1805), he made known chiefly for its harshness and insipidity. A rationalist in philosophy, he wrote *Sebaldu Nothanker* (1773), rather a heterodox monograph than the work of fiction it purported to be, and bitterly attacked Kant, Fichte, and the critical school in general. He attempted to cast ridicule upon most of what was significant in the German literature of the time, for example, the work of Goethe and Schiller, who made spirited reply in the *Xenien*, and that of G. A. Bürger (q.v.), against whose revival of the ballad form he directed his *Feyner kleyner Almanach vol schönerr, echter, liblicher Volkslieder* (1777-78; new ed. 1887). Yet in earlier critiques he worked effectively toward the improvement of taste; and his *Anekdoten von Friedrich II.* (1788-92) is of permanent historical value. Consult Gücking, *Nicolas Leben und litterarischer Nachlass* (Berlin, 1820). See also LESSING, GOTTHOLD EPHRAIM.

NICOLAI, OTTO (1810-49). A German musical composer, born at Königsberg in 1810. His early life was a struggle with poverty and difficulties, and although his first lessons in music were given to him by his father, the lack of sympathy between them, and the oft repeated brutality of the elder, caused the boy to run away from home (1826), and find a patron in Adler of Stargard, by whose aid he was enabled to complete his studies. He studied for three years in Berlin under Klein; and in 1835 went to Rome, where he went through three more years of study under Baini. After traveling for ten or twelve years over Europe, he became in 1847 kapellmeister at Berlin, a post which he soon re-

signed. He appeared as a composer of dramatic music as early as 1831; but his first work of importance was *Il Templario*, founded on Scott's romance of *Ivanhoe*, which, produced at Turin in 1841, attained a high and permanent reputation. In 1848 he wrote at Berlin *Die lustigen Weiber von Windsor*, on which his renown as a musician is founded, a work charming for its clear design and lively, vigorous tone. Two months after the production of this, his *chef-d'œuvre*, its composer died, in Berlin.

NICOLA'ITANS (Gk. Νικολαῖτες, *Nikolaitēs*). Representatives of a form of false teaching and loose moral practice, mentioned only in Revelation ii. 6, 15, and in early Christian literature bearing on these passages. Among the early references is the following by Irenæus (*Against Heresies*, i. 26): "The Nicolaitans are the followers of that Nicolas who was one of the seven first ordained to the diaconate by the Apostles. They lead lives of unrestrained indulgence. The character of these men is very plainly pointed out in the Apocalypse of John, [where they are represented] as teaching that it is a matter of indifference to practice adultery and to eat things sacrificed to idols." They evidently carried to an illogical and immoral extreme the principles of religious freedom from legal requirements taught by Saint Paul. Certain critics have seen in these references of the Apocalypse an allegorical portrayal of Paul's teachings by those to whom they were repugnant. Most scholars, however, find no warrant for this. The Nicolaitans were among the obscure early Gnostic heretics who offended chiefly in violating the decree of the Council at Jerusalem (Acts xv. 29), which forbade participation by Christians in the heathen feasts and in the licentiousness by which these celebrations were commonly attended. That they were personal followers of Nicolas or Nicolaus of Antioch (Acts vi. 5) has not been proved. Their name (in Greek, 'conqueror of the people') closely resembles the name Balaam (in Hebrew, 'destroyer of the people'), whence it has been argued that no such sect really existed, but the close association of the terms in the Apocalypse is a part of its allegorical method. There is no reasonable warrant for the conjecture. The sect was insignificant and disappeared. Other sects called Nicolaitans are met with in the Middle Ages; one flourished in the fifteenth century in Bohemia; these have no connection with the party mentioned in the Apocalypse. Consult the commentaries on Revelation, and McGiffert, *A History of Christianity in the Apostolic Age* (New York, 1897).

NICOLAS, Sir NICHOLAS HARRIS (1799-1848). An English antiquary, born at Dartmouth. In 1823 he published his *Index to the Herald's Visitations in the British Museum*. His labors also resulted in the reform of abuses which had crept into the administration of the record commission, the Society of Antiquaries, and the British Museum. Among his publications are: *Observations on the State of Historical Literature and on the Society of Antiquaries, with Remarks on the Record Commission* (1830); *Synopsis of the Peerage of England* (1825; new ed. revised by William Courthope, 1857); and *History of the Battle of Agincourt* (3d ed. 1833).

NICOLA'US (Lat., from Gk. Νικόλαος, *Nikolaos*) **OF DAMASCUS**. A Greek historian of the

first century B.C., an intimate friend of Herod the Great and of Augustus. His numerous works include his autobiography, of which a considerable portion remains; a history of the world down to his own times in 144 books, of which fragments have been preserved; and a panegyrical biography of Augustus, of which some extracts, made by command of Constantine Porphyrogenitus, are extant. He also wrote commentaries on various philosophical works, and several tragedies and comedies. A fragment of one of the tragedies has been preserved by Stobæus. For the fragments, consult: Müller, *Fragmenta Historicorum Græcorum* (5 vols., Paris, 1841-70); also, Trieber, *De Nicolai Damasceni Laconicis* (Berlin, 1867); and Steinmetz, *Herod and Nicolaus* (Lüneburg, 1861).

NICOLAY, nī'kō-lā, JOHN GEORGE (1832-1901). An American author, born in Essingen, Bavaria, February 22, 1832. He came to the United States in 1838, attended school in Cincinnati, Ohio, and later went to Illinois, where he edited the *Pike County Free Press*, at Pittsfield. Then he became assistant to the Secretary of State of Illinois, and while in this position met Abraham Lincoln. He served as private secretary to Lincoln during the Civil War (1861-65), and after the death of the President became United States Consul at Paris, France (1865-69). He was marshal of the United States Supreme Court (1872-87). Besides contributions to the leading magazines, his writings include books on the Civil War and on Lincoln, *The Outbreak of the Rebellion* (1881), and jointly with John Hay (q.v.) *Abraham Lincoln: A History*. This authoritative work appeared in the *Century Magazine* serially from 1886 to 1890, and was then issued in book form, together with the *Complete Works of Abraham Lincoln*, in 12 volumes (1890-94).

NICOLE, nē'kōl'. In Molière's *Bourgeois Gentilhomme*, a bright servant who with Madame Jourdain exposes and ridicules the foibles of her master.

NICOLE, nē'kōl', PIERRE (1625-95). A distinguished French Jansenist writer. He was born at Chartres, and at an early age attained unusual proficiency in classical studies, at first under the teaching of his father, a counselor in the Parlement of Paris. From 1642 to 1644 he studied philosophy in Paris, where he took his master's degree. Inclined to take holy orders, he made a theological course at the Sorbonne in 1645-46. He was already under the influence of the Jansenist leaders, especially Antoine Arnauld, and after taking his bachelor's degree in theology went to Port Royal in 1649. Five years later he returned to Paris and devoted his talents to promoting the cause of Jansenism. In 1679 his outspoken opposition to the ruling doctrines made it advisable for him to accompany Arnauld to the Low Countries, where he lived at Brussels, Louvain, and elsewhere until he got permission to return to Chartres, and in 1683 to Paris, where he died. He wrote a large number of controversial treatises, all characterized by purity of style and subtlety of discrimination. To him is due the principal part of the celebrated Port Royal logic—*La logique, ou l'art de penser* (Paris, 1662; Eng. trans. ed. T. S. Baynes, 10th ed., London, 1898). His *Essais de morale* (6 vols., 1671 seq.) is his most important work; it

was continued in a new edition with life by C. P. Goujet (14 vols., Paris, 1767-82).

NICOLINI, nē'kō-lē'nē, ERNESTO (properly ERNEST NICOLAS) (1834-98). A French singer, born at Saint-Malo. He studied at the Conservatory, and made his début in the *Mousquetaires de la Reine* at the Opéra Comique in Paris in 1857. Afterwards, he traveled extensively, and did not reappear in Paris until 1870. While in Saint Petersburg on another tour he renewed an acquaintance with Mme. Adelina Patti, whom he married after her divorce from the Marquis de Caux in 1886.

NICOLL, JAMES CRAIG (1847—). An American painter, born in New York. He studied under M. F. H. de Haas and Kruseman van Elten, and in 1885 was elected a National Academician. His marines include: "On the Rocks Near Portland" (1882), "Twilight," "Sunlight on the Sea," "Fog and Sunshine," and "On the Gulf of Saint Lawrence."

NICOLL, WILLIAM ROBERTSON (1851—). A British author and journalist, born at Lumsden, Aberdeenshire, Scotland, October 10, 1851. He was educated at the university and the Free Church College at Aberdeen; was a minister at Dufftown (1874-77), and at Kelso (1877-85). In 1884 he became the editor of the *Expositor*; in 1886 of the *British Weekly*, which he founded; and in 1891 of the *Bookman*, which he also founded. He has written: *The Incarnate Saviour* (1881); *The Lamb of God* (1886); *The Key of the Grave* (1893); *Literary Anecdotes of the Nineteenth Century* (1895); and, jointly with C. K. Shorter, a new *Life of the Brontës* (1895); besides editing a number of theological works.

NICOLLET, nē'kō-lā', JEAN NICOLAS (1786-1843). A French astronomer and explorer, born at Cluses in Savoy. When about twenty-one years old he went to Paris and became a naturalized Frenchman. In 1817 he secured a position in connection with the observatory, and in 1822 was promoted to be assistant astronomer in the Bureau of Longitudes. He discovered at the same time as Pons (q.v.) the comet of 1821, and in 1822-23 was engaged with Colonel Broussseau in measuring an arc of latitude in the south of France. Obligated to leave the country in 1831 because of unfortunate speculations, he went to the United States, where the Government gave him some assistance in making a geographical and geological exploration of the territory beyond the Mississippi. The results of these researches are embodied in a series of memoirs which appeared in the *Connaissance des temps* and *Silliman's Journal*. Among his other publications are: *Des assurances sur la vie* (1818); *Cours de mathématiques* (1830); and a *Report and Map of the Hydrographical Basin of the Upper Mississippi River* (1843). Consult Sibley, "Memoir of Jean N. Nicollet," in the *Collections of the Minnesota Historical Society*, vol. i. (Saint Paul, 1872).

NICOLLS, nīk'olz, MATHIAS (c.1630-87). An English colonial official, born at Plymouth. He was admitted to the bar, and in 1664 was appointed by Charles II. secretary of the commission headed by Col. Richard Nicolls (q.v.), which was to regulate New England and capture New Netherland. He became the first Secretary of New York after the English occupation (Sep-

tember 8, 1664), and was appointed a member of the Governor's Council. He drew up, under the supervision of Governor Nicolls, a code from the English, the Roman-Dutch, and the local laws of New England, which was promulgated at Hempstead in October, 1664, and was later known as the 'Duke's Laws.' In the Court of Assizes provided in this code, he was the presiding justice, and in 1665 was appointed judge of the Admiralty Court. He also served as captain of the militia and led some expeditions against the Indians. Though deposed as secretary when the Dutch recaptured the province in 1673, he was reappointed by Andros in 1674, and was elected mayor of the city as well. In 1680 he resigned all his offices and went to England. Upon his return he was appointed one of the two judges of the Court of Oyer and Terminer in 1683. During that year and the next he was Speaker of the First Assemblies of the Province. He bought and entered much land in Queens County, and died on his estate, Plandome.

NICOLLS, RICHARD (1624-72). A British soldier and colonial Governor. During the Civil War he commanded a troop of horse on the Royalist side. He followed the Stuarts into exile and served with the Duke of York under Marshal Turenne. After the Restoration, he was groom of the bedchamber for the Duke of York. In 1664 Charles II. appointed a commission, consisting of Colonel Richard Nicolls, Sir Robert Carr, Sir George Cartwright, and Samuel Maverick, to investigate complaints against the New England colonies, and reduce the Dutch in New Netherland, which had been granted to the Duke of York. Colonel Nicolls's presence was to be necessary for a quorum, and he was commissioned as Deputy Governor of the territory to be captured. After touching at Boston, he appeared before New Amsterdam, August 25, 1664, and on September 8th Governor Stuyvesant was forced to surrender. Governor Nicolls assumed authority over New York and New Jersey. He made no radical changes, was firm, yet conciliatory, and soon won the respect and confidence of the people and the good-will of the Indians. In March, 1665, he published the 'Duke's Laws,' which had been drawn up under his supervision (see **NICOLLS, MATTHIAS**), and which served for a time as a constitution. On June 12, 1665, he established the English form of municipal government for the city of New York. The French and Indian troubles of 1666 were settled with credit, but he complained that he had spent much money from his private purse to maintain the establishment. He asked several times to be relieved, and in 1667 his petition was granted, but he remained until Governor Lovelace arrived, in August, 1668. His time had been so fully occupied with affairs in New York that he largely left the management of New England to the other commissioners. When war broke out between the English and the Dutch, he served on shipboard and was killed at Solebay.

NICOL PRISM. A prism formed from a crystal of calcite devised by Nicol in 1828 to polarize light. The Nicol prism, which has undergone various modifications, is a most convenient source for obtaining polarized light, and is largely employed in many forms of polariscope. The accompanying diagrams will show its construction. In Fig. 1 A G B F D E C is a rhomb of calcite,

a material which is doubly refracting (see **LIGHT**, paragraph on *Double Refraction*), while Fig. 2 shows diagrammatically a section of a Nicol prism in the plane A B C D. In the natural crystal the angle B A D is 71° , but in the prism this is made 68° , and the two halves of the crystal forming the prism are cemented together with Canada balsam along the line B D, which makes an angle of 90° with B A. The plane of the bal-

FIG. 1. RHOMB OF CALCITE.

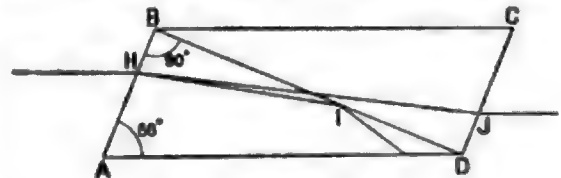


FIG. 2. NICOL PRISM.

sam is perpendicular to the end of the face of the prism. Under these conditions the ray of light falling upon the prism at H is broken by double refraction into two rays—the extraordinary, which travels to J and passes out of the prism and is available for experimentation, and the ordinary, which strikes the balsam at an angle of incidence so great that it is totally reflected at I and lost on the side of the prism. The plane of the polarization of the extraordinary ray is perpendicular to the plane of the diagram, while that of the ordinary ray is parallel to it. See **POLARISCOPE**; **LIGHT**.

NICOMACHUS, nī-kōm'ā-kūs (Lat., from Gk. *Νικόμαχος*, *Nikomachos*). A celebrated painter of the fourth century B.C., a son and scholar of Aristides. The references to him praise his mastery in technique, and rapid but effective execution. The notices, however, throw but little light upon his style. His works are known only from a particular list in Pliny (*Hist. Nat.*, xxxv., 108, cf. 145). Among them were: "The Rape of Proserpine," in the temple of Minerva, on the Capitol; "Victory Conducting a Four-Horse Chariot on High," also in the Capitol; "Apollo and Diana," "Cybele on a Lion," "Bacchantes Approached by Satyrs," and "Scylla."

NICOMACHUS (c. 100 A.D.). A Neo-Pythagorean philosopher and mathematician, born at Gerasa, probably in Judæa. He wrote an arithmetic in two books, of which the best edition is that of Hoche (Leipzig, 1866). In this he fully treated the theory of figurate numbers, and it is interesting as containing the first known multiplication table. Commentaries on this work were written by Iamblichus (q.v.), Philoponus, Soterichus, and others, and it was translated into Latin by Boëthius and Apuleius. He also wrote a *Harmonices Manuale* (published in 1652; French trans. 1880), of which the first book is still extant; the so-called second book, consisting of two fragments which probably did not belong to the original, was published in Jans's *Musici Græci* (Leipzig, 1895).

NICOMEDIA (Lat., from Gk. *Νικουμήδεια*, *Nikomēdeia*). The capital of ancient Bithynia, situated at the northeastern angle of the Gulf of Astæus, in the Propontis, now called the Bay of Ismid; founded in B.C. 264 by Nicomedes I. after

the destruction of Astacus (on the opposite side of the bay) by Lysimachus. Nicomedes made it the capital of the kingdom, and it soon became one of the most magnificent and flourishing cities in the East. Some of the later Roman Emperors, as Diocletian and Constantine the Great, selected it for their temporary residence. It suffered greatly both from earthquakes and the attacks of the Goths. Constantine died at a royal villa in the immediate vicinity. Hannibal committed suicide in a castle close by. It was the birthplace of the historian Arrian. The small town of Ismid or Isnikmid now occupies its site, and contains many relics of ancient Nicomedia.

NICOPOLIS (Lat., from Gk. *Νικόπολις*, *Nikopolis*). A town in Epirus, where Paul, in writing to Titus, stated that he designed to pass the winter (Titus iii. 12). It was founded in the year B.C. 31 by the Emperor Augustus, who named it the 'City of Victory,' in commemoration of the victory won by him at Actium. He decided to make a great city of Nicopolis, gathered a large population into it, and instituted games which drew throngs there every fourth year. The question of Paul's visit to Nicopolis is bound up with the authenticity of the pastoral Epistles (i.e. the two letters to Timothy and the one to Titus, qq.v.). Those who hold these to be authentic believe that Paul reached Nicopolis from Rome, preached there, and was there arrested for the second time and sent to Rome, where he was tried a second time and condemned. The original site of Nicopolis is now deserted. Remains of it are still to be found. Another city, Prevesa (Map: Balkan Peninsula, C 5), situated about five miles distant from the original location of Nicopolis, is the historical successor of the older city.

NICOPOLIS. A town of Bulgaria. See **NIKOPOLI**.

NICOSIA, *nē'kō-sē'ā* (more common than the forms *LEFKOSIA* and *LEVKOSIA*, of which it is a corruption). The capital and largest city of the island of Cyprus (Map: Turkey in Asia, E 5). It is the seat of the British High Commissioner and of an archbishop of the Greek Church. It is situated in a barren plain, a little northeast of the centre of the island, on the river Pedias, which is dry most of the year. The water supply of the city comes by aqueduct from the hills not far away. From a distance the high walls built by the Venetians and the beautiful Gothic cathedral, now a mosque, render Nicosia attractive; but the streets are narrow and labyrinthine, and most of the buildings insignificant. The manufactures are silks, leather, and woolen stuffs. Population, in 1891, 12,515; in 1901, 14,752. The city first appears in history in the time of Constantine, who fortified it with walls that lasted until the Venetians replaced them. It became the capital under the Lusignan kings, to the first of whom, Guy de Lusignan, the island was given in 1193 by Richard Cœur de Lion. Consult *Levkosia, the Capital of Cyprus* (London, 1881).

NICOSIA, *nē'kō-zē'ā*. A city in the Province of Catania, Sicily, situated in a mountainous region, on the Salso, 25 miles northeast of Cataniassetta (Map: Italy, J 10). The town is mediæval in appearance and customs. It is the see of a bishop, and has a Gothic cathedral, several ancient churches, and quaint houses. It

carries on some trade in corn, wine, oil, and cattle. Near it are beds of alum, a rich mine of rock salt, and springs of petroleum. Population (commune), in 1901, 16,004.

NICOT, *nē'kō'*, JEAN SIEUR DE VILLEMARIN (1530-1600). A French diplomat, born at Nîmes. He was appointed by Francis II. Ambassador to Portugal in 1560. During his residence at Lisbon he obtained from a Flemish trader some seeds of the tobacco plant, which he took back with him to France, where the plant was named *Nicotiana* in his honor. He published a *Historia Francorum* (1566), and a *Trésor de la langue française* (1606), one of the earliest French dictionaries.

NICOTERA, *nē-kō'tā-rā*, GIOVANNI (1828-94). An Italian statesman, born at San Biase (Calabria). He took an active part in the Revolution of 1848-49, fought in Calabria and Rome, and was afterwards taken prisoner at Sanza and condemned to death. Through the influence of England this sentence was commuted to imprisonment for life. In 1860 he was set at liberty again, and joined Garibaldi. He was concerned in all of the political movements of the succeeding years, and was at all times a supporter of Victor Emmanuel. After the establishment of the Kingdom of Italy, he was Minister of the Interior under Depretis (1876-77), and again during the Premiership of Rudini (1891-92).

NICOTIANA. See **TOBACCO**.

NICOTINE (Fr. *nicotine*, Sp. *nicotiana*, from Fr. *nicotiane*, tobacco, named in honor of Jean Nicot), $C_{10}H_{11}N_2$. One of the vegetable alkaloids that contain no oxygen; it constitutes the active principle of the tobacco plant, in the leaves, roots, and seeds of which it occurs in combination with malic and citric acids. The smoke of burning tobacco-leaves contains but a mere trace, if any, of nicotine; which does not prove, however, that tobacco smoke is harmless, for its other ingredients are probably more or less injurious to health. Nicotine is a colorless, intensely poisonous liquid, of specific gravity 1.027 at 66° F.; it boils at 466° F. (241° C.), evolves a very irritating odor of tobacco, especially on the application of heat, is very inflammable, and burns with a smoky flame. It is moderately soluble in water, but dissolves readily in alcohol and ether. If exposed to the air, it absorbs oxygen and becomes brown and ultimately solid. The quantity of nicotine contained in tobacco varies from 2 to 8 per cent.; the coarser kinds containing the larger quantity, while the best Havana cigars seldom contain more than 2 per cent., and often less. Turkish tobacco scarcely contains any nicotine at all.

The principal physiological effects of even minute doses of nicotine are as follows: intense gastro-intestinal irritation, among the symptoms of which are nausea and vomiting, accompanied by great muscular weakness, a rapid, feeble pulse, coldness of extremities, and extreme general collapse; the motor nerves and the respiration are rapidly paralyzed, and death may ensue within three minutes of taking a dose of the poison. See also **ALKALOIDS**.

NICOYA, *nē-kō'yā*, GULF OF. An inlet of the Pacific Ocean, on the west coast of Costa Rica, formed by a peninsula ending in Cape Blanco

(Map: Central America, E 6). It is about 60 miles long and 20 to 30 miles wide, and is lined on both sides with high and picturesque mountains. On its eastern shore lies Punta Arenas, the only port of entry on the Pacific coast of Costa Rica.

NICTHEROY, nêk'ta-roí'. A town of Brazil, in the State of Rio de Janeiro. It is situated on the east side of the entrance to the bay, opposite the city of Rio de Janeiro (Map: Brazil, II 13). The town is not attractive, but it is surrounded by delightful suburbs, where the residences of the wealthy classes are situated. Prior to 1894 Nictheroy was the capital of Rio de Janeiro. The population was estimated in 1898 at 26,000.

NICUM, JOHN (1851—). An American clergyman and author, born at Winnenden, Württemberg. He studied at Muhlenberg College, Allentown, Pa., and at the Philadelphia Theological Seminary. In 1876 he became pastor at Frookville, Pa., but two years later removed to Philadelphia, where he remained two years, and then went to Syracuse, N. Y. In 1887 he took charge of the Saint John's Evangelical Lutheran Church in Rochester. His books include *History of the New York Ministerium* (1884), and *Confessional History of the Lutheran Church in the United States* (1891).

NIDIFICATION (from Lat. *nidificare*, to make a nest, from *nidus*, nest + *facere*, to make). Strictly, the act and process of nest-building. In the present article, however, the word will be broadly interpreted, so as to include the entire series of acts, instincts, and adaptations connected with the provision of a temporary breeding-home, *nidus*, or 'nest' for their eggs, embryos, or young, and the care of offspring, by the parents of animals generally.

A nest differs from an animal's ordinary residence in that it is not made primarily for the animal's own use, but for that of expected young. In some instances it is mainly a convenient lying-in place for the mother; in others, merely a means for the safety and comfort of eggs or helpless embryos; but often it combines these purposes and adds to them that of a nursery. The last phase is illustrated by certain social insects, some birds, a few mammals, and in human society. In the lowest ranks of invertebrate life, and to some extent among animals of comparatively high organization, the eggs, or 'spawn,' are simply voided into the water or earth and left to survive or perish, unregarded by the parent. Some animals, however, produce comparatively few eggs, protected against many dangers by being placed within one or more envelopes or 'capsules.' (See *Egg*.) Another widespread method is that of retaining the embryo in the maternal body until it is able to shift for itself. This is seen in many invertebrates and in some fishes. These animals are therefore known as *ovoviviparous*.

MATERNAL CARE OF EGGS. An advance upon this is made by a large class of creatures which carry their eggs about with them until they hatch, and in some cases even continue to care for the young, although they make no nest. Examples of this are to be found in all classes of animals, from mollusks and crustaceans up to a few of the lowest birds; and some of the brooding habits and physical adaptations thus

manifested are surprising. Thus the female argonaut (q.v.) has developed an elaborate boat-like shell in which her eggs and embryos rest secure; the violet-snail (*Janthina*, q.v.) drags hers beneath a raft; and other instances are citable. Spiders' eggs are covered with silk, forming a bag or ball of various shapes and colors. (See *SPIDER*.) Crustaceans almost universally keep their eggs with them. Some insects inclose their eggs in packets and take care of them, much as do the crabs, but most insects simply deposit their eggs so that the resulting larvæ shall be within reach of suitable food, and do not know what becomes of them. It is not until the highest grades of Hymenoptera are reached—the wasps, bees, and ants—that anything which may be called a 'nest' is made in preparation for the eggs or young, or any parental care is exerted. (See *ANT*; *BEE*; *WASP*; *INSECT*, paragraph *Social Insects*.) The equal of this is hardly to be found among vertebrates until man is reached—and even then only among men in a somewhat advanced stage of culture.

FISHES AND REPTILES. Among fishes a certain amount of instinct is adapted to the best interests of the young. Thus many kinds migrate long distances to seek the water or food proper for the young, but, a suitable general surrounding having been obtained, little or no further care is taken. Only a few species build nests. Certain kinds make very crude nests, such as the hollow scooped out in the sand on some warm, clean, sunny bottom by the male sunfish (see *BASS*; *SUNFISH*), or the more elaborate structures of sticklebacks and gobies (qq.v.). Amphibians and reptiles rarely make anything which may be called a nest, but some care for their eggs in very curious ways elsewhere described.

BIRDS. The nest-making of birds is most familiar and perfect, yet it is only among the higher forms that it is manifested to any great extent. In no respect is there greater diversity among birds than in the structure of the nest. As a rule, its character is closely associated with the intelligence of the bird, modified more or less by the necessities of the situation and the structure of the bird's bill and feet. The nests of ostriches and other *Ratitæ* are mere accumulations of sand or earth, or cavities scraped in the ground. The nests of the lowest water-birds consist of burrows in the ground, or the eggs are laid on the bare earth or rock. Good examples are the guillemots (q.v.). The king-penguin treats its eggs in the same way. Among those a little higher in the scale, nests of sea-weed and coarse grass loosely put together make a home for the young. Most of the ducks and geese build nests of grass, and often include feathers from their own bodies, a habit carried to the extreme in the eider-duck (q.v.). Few of the wading birds build nests, the herons coming nearest to it with a platform of sticks. The grouse and quail, turkey and pheasant, all scrape together nests of leaves and grass on the ground. The allied mound-birds are remarkable for collecting great heaps of decaying vegetable matter, in which the eggs are laid, the heat caused by the decay ripening them. Doves and pigeons usually build a very frail nest of twigs, but a few species are ground breeders. Eagles, hawks, and vultures construct coarse, heavy nests of sticks and twigs on large trees or cliffs, while owls often resort to hollows in

PENSILE NESTS OF BIRDS



1. AUSTRALIAN FLOWER-PECKER (*Dicaeum hirundinaceum*).
2. EUROPEAN PENDULINE TITMOUSE (*Egithalus pendulinus*).
3. BRAZILIAN CRESTED CACIQUE (*Ostinops citrius*).

4. INDIAN TAILOR BIRD (*Orthotomus sutorius*).
5. RED-EYED VIREO (*Vireo olivaceus*).
6. BALTIMORE ORIOLE (*Icterus galbula*).

trees, or to the deserted burrow of some mammal, especially the prairie dog. Parrots, woodpeckers, kingfishers, mouse-birds, todies, and some others lay their eggs in holes in trees, or in earthen banks, with little or no bedding. Humming-birds (q.v.) build the most delicate and beautiful nests known; and swifts extraordinary ones, consisting largely of mucilaginous saliva. (See CHIMNEY SWIFT; SALANGANE.) Many song-birds build on the ground, where the nest is more or less cleverly concealed, but the great majority build in trees or bushes. The most remarkable nests built by any birds are those of the American orioles or hangnests, and more especially of the weaver-birds (q.v.) of Africa and the East Indies.

The perfection of many nests for the purposes to which they are put, and the ingenuity, skill, and apparently æsthetic sentiment displayed by many birds, long ago led to some study and much speculation. An excellent book was made upon the subject early in the nineteenth century—Rennie's *Architecture of Birds* (London, 1831). He divided his subjects into such classes as ground-nesters, squatters, and miners; builders of mounds, of umbrellas, of domes; masons; carpenters; platform-makers; basket-makers; weavers; tailors; felters; and cementers. This was purely artificial, but did well enough so long as nests and eggs were treated as things separate from the bird itself. About forty years later Wallace included in his book *Contributions to Natural Selection* (London, 1870) an essay on "A Theory of Birds' Nests," in which he discussed the subject from an evolutionary point of view, showing the analogy between the method of birds and primitive men in meeting their diverse requirements of shelter out of the materials most available. Wallace places birds' nests in two great classes—a functional, not a structural, classification. The first class includes those in which the eggs, young, and brooding parents are not exposed. To this group belong nests that are built in natural covers, such as holes in trees or in banks and cliffs, as well as nests covered by the bird, such as the suspended nest of the American orioles. To the second class belong the nests of the ordinary type, cup-shaped and open above, so that the eggs, young, and brooding females are exposed. This contrast in method of nidification, as he believed, correlated with the color of the female. As he says: "When both sexes are of strikingly gay and conspicuous colors the nest is of the first class, or such as to conceal the sitting birds; while, whenever the male is gay and conspicuous, and the nest is open so as to expose the sitting bird to view, the female bird is of dull or obscure colors." The comments and criticisms upon this theory by the Duke of Argyll, by Prof. A. Murray, and by J. A. Allen (*Bulletin Nuttall Ornith. Club*, vol. iii., Cambridge, 1878), and by others more recently, show that it is not so universal in its application or fully explanatory as its author considered it. The hypothesis was restated, with improvements, by Wallace, in *Darwinism* (New York reprint, 1889).

The more recent philosophic view, well summarized by Chapman (*Bird Life*, New York, 1898), is that, apart from and above the various considerations already mentioned, the necessity for protection of the eggs and young from physical accidents, loss of heat, and seizure by

enemies is the real motive; and the superior excellence as cradles of the nests of birds of the higher orders is explained by the fact that these orders are 'altricial'—that is, their young are born in a helpless condition, must be cared for by the parents for a considerable time, and hence both old and young need much better and safer quarters than do the 'precocial' birds, whose young (e.g. chickens) run about at birth and have no need of a nursery.

Wallace also treated of the belief formerly prevalent that birds work by instinct and never make any improvement during their lifetime in nest-building. He asserted that the chief mental faculties so exhibited by birds are the same in kind as those manifested by mankind in the formation of their dwellings; that is, essentially, imitation, and a slow and partial adaptation to new conditions. In answer to the objection that it is not so much the material as the form and structure of nests that varies, Wallace replied that such diversities may be explained in a great measure by the general habits of the species, the nature of their tools, the materials they can most easily obtain, and differences of habitat and needs that may have occurred within the period of existing species, due to changes in climate, the earth's surface, food, and so forth. Birds learn something, doubtless, in regard to the size, structure, and material of the nest of their own species before they leave it. Wallace quotes a number of cases of birds reared in the nests of other birds that sang only the song of the foster parent, learned while in the nest. Then, too, young birds do not always mate with birds of their own age, and the young bird learns nest-building from its more experienced mate. It is not unusual to see one bird of a pair, say an English sparrow, rediposing the material that the other bird has just put in place. Several observers have stated that young birds build less perfect nests than old birds, and Wallace quotes one instance in which some young chaffinches were taken to New Zealand and there set free. They built a nest in the new home which showed "very little of that neatness of fabrication for which this bird is noted in England." It is an oft-repeated observation that the nests of the Baltimore oriole, when built near the habitations of man, differ in shape and structure from those in the wilds where twine and threads are not at hand, and where there is more necessity of concealment from hawks and snakes. The swallows and swifts of all parts of the world are quick to change their nesting places from hollow trees and rocky cliffs or caverns to the porches, barns, and chimneys of men's habitations, and changes in the style of their architecture follow. The nests of house wrens and purple martins vary with the situations chosen. The orchard oriole may build a shallow nest in stout branches or deep ones in swaying willows. Many similar instances of change in form and material might be adduced. "Children and savages imitate before they originate; birds, as well as all other animals, do the same," so when the environment remains constant, the form and constructive material of birds' nests vary little.

BROODING OF BIRDS. The eggs of birds are hatched by the steady application of warmth for a sufficient time to mature the embryo to the stage when it breaks from the shell. This

necessary warmth (about 105° F.) is secured by the bird covering the eggs with its body, 'sitting' upon or 'incubating' them almost continuously for a length of time which in a general way is proportioned to the bird's size. No very extended and accurate observations on this point have been recorded; the best are those by Evans in *The Ibis* (London) for 1891 and 1892. Broadly speaking, most of the small song-birds hatch their young in from 13 to 15 days, but the very smallest may take less time—the humming-bird, it is said, only 10 days. In canaries, it is from 15 to 18 days; in the common fowl, it is 21 days; in the duck, it is from 28 to 30 days; in the guinea-fowl, it is 28 or 29 days; in the turkey, 30 days; and in the swan, from 40 to 45 days. The emeu is said to sit 50 days. Small altricial birds usually begin sitting after the first egg is laid; but game-birds and water-fowl rarely begin to sit until the whole clutch is in the nest, so that the whole brood shall hatch simultaneously.

It is in most birds the function of the female to perform the duties of incubation, during which she is to a greater or less extent defended, fed, and cheered by her mate. Twice or oftener each day she leaves the nest for rest and to get food, and the male takes her place for an hour or two. It sometimes happens that if she is killed, the male concludes the process of incubation and cares for the young. In some groups he does the entire duty of sitting. This seems to be universally true of the ostrich and other ratite birds, and is the practice of the godwits, phalaropes, and certain other shore-birds. Both sexes join in the care of the young at first, but in most cases their education is gradually left entirely to the mother.

NESTS OF MAMMALS. Among the mammals, a 'nest' in the present sense of the word is not common. The female, when about to bring forth young, is either already in a den or lair which has been a family residence during the winter or is permanently so, or else requires no more accommodation than a retired corner in the midst of a thicket or beneath a sheltering rock. Squirrels, wood-rats, and mice (q.v.), however, often construct in bushes and trees, or among tall grass or low brush, globular nests of leafy twigs or of grass in which the young are born. The 'lodges' of the beaver, muskrat, coypu, and the like, elsewhere described, are family houses in which the protection of the young is probably the prime desideratum. Hardly different, and by no means so elaborate, are the platforms or 'nests' of the anthropoid apes, and especially of the orangs (q.v.), where the young are born, but in which they do not long remain. There is, however, little to choose between these structures, or their advantage to the young, and those of many nomadic savages, such as the aboriginal Bushmen of South Africa, the northern Australians, or the Indians of the Utah Basin and deserts of Arizona and Chihuahua.

Consult standard works on zoölogy, especially *Cambridge Natural History*, vols. iii.-x. (London, 1898-1902); and Newton, article "Nidification," in *Dictionary of Birds* (London and New York, 1893-96). See also works cited under Egg.

NIEBUHR, něbūr. BARTHOLOMÆUS GEORG (1776-1831). A German historian, critic, and philologist, born August 27, 1776, at Copenhagen,

where his father, Carsten Niebuhr, then resided. He showed singular aptitude for learning in his earliest youth, and his powers of acquiring knowledge kept pace with his advancing years. After preliminary education, under the superintendence of his father, he studied law and philosophy at Kiel, and then went to Edinburgh, where he devoted himself more especially to the natural sciences. On his return to Denmark he became private secretary to the Finance Minister, Schimmelmann, and from that period held several appointments under the Danish Government, being made director of the Government bank in 1804. He entered the Prussian civil service in 1806, and during the three succeeding years he shared in the vicissitudes which befell the Government of his chief, Count Hardenberg. The opening of the University of Berlin in 1810 opened a new era in the life of Niebuhr. He resigned his Government position and gave at the university a course of lectures on Roman history, which, by making known the results of the new critical methods which he had applied to the elucidation of obscure historical evidence, established his position as a leader in the scientific study of history, and effected an important change in historical method. In 1813 he reëntered the Government service. Appointed in 1816 Prussian Ambassador at the Papal Court, Niebuhr was enabled to verify many of his conjectures and test his methods by the actual sources of ancient Roman history. On his return from Rome in 1823, Niebuhr took up his residence at Bonn, where he delivered classical and archaeological lectures and expositions. The Revolution of 1830 again stirred his interest in public affairs. He died January 2, 1831. Niebuhr's scholarship was broad, vigorous, and independent. He was an accomplished linguist and a philosophical and scientific thinker. He was a path-breaker in the modern method of historical criticism, and while all his conclusions are not accepted to-day, he showed the way by which they might be tested in the light of more complete knowledge. He was the founder of the *Rheinisches Museum* at Bonn. Among his important works are: *Römische Geschichte* (3 vols., Berlin, 1811-32; new ed. 1873; the first two volumes translated by Hare and Thirlwall, and the third by Smith and Schmitz); *Griechische Heroengeschichte* (1842; 11th ed. 1896), written for his son Marcus; *Geschichte des Zeitalters der Revolution* (1845). The *Kleine historische und philologische Schriften* (1828-43) contain his introductory lectures on Roman history, and many of the essays which had appeared in the transactions of the Berlin Academy. Besides these, and numerous other essays on philological, historical, and archaeological questions, Niebuhr coöperated with Bekker and other learned annotators in reëditing the *Scriptores Historiæ Byzantinæ*; he also discovered hitherto unprinted fragments of classical authors, as, for instance, Cicero's *Orations*, and portions of Gaius; published the *Inscriptiones Nubienses* (Rome, 1821); and was a constant contributor to the literary journals of Germany. His *Lectures on Ancient History* are familiar in English translation. Consult: Winkworth, *Life and Letters of Niebuhr* (London, 1852); Lieber, "Reminiscences of an Intercourse with Niebuhr," in *Miscellaneous Writings* (Philadelphia, 1884); and for his biography, Classen (Gotha, 1876) and Eyssenhardt (ib., 1886).

NIEBUHR, CARSTEN (1733-1815). A German traveler, father of the preceding, born at Lüdningworth in Hanover, where his father was a small farmer. He entered the University of Göttingen, and in 1760 became a lieutenant of engineers in the Danish army. The next year he sailed with the expedition sent out by Frederick V. of Denmark to explore Egypt, Arabia, and Syria. His companions, the best known of whom was the naturalist Forskål (q.v.), all died of hardship or disease, but Niebuhr continued alone and only after six years of wandering did he return to Europe. The results of his observations appeared in *Beschreibung von Arabien* (1772); *Reisbeschreibung von Arabien und andern umliegenden Ländern* (1774-78); and *Reisen durch Syrien und Palästina* (1837). He also brought out the results of Forskål's work under the titles *Descriptiones Animalium* (1775), *Flora Egyptiaco-Arabica* (1776), and *Icones Rerum Naturalium* (1775-76); and contributed a number of papers to the German periodical *Deutsches Museum*. The accurate observation and the unswerving truthfulness of their author place these works among the most reliable books on the lands which they describe. In 1778 Niebuhr entered the civil service and removed from Copenhagen to Meldorf, in Holstein, where he died. Consult *Carsten Niebuhrs Leben* (1816), by his son, Barthold Georg Niebuhr, an English version of which, by Mrs. Sarah Taylor Austin, was published in the *Lives of Eminent Persons* (London, 1833).

NIECKS, nēks, FREDERICK (1845-). A British musician, critic, and writer, of German birth and parentage. He was born in Düsseldorf, and studied under native teachers. When twenty-three years of age he moved to England, and became organist at Dumfries, and played viola in A. C. Mackenzie's string quartet. He subsequently became critic for the *Monthly Musical Record* and Novello's *Musical Times*. He was appointed professor of music in Edinburgh University, and was considered one of the highest musical authorities in Great Britain. His works include: *Dictionary of Musical Terms* (1884); *Frederick Chopin as a Man and Musician* (1888).

NIEDERMEYER, nē'dēr-mī'ēr, LOUIS (1802-61). A Franco-Swiss composer, born at Nyon, Switzerland. He studied under Moscheles and other eminent masters at Vienna and Rome. His first opera was produced at Naples, but of several composed by him, *Stradella* (1837) was the only one which had success. He also set to music a number of songs by Victor Hugo, Lamartine, and Manzoni. Dissatisfied with the meagre success of his secular work, he turned to church music and achieved real success. The Ecole Niedermeyer, founded by him, subsequently came under Government subvention, and equally favorable results attended his journal *La Maîtrise*, which became a very influential musical factor. He died in Paris, and a bust of him has been placed in the foyer of the Grand Opéra.

NIEDERWALD, nē'dēr-vālt. The finely wooded western spur of the Taunus, in the Prussian District of Wiesbaden, near the Rhine. Its height is 1115 feet. On it, opposite Bingen, stands the national monument commemorating the war of 1870-71 with France. The pedestal, 82 feet in height, is richly decorated with reliefs and allegorical figures. On it stands a

bronze figure of Germania, 34 feet high, holding the Imperial crown, typifying the formation of the Empire. The monument is the work of the Schilling of Dresden. It was unveiled on September 28, 1883, when an anarchistic plan for dynamite explosion was frustrated by the damp weather. The two ringleaders of the attempt were executed in 1885. Two railways lead to the monument from Rüdelsheim and Assmannshausen, famous for their wines.

NIEDNER, nēt'nēr, CHRISTIAN WILHELM (1797-1865). A German ecclesiastical historian. He was born at Oberwinkel, near Waldenburg; studied theology at Leipzig; and was professor there (1829-49) and afterwards at Berlin (1859-65). His *Geschichte der christlichen Kirche* (2d ed. 1886) shows a remarkably minute acquaintance with materials, but is composed in a peculiarly abstract and difficult style. For the last twenty years of his life, Niedner was an editor of the *Zeitschrift für die historische Theologie*.

NIEHAUS, nē'hous, CHARLES HENRY (1855-). An American sculptor, born in Cincinnati, Ohio. He studied at the McMicken School of Design there, and in Munich, where his "Fleeting Time" won the first medal ever awarded to an American. He returned to America in 1881, and two years afterwards made statues of Garfield for Cincinnati, and of William Allen for the Capitol in Washington. Both these works are massive and dignified, and are fine portraits. From 1881 until 1843 he was in Rome, and upon his return to America he settled in New York City. His other works include: the Lee monument at Richmond (1886); "The Scraper" (1893); the statues of Hooker and Davenport, in the Connecticut State Capitol; and the bronze doors for Trinity Church, New York City, given in memory of John Jacob Astor. The six reliefs of religious and historical subjects which decorate these doors are fine examples of delicate and skilled workmanship. The colossal statues of Gibbon and Moses, for the Congressional Library in Washington, are also works notable for strength and simplicity. He was awarded first prize in the competition for the memorial to Samuel Hahneman, in Washington, D. C. Other works that should be mentioned are the pediment of the Appellate Court building, New York City, and two large groups representing Mineral Wealth at the Pan-America Exposition of 1901.

NIEL, nē'el', ADOLPHE (1802-69). A French marshal. He was born at Muret, Haute-Garonne, and educated at the Ecole Polytechnique and at the military academy of Metz. He became lieutenant of engineers in 1827, captain in 1835, and served in Algeria in 1836-37, gaining the rank of *chef-de-bataillon* by his courage. He commanded the engineers in the army of Oudinot, which put an end to the Roman Republic in 1849, and became brigadier-general and director of the engineer department in the Ministry of War. As general of division he conducted the operations which destroyed the Russian fortress of Bomarsund in August, 1854. At the head of the engineers in the Crimea, he directed the siege operations around Sebastopol. During the Italian War of 1859 his services at Magenta and Solferino made him marshal. In 1867 he became Minister of War.

NIELLO (It., blackish). A black substance capable of being ground fine and also of being

melted by a moderate heat. The ingredients are essentially silver and sulphur, but other metals are melted with the silver before the sulphur is added. It is used as enamel is used, to fill up incised lines and patterns, the metal background being nearly always silver. Thus the top and sides of a silver box may be engraved with elaborate ornaments in scrolls, conventional flowers, and the like: the separate parts are heated, the powdered niello is spread over the whole surface, and as it melts, fills every incision, even the finest lines and points. The metal is then cleaned and polished: so that the smooth surface shows a black pattern on a plain silver ground. In some modern work the black pattern is slightly in relief: this suggests the application of the ground and nearly fused niello by hand to the actual lines of the pattern.

The art of working in niello dates from antiquity. It was in common use under the Byzantine Empire, and this tradition has been inherited by the modern Russians, together with so many other forms of decorative art. It was also practiced in Western Europe throughout the Middle Ages, though it was less popular than enamel. A great deal of altar plate and similar decorative objects belonging to the Christian ritual were adorned by niello. The metal-workers of India have always employed the art with high success. Consult: Ottley, *History of Engraving* (London, 1816); Duchesne, *Essai sur les nielles gravures des orfèvres florentins du XV^{ème} siècle* (Paris, 1826); Waterton, "On Niello," in *Archæological Journal*, vol. xix. (London, 1862); Passavant, *Le peintre-graveur* (Leipzig, 1860-64); Labarte, *Arts of the Middle Ages* (2d ed., Paris, 1872-75); Davenport, "Niello Work," in *Journal of the Society of Arts*, vol. xlviii. (London, 1901).

NIEM, nēm (or **NIEHEIM**), DIETRICH VON (1340?-1418). A German chronicler, born in the town of Nieheim, in the mediæval Bishopric of Paderborn. He received office under the Papal Curia at Avignon, and went with it to Rome in 1376. In 1395 he was made Bishop of Verden (Hanover) by Boniface IX. He appears to have been forced from this dignity by disputes, and in 1403 is met with as *abbreviator* in the Papal Chancery. During the subsequent discussions which harassed the Church, he insisted on internal reforms. He wrote in this connection his three books, *De Schismate* (completed in 1410; printed in 1532, and subsequently), a vivid history of the events of the years 1376-1410. This with others of his works, such as the *Historia de Vita Joannis XXIII.* (1682), and the *Nemus Unionis* (incorporated with the Basel 1566 edition of the *De Schismate*), forms an important source for historical investigation. Consult the *Life* by Sauerland (Göttingen, 1875).

NIEMANN, nē'män, ALBERT (1831-). A German dramatic singer, born at Erxleben. He was at first a singer in the chorus at Dessau. After a thorough training under Schneider and Nusch, his voice (tenor) attracted the attention of the King of Hanover, who took him into his service. Wagner selected him to sing in *Tannhäuser* on its first production in Paris in 1861. He sang in the United States, and was remarkable for his ability in the dual rôle of vocalist and actor. He retired from the stage in 1889.

NIEMBSCH VON STREHLENAU, nēmsh fōn strā'le-nou, NIKOLAUS. See **LENAU**, NIKOLAUS.

NIEMCEWICZ, nyēm-tsa'vich, JULIAN URSYN (1757-1841). A Polish author and statesman, born at Skoki, Lithuania. After graduating from a military school he entered the army at twenty as an adjutant and became major in 1788, when he was sent as Deputy to the Polish Diet. With a colleague he published the *People's Paper*, and was the framer of the so-called 'Constitution of the 3d of May,' making monarchy hereditary in Poland (1791). He was Kosciuszko's adviser and aide, and was severely wounded at Maciejowice and taken prisoner with his chief (1794). While in the fortress of Saints Peter and Paul in Saint Petersburg, he translated Pope's *Rape of the Lock* and Gray's *Elegy*. Released by Paul after two years, he came with Kosciuszko to the United States, where he married Mrs. Livingston Kean of New York. On the report of Napoleon's entrance into Poland, he left America for his fatherland in 1807. The King of Saxony appointed him secretary of the Senate in the new Duchy of Warsaw, as well as inspector of schools and member of the Supreme Council of Public Instruction. When Poland came under Russia's control, he was retained in office by Alexander I., but he did not lose faith in the restoration of Poland, and took a most active part in the events of 1830, after which he went into exile. He died in Paris. His *Historical Ballads* (1816-19) which aroused the national consciousness of the Poles, have retained much of their hold on the public, and his *Meditations at Ursynow* are his best lyric poems. *The Envoy's Return*, among his dramatic works, and his novel of manners, *Johann of Tenczyn*, enjoyed a great vogue. The *History of Sigismund III.'s Reign* (latest ed. 3 vols., Breslau, 1836) and a *Collection of Memoirs on Ancient Poland* are valuable for the material collected. A collection of his works was published in Leipzig (1838-40), but it is incomplete. Consult a biography in Polish, by A. Czartoryski (Berlin, 1860).

NIEMEN, nē'men, *Pol. pron.* nyēm'ën. A river of Russia and Prussia (Map: Russia, B 3). It rises near the city of Minsk, and flows westward to Grodno, where it becomes navigable. Thence it flows northward, forming the boundary between West Russia and Poland; turning again westward at Kovno, it enters East Prussia, where it takes the name of Memel, and empties into the Kurisches Haff through a large compound delta beginning near the city of Tilsit. Its total length is 490 miles. It is of considerable commercial importance, being the outlet for large quantities of timber and grain from Russia. Its navigation is extended through several canal systems. Its banks are mostly low and often marshy, and in the delta they are protected from inundations by large dikes.

NIEMEYER, nē'mi-er, AUGUST HERMANN (1754-1828). A German educator and theologian. He was born at Halle, and after finishing his studies was appointed professor of theology in the university (1779). In 1807 Niemeyer was carried to France a prisoner of war. A year afterwards, on his return, he became rector of the University of Halle, and its chancellor. As a theologian, he held to a moderate rationalism;

but even his theological works were tinged with the views of an educator, and in the latter character he did his most important work. Among Niemeyer's works, the chief are: *Charakteristik der Bibel* (1775-82); *Handbuch für christliche Religionslehrer* (1805-07); and *Leitfaden der Pädagogik und Didaktik* (1802).

NIEMEYER, FELIX VON (1820-71). A German physician. He was born at Magdeburg, where he practiced medicine after studying at Halle, Prague, and Vienna. At the time of the cholera epidemic of 1848-49 he published *Die symptomatische Behandlung der Cholera mit besonderer Rücksicht auf die Bedeutung des Darmleidens*. In 1853 he became head of the medical department of the city hospital at Magdeburg, and two years afterwards was appointed professor at Greifswald, whence in 1860 he went to Tübingen. Niemeyer's great work, *Lehrbuch der speziellen Pathologie und Therapie* (1858 sqq.; 11th ed. 1884), met with immediate success and proved one of the most important medical works of the century.

NIEPCE, né'eps', JOSEPH NICÉPHORE (1765-1833). A French scientist, born at Chalon-sur-Saône. He entered the Revolutionary army in 1789, but two years later was compelled to resign because of ill health, and in 1795 became civil administrator of the District of Nice. In 1801 he returned to his native town and thenceforth devoted himself to the study of chemistry and mechanics. During the following years he made a number of inventions, and in 1813 turned his attention to the production of pictures upon metal plates by means of light. In 1824 he discovered a process by which he could fix the images of the camera obscura. Two years later he entered into relations with Daguerre, and in 1829 the two formed a partnership to "coöperate in perfecting the discovery invented by M. Niepce and perfected by M. Daguerre." Article V. of their agreement says that Niepce gave "his invention" and Daguerre "a new contrivance of the dark chamber, his talents, and his education;" so that if the title "inventor of photography" can be applied to any one man it seems that it should go to Niepce. He died at Gras, near his birthplace, poor and comparatively unknown. He wrote *Notice sur l'héliographie* (1829). Consult: Ernouf, *Les inventeurs du gaz et de la photographie* (Paris, 1877); and Fouqué, *La vérité sur l'invention de la photographie: Nicéphore Niepce* (ib., 1867).

NIEPCE DE SAINT VICTOR, de sän vèk'tör', CLAUDE MARIE FRANÇOIS (1805-70). A French photographer, born at Saint-Cyr, near Chalon-sur-Saône. He served in the army, and was appointed in 1854 second commandant of the Louvre. The discoveries in photography made by his uncle, Nicéphore Niepce, jointly with Daguerre, had attracted his attention to that art, and he succeeded in bringing out himself a number of interesting inventions. He was the first to use albumen for photographic purposes, and was one of the first to try photography on glass and to produce steel-engravings by a photographic process. He also succeeded in obtaining colored images, which he named *heliochromes*; the colors, however, were fugitive. In 1855 he published the various memoirs in which he had at different times communicated his discoveries to the Academy of Sciences, under the title of

Recherches photographiques, which was followed in 1856 by *Traité pratique de gravure sur acier et sur verre*.

NIESE, nē'ze, BENEDICTUS (1849—). A German classical philologist and historian. He was born at Burg, on the island of Fehmarn, in Schleswig-Holstein, and in 1877 he became professor in the University of Marburg. His publications include: *Flavii Josephi Opera I.-VII.* (Berlin, 1885-95); *Grundriss der römischen Geschichte* (2d ed., Munich, 1897); *Geschichte der griechischen und makedonischen Staaten* (Gotha, 1893-99); *Flavii Josephi Antiquitatum Epitoma* (Berlin, 1896); *Kritik der beiden Makkabäerbücher* (ib., 1900).

NIETZSCHE, nēt'she, FRIEDRICH (1844-1900). A German philosophic writer, one of the most daring thinkers and charming stylists of the nineteenth century. He was born at Röcken, near Leipzig, son of a Protestant pastor of the village, who died when the precocious boy was five years old. He was brought up by his mother at Naumburg on the Saale; studied at the noted State school at Pforta, and then devoted himself to the study of the classics in the universities of Bonn and Leipzig. At twenty-five, on the recommendation of Ritschl, he became professor extraordinarius of classical philology at Basel, and shortly afterwards was promoted to be professor ordinarius there—a post which he was forced to resign in 1879 because of an affection of his eyes. Meanwhile Nietzsche had made the acquaintance of Wagner and become an ardent advocate of Schopenhauer's theories of art. During this period, which was brief and immature, the only work of importance he wrote was *Geburt der Tragödie aus dem Geiste der Musik* (1872), in which he maintained that both Dionysiac (orgiastic) and Apollonic (temperate) motifs contributed to the origination of Attic tragedy. The book might be termed a defense of Wagner's programme. But shortly thereafter came a breach between Nietzsche and Wagner, said to be due to Wagner's compromises with success. With the loss of faith in Wagner, he lost faith in God and in Christianity, in traditional morality, and in current human ideals, and ended by deifying passion and despising reason. He went so far as to say that the untruth of a view is not a valid objection to it if only it be useful, and that the falsest views are often the most useful. Satisfaction of instincts became his ideal; we must, he maintained, at all hazards realize the will to dominate (*der Wille zur Macht*). The moral man who lives for others is a weakling, a degenerate. The lordly egoist who exploits other men and rises on stepping stones of their dead selves to higher things is the proper human ideal, the over-man (*Uebermensch*). The evolution of Nietzsche's thought, which culminated in this idealization of the inhumane victor in the struggle for existence, can be traced in his *Menschliches, Allzumenschliches, ein Buch für freie Geister* (1876-80); *Morgenröthe, Gedanken über moralische Vorurtheile* (1881); *Also sprach Zarathustra* (1883-84); *Jenseits von Gut und Böse* (1886); *Zur Genealogie der Moral* (1887); *Der Fall Wagner* (1888); and *Gotzendämmerung* (1889). Among his other works should be mentioned *Der Wille zur Macht, Versuch einer Umwertung aller Werte* (1896). Of this book the first part is entitled *Der Antichrist*, where

the author traces the history of the world, showing the part played by tawny brutes and tawny heroes in the great struggle for power, and representing might as right, a right overthrown by the slavish and false concepts of the Jewish Nazarene. After Nietzsche left Basel he lived for several years in Turin; in 1889 it became evident that his brain was affected, partly due to hereditary causes and partly to the abuse of soporifics. He retired to his mother's home near Weimar, where he was cared for by his sister until his death. As can be seen from the above sketch of the course of his philosophical development, Nietzsche accepted the struggle for existence as an ultimate fact which man ought not to attempt to ameliorate. It is only the slavish spirit which attempts to modify the inevitable natural process of the elimination of the unfit. This attempt to stem the tide of natural evolution results in the servile morality (*Sklavenmoral*) characteristic of the present day. Nature's morality is the morality of the ruthlessly strong hero (*Herrenmoral*). This view is the inevitable outcome of an uncritical acceptance of the merely physical 'is' as the moral 'ought.' Its philosophical significance lies in its exhibiting in undisguised form the logical consequences, for a Darwinian, of the principle that whatever is, is right. His popularity is due partly to this hyper-Darwinianism, but more largely, since such a doctrine is against the predominant spirit of humanity of the present age, to his fascinating literary style. He is a great prose poet, and if we may judge from a volume of early verse, *Gedichte und Sprüche* (1897), in tone a revolt against the lyric tradition of Heine, he might have been a great lyricist. Richard Strauss (q.v.) has founded one of his most famous tone-poems upon *Also sprach Zarathustra*. A complete edition of his works was begun at Leipzig in 1895; an English version under the editorship of Tille is incomplete. Consult the biography by his sister, Frau Förster-Nietzsche (Leipzig, 1895, sqq.), and appreciation in Riehl, *Friedrich Nietzsche, der Künstler und der Denker* (Stuttgart, 3d ed., 1901); also Seth, *Man's Place in the Cosmos* (2d ed., Edinburgh, 1902); Wallace, *Lectures and Essays in Natural Theology and Ethics* (Oxford, 1898); Dolson, *The Philosophy of Friedrich Nietzsche* (New York, 1901), with an excellent bibliography; Brandes, *Friedrich Nietzsche* (Frankfort, 1888); Kronenberg, *Nietzsche und seine Herrenmoral* (Munich, 1901); Eisler, *Nietzsches Erkenntnistheorie und Metaphysik* (Leipzig, 1902).

NIEUWENHUIS, nē'vən-hois, DOMELA (1846—). A Dutch Socialist, son of Domela Nieuwenhuis (1808-69), who was a prominent Lutheran theologian. The son, born at Amsterdam, studied theology, was for nine years preacher at the Lutheran Church in The Hague, and then became a leader of the Social Democrats and practically the founder of the party in Holland. In 1887 he entered the States General, but he failed of reelection in 1888. His views became more and more extreme, and he broke from the State Socialists to form with Cornelissen a free Socialist faction. Nieuwenhuis was prominent in the Socialist Congresses of Brussels (1891) and of Zurich (1893) as an opponent of Liebknecht and his motion against war and compulsory military service. In 1897, when

Recht voor allen became the property of the centralization Socialists, Nieuwenhuis started a new journal, *De vrye Socialist*.

NIEVO, nē-ā'vō, IPPOLITO (1832-61). An Italian novelist and poet, born at Padua. He studied in his native town, took part in the revolutionary disturbances of the time, and finally joined Garibaldi. His *Confessioni di un ottuagenario* (1867) holds a high place among the historical novels of the century. He also wrote *Il conte pecorajo* (1857), *Angelo di bontà* (1858), and *Poesie* (1883).

NIÈVRE, nyā'vr'. A central department of France, nearly conterminous with the former Province of Nivernais. It is named from the river Nièvre, an affluent of the Loire. It has the Loire and the Allier as its western boundary (Map: France, K 4). Its area is 2658 square miles. The eastern half is occupied by the forest-covered Morvan Mountains, and the soil is generally rocky and sandy. Forest and mineral products, the latter including coal, iron, marble, and mill-stones, form the chief wealth of the department, but stock-raising and viticulture are also important. The chief manufactures are glass and porcelain, and there are large iron and steel works. Population, in 1891, 343,581; in 1901, 323,783. The capital is Nevers (q.v.).

NIFLHEIM, nif'l-hīm (Icel., cloud-home). One of the nine separate abodes or homes of which the old Scandinavians conceived the world as consisting in the beginning of time. It is the kingdom of cold and darkness, and is separated from Muspelheim, the kingdom of light and heat, by a huge chasm (Ginnungagap, yawning gap).

NIFO, nē'fō, AGOSTINO, or AUGUSTINUS NIPHUS (c.1473-c.1538). An Italian scholar, born in the Province of Calabria. At an early age he settled at Sezza, and afterwards studied and taught philosophy at Padua, Salerno, Naples, Rome, and Pisa. Nifo at first belonged to the school of Averroës (q.v.). His commentaries, several times reprinted, were collected with his *Opuscula Moralia et Politica* in 14 volumes (Paris, 1654). Afterwards, Nifo modified his beliefs to suit orthodox doctrine, and published the writings of his master (1495-97), with notes and objections. He was charged by Leo X. to answer Pompanazzi's *De Immortalitate Animi*, and for this service he received the title of Count Palatine. His philosophical treatises, *De Immortalitate Animi* (1518 and 1524), *De Intellectu Libri VI.* (1503, 1527, 1592), and *De Infinitate Primi Motoris Quæstio* (1504), are the most important of his productions.

NIGEL, nig'el, known as NIGEL WIREKER (fl. c. 1190). A satirist who flourished toward the close of the twelfth century. He was a monk in Christ Church priory, Canterbury, and was personally acquainted with Thomas à Becket. His famous work is *Speculum Stultorum* (A Mirror of Fools), a satire in Latin elegiac verse on the clergy and society in general. The hero is Burnellus, or Brunellus, an ass, who wants a longer tail. The poem was immensely popular for centuries. Under the title, "Daun Burnel the Ass," it is quoted by Chaucer in the "Nun's Priest's Tale." Nigel also wrote several short Latin poems and a prose treatise, *Contra Curiales et Officiales Clericos*. Consult: Wright, *The Anglo-Latin Satirical Poets* (London, 1874);

and Ward, *Catalogue of Romances* (London, 1883-93).

NIGEL/Ā (Neo-Lat., fem. of Lat. *nigellus*, blackish, diminutive of *niger*, black). A genus of annual plants of the natural order Ranunculaceæ, indigenous to the Mediterranean region and the warmer temperate parts of Asia, having five colored spreading sepals, five or ten small two-lipped petals, with tubular claws; carpels more or less connected, many-seeded; leaves divided into threadlike segments, and flowers solitary at the top of the stem or branches. *Nigella damascena*, occasionally seen in gardens, is known by the names fennel flower, devil-in-a-bush, and devil-in-a-mist. The somewhat peppery aromatic seeds have been used as a substitute for spices. Those of *Nigella sativa*, nutmeg flower, a species common in grain fields in the south of Europe, are supposed to be the black cummin of the ancients, and perhaps the cummin of the Bible. The seeds of a species of *Nigella* are much used by the Afghans for flavoring curries.

NIGER, nî'jēr, or JOL'ĪBA. The third largest river of Africa (Map: Africa, D 3). It has no single native name. It is generally known, however, as the Joliba in the upper course, the Issa and Mayo in the middle, and the Kwara (Quorra) in the lower course. The Niger rises on the inner frontiers of Sierra Leone and Liberia, and flows first northeastward to Timbuktu; thence eastward along the escarpment of the Sahara Plateau; finally it turns to the south-east, which direction it maintains, with a few deviations, to its mouth. It enters the Gulf of Guinea through a vast delta extending 100 miles inland, and occupying an area of 14,000 square miles. The delta consists almost wholly of low and malarious mangrove swamps, and its size is increasing rapidly, owing to the constant inland breezes which prevent the sediment from being carried to sea. Only one of the numerous arms of the delta, the Nun, is accessible to sea-going vessels. The length of the Niger is about 2600 miles, and the incline of its bed through its whole course is very gentle, with few rapids, in which respect the Niger differs conspicuously from other African rivers. It is, however, navigable only in sections, being obstructed at several places. At Bamaku, 250 miles from its source, it is already 500 yards wide, and from here it is navigable for small steamers to Timbuktu, above which place it spreads out into a large inland delta converging in the marshy Lake Debo. Below Timbuktu it runs through a rocky gorge, where it is narrowed to a width of 300 feet, and obstructed by rapids. The greater part of its middle course lies in a desert region, where it receives scarcely any tributaries, and where vegetation flourishes only immediately along its banks. As it flows southward, however, the country becomes more and more fertile and populous. The head of permanent steam navigation is at Rabba, 460 miles from the mouth of the river, which below that point is a broad and tranquil stream 50 feet deep in the dry season, and over 100 feet deep during floods. Some distance below Rabba the Niger receives its largest tributary, the Benue (q.v.).

The chief towns or settlements on the river are, in descending order, Bamaku, Sego-Sikaro, Sansanding, Gundam, Timbuktu, Gogo, Birni,

Say, Busah, Rabba, Lakoja, and places situated in the delta.

The name Niger (*Nigris*) is mentioned by ancient writers, but did not probably refer to this river. The stream was first made known to Arabian geographers in the Middle Ages by travelers across the Sahara, but it was then believed to communicate with the Nile. It had not been seen by Europeans until Mungo Park explored its upper course in 1796. The lower course was first explored by Clapperton, Denham, and Lander in 1825-32. Consult: Baikie, *Reports on the Geographical Position of the Countries in the Neighborhood of the Niger* (London, 1863); Rohlfis, *Quer durch Afrika* (Leipzig, 1874); Thomson, *Mungo Park and the Niger* (London, 1890); Möckler-Ferryman, *Up the Niger* (ib., 1892); Trotter, *The Niger Sources and the Borders of the New Sierra Leone Protectorate* (ib., 1898); Hourst, *The Exploration of the Niger*, trans. (ib., 1898); Vandeleur, *Campaigning on the Upper Nile and Niger* (ib., 1898).

NIGERIA, or NIGER TERRITORIES. A British colonial possession in Africa, organized in 1900. It occupies the territory between the Military Territories of French Sudan (q.v.), Lake Chad, the German possession of Kamerun, the Gulf of Guinea, the British colony of Lagos, and the French possession of Dahomey (Map: Africa, E 3). It is divided into Northern and Southern Nigeria. Northern Nigeria comprises a large portion of the Fulah or Sokoto Empire, with its subordinate States of Nupe, Ilorin, Muri, Gandu, Kano, Katsena, Banchi, a portion of Adamawa, Bakundi, Donga, Takum, and Zaria, besides a part of the Kingdom of Bornu, and of the pagan confederation of Borgu. Southern Nigeria consists of what was formerly known as the Niger Coast Protectorate, supplemented by the Protectorate of Lagos and considerable acquisitions along the Cross River in the southeast. No trustworthy figures for the area of the region and for the population are available. Current estimates of the area range from 400,000 to 500,000 square miles; of the population, from 25,000,000 to 40,000,000.

The physical features of the region are as yet slightly known. The country along the gulf is, as far as 40 miles inland, swampy, and intersected by the numerous arms of the Niger and a multitude of other streams interlacing each other and lined with mangrove trees. The climate of that district is characterized by humidity and unhealthfulness. The portion north of the coast region, as far as the confluence of the Benue with the Niger, is an undulating forest country, while that north of the Niger is mostly hilly and partly covered with thin forests. The extreme north partakes of the character of the Sahara. The climate of the interior appears to be more healthful.

Agriculture is pursued mostly along the Benue River and in the plains of the interior. Cotton and many cereals are raised to some extent, but the chief articles of food among the natives are bananas and yams. The oil tree is found in abundance and the forest region is full of rubber trees and valuable woods. In its present state of development the country produces chiefly palm oil and kernels for export. Some ivory, indigo, and rubber are also brought to the southern ports from the interior. The principal means of communication are the Niger, the

Benue, and a number of smaller rivers. The principal seaports are Akassa, Old and New Calabar, and New Benin. The imports and exports for 1900-01 amounted to \$5,842,490 and \$5,679,135 respectively.

At the head of the administration of Nigeria are two high commissioners, assisted by residents. There are a supreme court, at Asaba, and a number of resident courts. The revenue is derived principally from customs duties, which are collected at the ports of Lagos and Southern Nigeria, and distributed among these two governments and that of Northern Nigeria. In 1900-01 the revenue and expenditures amounted to \$1,855,392 and \$1,481,176 respectively. The control of the British Government thus far extends only to a small proportion of the territory along the coast. The prerogatives of the Sultan of Sokoto are still recognized in a large measure.

The inhabitants of the coast region are pure negroes in a very low state of civilization. The inhabitants of the interior are also of negro descent, intermixed with some of the races of Northern Africa. They show some traces of Moorish influence. The religion is Mohammedanism tinged with fetishism. The most advanced and intelligent of the population are the Hausas (q.v.).

British settlements and trading stations were established along the Gulf of Guinea in the region of the Niger at a very early period, but these were only private enterprises without any political powers or aims. It was only with the establishment of the United African Company, reorganized into the National African Company by Sir George Goldie in 1882, that the movement looking toward the future acquisition of Nigeria by Great Britain was started. After having concluded political treaties with the native rulers the company obtained a royal charter in 1886, and its name was changed to the Royal Niger Company. The boundaries were fixed by treaties with Germany in 1885, 1886, and 1893, and with France in 1889, 1890, and 1898.

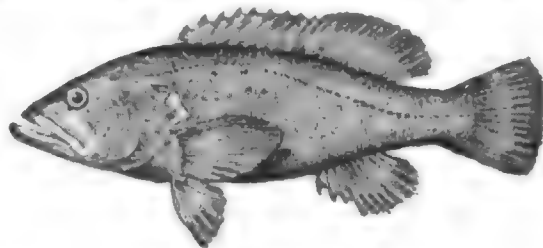
In 1884 and 1887 the territory of Nigeria was declared a British protectorate, and the seaboard region was organized into the Oil River Protectorate, and was put under the authority of a royal commissioner in 1891, the company having no jurisdiction in that part of the country. The name of the Oil River Protectorate was soon changed to Niger Coast Protectorate, and its territory was augmented by the addition of the Kingdom of Benin in 1897, and further extensions along the Cross River in the southeast. On January 1, 1900, the company surrendered its charter and the whole territory passed under the British control.

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NIGGER CHUB, or **NIGGER DICK**. A chub (*Ezoglossum maxillingua*) of the lakes and

rivers of the Middle States, distinguishable from all other cyprinids by its three-lobed under jaw. It is about six inches long, dusky greenish on the back, with a black bar behind the gill-cover. Compare **CUTLIPS** (a name also locally given to the present fish).

NIGGER-FISH. One of the many names given to the sea-bass of the genus *Bodianus*, allied to the groupers. They are small, brightly-colored spotted fishes that live in warm seas. A common species about Bermuda, Florida, and



NIGGER-FISH (*Bodianus fulvus*).

southward is *Bodianus fulvus*, also called 'yellow fish' and 'butter-fish,' a dark variety of which is especially designated by 'nigger-fish.' The Spanish name for the group is guativere. They are brought to market.

NIGGER TOES. See **BRAZIL NUT**.

NIGHT-APE. A nyctipithecine monkey. See **DOUROCOULI**.

NIGHT-BLINDNESS. A form of amblyopia, or a limited ability to see in a faint light, due to defective power of retinal adaptation; nyctalopia. See **SIGHT**, **DEFECTS OF**.

NIGHTHAWK. The North American nightjar (*Chordeiles Virginianus*), numerous and well known in all temperate parts of the continent in summer, whence in winter it migrates to the tropics. It is about 10 inches long and 23 inches in expanse of wing. The gape is destitute of bristles. The tail is slightly forked. The general color is brown, much mottled, and marked with white. There is a white mark on the throat, in shape like the letter V, and a broad white bar, which extends across the first five primary wing-feathers, is plainly visible when the bird is near by and flying. The middle toe is provided with a comb-like process used by the bird to free itself of vermin. The nighthawk is seen pursuing its insect prey in the air, chiefly after sunset and before dawn, and attracts attention by its sharp, tearing cry. It also produces in its flight a remarkable hollow booming sound, "like blowing into the bung-hole of a barrel," in the moments of its perpendicular descent through the air, which has gained for it such rustic names as 'bullbat' and 'piramidig;' also 'mosquito hawk.' Its movements in the air are extremely beautiful and rapid. When fat and plump, as it usually is on its southward migration, it is said to be good eating, and some are shot for that purpose. A closely allied species occurs in Texas and Mexico, and another in the West Indies. The latter is very generally known as the 'gie-me-a-bit,' from its very characteristic note. Nighthawks lay their eggs on the bare ground or on a flat rock or roof of a building. They are usually two in number, and are dull white, closely marked with fine specks of grayish brown. At rest these birds roost by squatting lengthwise on a large horizontal tree-

branch, and at once become nearly invisible. Compare WHIPPOORWILL. See Plates of NIGHTJAR, GUACHARO, ETC.; and of EGGS OF SONG-BIRDS.

NIGHT-HERON. A heron of the genus *Nycticorax*, intermediate in form between bitterns and herons, but with shorter and thicker bill than either, and legs shorter than in herons. The common night-heron or 'qua-bird' (*Nycticorax nycticorax*) is found throughout all warm temperate regions. The American bird, a subspecies to which the name *nervius* is given, is abundant in America and is partly a bird of passage. Its length is fully two feet. Its plumage is soft, the general color ash-gray, passing into black on the neck and head, and into white on the breast and belly; the back of the head is adorned with three very long white feathers, which hang down on the neck. The young are very different—grayish-brown marked with white above, and white streaked with blackish underneath. The nests are built in trees and usually many together, forming a heronry; eggs 4-6, dull blue. (See Plate of EGGS OF WATER AND GAME BIRDS.) The night-heron feeds chiefly by twilight or at night, and is never seen standing motionless like other herons, but walks about in search of prey by the sides of ditches and ponds, as its food consists chiefly of fishes, frogs, and other aquatic animals. Its cry is very loud and hoarse. Another species (*Nycticorax violaceus*) is found in the Southern United States. Its crown is white washed with buff, and it is therefore called the 'yellow-crowned night-heron.' It is more solitary than the common species, appearing singly or in pairs, and is also less nocturnal. Other species of night-heron are found in Africa and Australia.

NIGHTINGALE (AS. *nihtegale*, OHG. *naht-agala*, Ger. *Nachtigall*, from AS. *niht*, night + *galan*, to sing). A justly celebrated migratory song-bird of Western and Central Europe, which is a warbler, closely related to the robin redbreast, and as large as a thrush—the *Daulias lusciniæ* of modern ornithologists. It is rich brown in color, the rump and tail reddish, the lower parts grayish white. The sexes are alike. It is plentiful in some parts of the south and east of England, but does not extend to the western counties, and never appears in Ireland. It frequents thickets and hedges, and low damp meadows near streams. It arrives in England about the middle of April, the males ten to fourteen days before the females. It is at this season, and before pairing has taken place, that bird-catchers generally procure nightingales for cage-birds, as they then become easily reconciled to confinement, while if taken after pairing, they fret and pine till they die. The nightingale makes its nest generally on the ground, but sometimes on a low fork of a bush. The nest is loosely constructed of dead leaves, rushes, and stalks of grass, with a lining of fibrous roots. The eggs are four or five in number, of a uniform olive-brown. The song of the male ceases to be heard as soon as incubation is over, and Newton remarks that it is not safe for novelists to represent it as singing before April 15th, nor after June 15th. In captivity, however, it is often continuous throughout the year, especially in roomy aviaries. The nightingale usually begins its song in the evening and sings with

brief intervals throughout the night. The variety, loudness, and richness of its notes are equally extraordinary; and its long quivering strains are full of plaintiveness as well as of passionate ecstasy. The nightingale has been a favorite from the most ancient times, and is often mentioned in the poetry of India and Persia, as well as of Greece and Rome, but the bird referred to by these Eastern writers is in most cases a larger species (*Daulias philomela*), the 'philomel,' 'sprosser,' or 'thrush-nightingale,' which is never seen west of the Rhine; or else a third species (*Daulias Hafizi*) of Persia and Turkestan. The bird also has a place in classic mythology in the story of Procne and Philomela. Consult: Newton, *Dictionary of Birds* (London and New York, 1893-96); Burroughs, *Winter Sunshine* (Boston, 1876). See Colored Plate of SONG-BIRDS.

NIGHTINGALE, FLORENCE (1820—). An English philanthropist, born at Florence, Italy, the daughter of William Edward Nightingale, of Embley Park, Hampshire. Her attention was early directed to the condition of hospitals; she traveled extensively on the Continent to study such institutions, and entered upon a course of training in nursing with the Sisters of Saint Vincent de Paul in Paris and at the Kaiserswerth institution on the Rhine. When the Crimean War broke out in 1854, she organized a nursing department at Scutari, and by her untiring energy and extraordinary ability in alleviating the suffering of the sick and wounded acquired a world-wide reputation. At the close of the war she gave a testimonial fund of £50,000 to the founding of the Nightingale Home at Saint Thomas Hospital for the training of nurses. During the American Civil War and during the Franco-Prussian War she was often consulted on questions concerning camp hospitals. Among her publications are: *Notes on Hospitals* (1859); *Notes on Nursing* (1860); *Notes on the Sanitary State of the Army in India* (1863); and *Life or Death in India* (1874). Consult Edge, *A Woman's Example and a Nation's Work* (London, 1864).

NIGHTJAR. A general term, derived from their nocturnal habits and jarring utterances on the wing, for the large family Caprimulgidae (i.e. 'goat-suckers'), which is nearly cosmopolitan in extent. Nightjars are birds varying in size from eight to fifteen inches in length; all have light soft plumage, in finely mottled shades of gray, brown, and white; and they bear many resemblances to owls in structure as well as in their nocturnal and crepuscular habits. In some particulars they resemble the swifts, and, like them, capture all their food upon the wing; and as moths form a conspicuous part of this, the tribe has been called 'moth-hunters.' In pursuit of this prey they are often seen in the dusk about pastures with the cows or (in Southern Europe) with the goats; and their habit of dodging about the cattle after insects, together with their capacious mouths, led to strange superstitions which are entirely without foundation. The wings are long and powerful, and in the males of some species are furnished with long ornamental feathers (see STANDARDWING); while in others some tail-feathers are lengthened. The legs and feet are small and weak, and the middle toe is usually remarkably long, and serrated on

its inner edge, so as to form a kind of comb attached to the toe. Although the bill is very short and weak, the gape is extremely wide, as if the head itself were divided, and the mouth is surrounded by bristles, assisting the bird in securing its agile prey. All avoid activity in daylight, when they rest quiet on the ground, a log, stone, or large horizontal tree-branch, in some shady place, and almost always lengthwise of the perch—a habit due not only to the feeble grasping power of the feet, but to the greater invisibility thus obtained. In many instances the birds have a further protective habit of stiffening themselves in certain positions where they resemble a knot, or a broken and projecting stick, and so escape notice. (See MOREPORK.) They make no nests, or only very poor ones, which are placed on the ground. The oblong eggs are usually two, and are whitish or inconspicuously marked. (See Colored Plate of EGGS or SONG-BIRDS.) The voice is a screaming, jarring, or booming note, produced in flight; while many species have an oft-repeated cry, usually translatable into syllables, as 'whip-poor-Will' or 'chuck-Will's-widow.' About 100 species are known, included in about fourteen genera. Of these, four or five genera with six species occur in the United States. The best known are the whippoorwill, chuck-Will's-widow, poorwill, and night-hawk (q.v.). The best-known species of the Old World is the common nightjar, 'churn-owl,' or 'fern-owl' (*Caprimulgus Europæus*), familiar throughout Central Europe, the Mediterranean region, and Western Asia. The potoos (q.v.) of Jamaica and South America represent a distinct subfamily (*Nyctibiinæ*); and an aberrant form is the guacharo (q.v.).

Consult standard authorities, especially Newton, *Dictionary of Birds* (London and New York, 1893-96). See Plate of NIGHTJARS, ETC.

NIGHTMARE (night + mare, AS. *mara*, OHG. *marō*, *mar*, dialectic Ger. *Mahr*, *Mar*, incubus; connected with Polish *mora*, Bohem. *mura*, incubus, Russ. *kiki-mora*, ghost). A sensation of distress, suffocation, or oppression which occurs during sleep, and is attended by hideous dreams, or indefinite feelings of terror, with a sense of utter helplessness and inability to move or cry out. Nightmare is associated with disturbances of the circulation and respiration, and is most commonly caused by the taking of heavy meals or indigestible food shortly before going to bed. It occurs in persons of a nervous temperament, or in those subjected to severe mental strain or overwork. The physical symptoms of nightmare include groaning, flushing of the face, neck and chest, cold perspiration, or a general trembling of the body. The breathing is disturbed and sometimes stertorous. The pulse is irregular, but otherwise normal.

The night terrors of children may be regarded as a form of nightmare. The child sees some object which inspires him with fear, and springs up, screaming and protesting. He recognizes no one and has no remembrance of the circumstance in the morning. Other allied psychical conditions are observed in certain forms of incipient delirium, such as occurs in fevers, or as the result of alcoholic excesses. See DELIRIUM.

NIGHTMARE ABBEY. A novel by Thomas Love Peacock (1818). The hero is a caricature of Shelley.

NIGHTSHADE (AS. *nihtscada*, OHG. *naht-scato*, Ger. *Nachtschatten*, nightshade, from AS. *niht*, OHG. *naht*, Ger. *Nacht*, night + AS. *scada*, OHG. *scato*, Ger. *Schatten*, shade). The common name of certain plants of the natural order Solanaceæ, possessing the narcotic properties frequently developed in that order. Among them are some species of *Solanum*, particularly the common nightshade or black nightshade (*Solanum nigrum*), an annual or biennial slightly



BLACK NIGHTSHADE.

narcotic weed in waste places throughout the world. It has erect angular stems, ovate leaves, drooping lateral umbels of white flowers, and globose black berries. The leaves in a fresh state are said to be injurious to animals, but seem to lose almost all narcotic property by boiling. The berries, although generally dreaded or suspected, may also, it is said, be eaten, at least in moderate quantity, without danger. They contain, however, the alkaloid solanin, found also in the shoots of the potato. *Solanum Dulcamara* is popularly known as bittersweet (q.v.). See BELLADONNA, and Colored Plate of POISONOUS PLANTS.

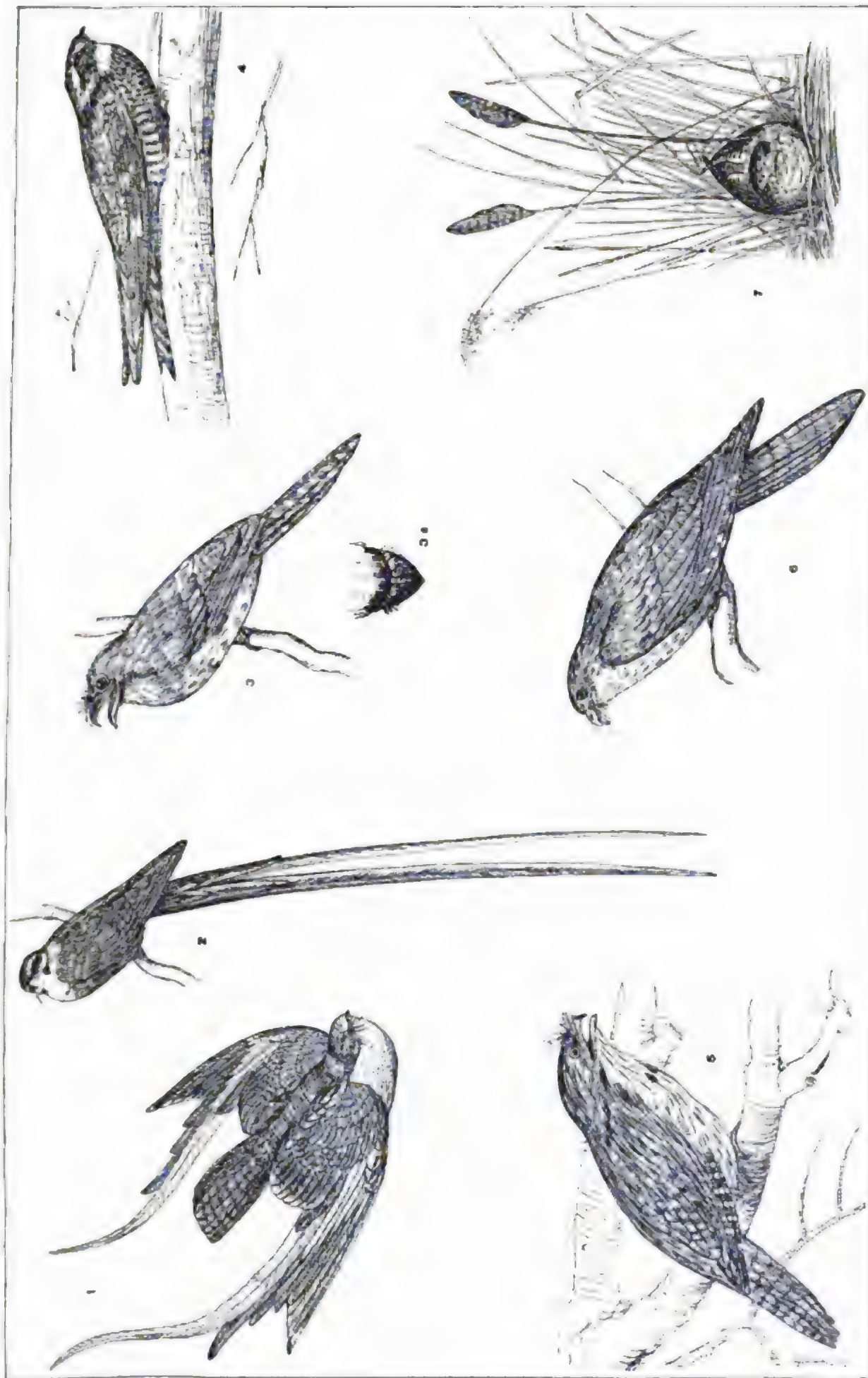
NIGHTSHADE FAMILY. A natural order of plants. See SOLANACEÆ.

NIGHT WALKER, THE, or THE LITTLE THIEF. A comedy by Fletcher. It was written probably not later than 1618, was altered by Shirley in 1633, and performed in 1634.

NIGHT WATCH, THE. A large picture by Rembrandt in the Ryks Museum at Amsterdam (1642), representing a company of arquebusiers under Capt. Frans Banning Coch coming out of their guild house. The faces are portraits. The painting is Rembrandt's largest and most renowned work.

NIGIDIUS FIGULUS, PUBLIUS (c.100-44 B.C.). A Latin grammarian and Pythagorean philosopher. He was pronounced by Aulus Gellius the most learned of the Romans next to Varro, and was so celebrated as an astrologer that in later times it was believed he had predicted the future greatness of Octavianus on learning of the latter's birth. He was a partisan of Pompey in the Civil War, and in consequence was compelled by Cæsar to live abroad, and died in exile. The surviving fragments of his works, which treated grammar, religion, and

NIGHTJARS, GUACHARO, ETC.



1. STANDARD-WINGED NIGHTJAR (*Cosmetornis vexillarius*).
2. BRAZILIAN FORK-TAILED NIGHTJAR (*Hydrophaps furcifer*).
3. MALACCAN FROGMOUTH (*Batrachostomus stellatus*).
- 3a. BEAK OF FROGMOUTH from above.

4. AMERICAN NIGHTHAWK (*Chordeiles Virginianus*).
5. MOREPORK (*Podargus Cuvieri*).
6. OIL-BIRD, or GUACHARO (*Steatornis Caripensis*).
7. PENNANT-WINGED NIGHTJAR (*Macrodipteryx macrodipterus*).

the natural sciences, are printed in the *Variæ Lectiones* (1618, iii. 16) of Rutgersius. Consult: Breysig, *De Nigidii Figuli Fragmentis* (Berlin, 1854); Klein, *De Vita Nigidii* (Bonn, 1861); Röhrig, *De Nigidio Figulo* (Coburg, 1887); and Swoboda, *P. Nigidii Figuli Operum Reliquiæ* (Vienna, 1889).

NIGRA, nē'grā, COSTANTINO, Count (1827—). An Italian diplomatist, born at Castellamonte, near Ivrea. He interrupted his studies at Turin to take part in the war against Austria (1848-49), and then entered the diplomatic service and became secretary to Cavour. After the Peace of Villafranca (1859) he was sent to France as Minister Plenipotentiary. He took an active part in the negotiation of the Treaty of Zurich in 1859, and the cession of Savoy and Nice to France, and was made Ambassador to Paris (1861). After the fall of the Empire he became Ambassador to Saint Petersburg (1876-82), London (1882-85), and Vienna (1885), and in 1890 was elected Senator.

NIGRITIA, nē-grīsh'ē-ā. Another name for the Sudan (q.v.).

NIHILISM (from Lat. *nihil*, *nil*, nothing, from *ne*, not + *hilum*, trifle, little thing). A term applied to the tenets of the revolutionary wing of the Russian Liberal Party. The term was first used in a novel by Ivan Turgeneff, *Fathers and Sons*. Originally it was a school of philosophic and ethical individualism which held aloof from political agitation. In the common mind Nihilism is associated with assassination and revolution, since Russian Nihilists seek to overthrow the present Government by force. The movement which resulted in the formation of the Nihilistic Party began early in the nineteenth century. As early as 1818 those who aspired for greater freedom in Russia formed an association to further the common welfare. On December 26 (old style, 14), 1825, occurred the celebrated rising of the Decembrists among the officers and soldiers of the army, which aimed at the emancipation of the serfs and the introduction of constitutional government. The revolt was easily quelled, and six leaders were executed; 125 others were imprisoned or exiled. Toward the middle of the century liberal ideas received an impetus from the study of socialistic writers of other countries. On April 23, 1849, some thirty-three men were arrested who belonged to an association formed by Petrashevsky, an official of the Foreign Office. These were sentenced to death, but the sentences were commuted to imprisonment and banishment. There were no further disturbances during the reign of Nicholas I.

In 1857 Alexander Herzen founded in London his journal, the *Kolokol* (Tocsin), which had enormous influence upon the Russian youth. About this time there arose in Russia itself a literary movement, under the leadership of Tchernishevsky, which criticised existing society and sought to arouse the people. Tchernishevsky's paper was suppressed in 1862, but later he wrote a novel, *What is to be Done?* which had great influence in popularizing revolutionary ideas. Shapoff, writing from the historical point of view, urged the introduction of self-government and local autonomy. Organizations sprang up in the universities, and new regulations introduced by the Government increased the opposi-

tion of the students. The secret associations of Saint Petersburg united in 1863 under the name 'Land and Freedom.'

During the decade from 1860 to 1870 true Nihilism was first developed. Its fundamental principle was absolute individualism, the negation of duties imposed by family, State, and religion. An active materialistic propaganda was maintained. It stood for the rights of women and children, demanding equality of treatment for women, and in this respect it won a decided victory. But this individualism was confronted with misery among the common people which was not removed by the emancipation of the serfs. Economic conditions forced a change of policy and the development of political agitation. In 1868 Bakunin (q.v.) started a paper at Geneva, and became the leader of the anarchists, who gained control of the movement. Bakunin advocated the total abolition of the State and the substitution of small communes. The mir, or village commune (q.v.), had only to be freed from the State to make an ideal basis. The Russian students, forbidden in 1873 to study at Zurich, returned home to take active part in the propaganda. Associations sprang up throughout the land. Many of the aristocrats took part in this movement. The attention of the Government was of course attracted, and in 1873 and 1874 some 1500 persons were arrested. Most of these were released after a few months' imprisonment; the rest were confined for three or four years, and in 1877 193 were banished to Siberia. During this same period, and indeed at all times, there existed a more moderate party; but it did not satisfy the demands of the young men and women, particularly of the universities, which have been a hotbed of political agitation. About 1875 the 'Narodniki' became a prominent and widespread organization. It was under the leadership of the society at Saint Petersburg. The Government now became active, and during 1876 and 1877 the prisons were filled with propagandists. The trials of 1877 and 1878 mark the end of the first period of revolution. The number of persons involved in these trials was about 3500.

The attempts to organize the people into revolt now ended. The cruelty of the Government led to reprisals, and the Nihilism which began peacefully in the seventies took on another nature. At first spies of the Government were murdered. February 5, 1878, Vera Zassulitch, a young woman of twenty-eight, shot at General Trepoff, who had caused a prisoner to be whipped for refusing to take off his hat to him. She was tried before a jury of educated men, eight of whom held Government positions, and, to the general surprise, she was acquitted. The Government was enraged at this, and the verdict was annulled. August 4, 1878, General Mezentseff was killed in the streets of Saint Petersburg. On February 21, 1879, the Governor of Kharkov, Prince Krapotkin, was assassinated, and other attempts were made to assassinate hated officials. April 14, 1879, an attempt to assassinate the Emperor, Alexander II., was made by Solovieff, who was captured and hanged. Two later attempts were likewise failures, but the next (March 13, 1881) was successful. (See ALEXANDER II.) It was hoped that the terror inspired by the death of the Emperor would lead to the introduction of a constitutional system. When

this hope failed, constructive measures were sought. In 1880 two reform parties were prominent; one of them had as its mouthpiece the *Tcherny Perediel*, which found its chief support in the workingmen, and proposed to educate and organize society in order that social revolution might be effected. The second and more important party was the *Narodnaia Volia* (Will of the People), which sought to overthrow despotism by the communistic instincts of the peasants. It set forth a programme with the following demands: (1) A representative assembly having supreme control in all State matters; (2) provincial self-government with elective officers; (3) village communes, which were to be economically and executively independent; (4) freedom of conscience, press, speech, association, and political agitation; (5) manhood suffrage; (6) militia instead of a standing army; (7) nationalization of land; (8) measures to socialize factories, etc. The *Narodnaia* practically dissolved in 1884. With its downfall there came a period of quiet in the social movement, although in the cities there still exists a reform movement among the workingmen. See **COMMUNISM**; **SOCIALISM**.

Consult: Turgenieff, *La Russie et les Russes* (Paris, 1847); Herten, *La conspiration russe de 1825* (London, 1858); Thun, *Geschichte des russischen Nihilismus* (Basel, 1883); Stepaniak, *Underground Russia* (London, 1883); id., *Russia Under the Tsars* (ib., 1885); Tikhomirov, *Russia, Political and Social* (ib., 1887); Oldenburg, *Der russische Nihilismus* (Leipzig, 1888); Stegmann, *Handbuch des Socialismus*, article "Russland" (Zurich, 1897); Karlowitsch, *Die Entwicklung des russischen Nihilismus* (3d ed., Berlin, 1880), a convenient short history of the movement; Kennan, *Siberia and the Exile System* (New York, 1891); Krapotkin, *Memoirs of a Revolutionist* (Boston, 1899).

NIHONGI, nē'hōn-gē' (Jap., Chronicles of Japan). An ancient Japanese historical book. In A.D. 712 the *Kojiki* (Records of Ancient Matters), the first book written in Japan, appeared. It was followed in 720 by the *Nihongi*, which gives the substance of the *Kojiki* in Chinese form. Not only are Chinese phrases and sentences employed, but it is fashioned throughout on the model of Chinese histories. It transforms, for example, the two gods from whom sprang the Japanese race into the 'positive' and 'negative' principles of the Chinese philosophy, and it puts into the mouths of mythical Japanese monarchs speeches filled with quotations from the Chinese classics. It omits a few legends, explains away the grossness of a few others, and gives variant versions of still others. It adds also 72 years of history. In Japan it has far excelled the *Kojiki* in popularity, but to the serious student it is of much less value, though it is still a secondary source for the history of ancient Japan.

NIIGATA, nē'ē-gū'tā. A seaport on the west coast of Hondo, Japan, and capital of a prefecture, at the mouth of the Shinano River, in latitude 37° 55' N. and longitude 139° 3' E. (Map: Japan, F 5). By the treaty of 1858 Niigata was opened to foreign commerce on January 1, 1869, but the existence of a heavy bar at the mouth of the river has prevented its commercial development. The Province of Echigo, in which Niigata lies, abounds in mineral wealth, petro-

leum, coal, and metals, and the soil yields rice, silk, tea, and the lacquer tree, and inferior lacquer ware is manufactured at Niigata on a large scale. The town is clean, and well provided with schools, banks, newspapers, and post offices. The climate is very hot in the summer and extremely cold in the winter. Population, in 1898, 53,336.

NIJAR, nē'hār. A town of Southeastern Spain, in the Province of Almería, situated in an artificially irrigated plain, 15 miles northeast of Almería (Map: Spain, D 4). There are mines of lead, iron, manganese, and phosphorite, and the town manufactures woolen blankets and fine ironstone pottery. Population, in 1900, 12,558.

NIJKERK, nī'kērk. A town in the Province of Gelderland, Holland, 28 miles southeast of Amsterdam (Map: Netherlands, D 2). It has a good harbor connected with the Zuider Zee by a wide canal two miles long. The chief industries are matting and flax-spinning; a brisk trade is carried on in grain, wood, and cattle. Population, in 1899, 8124.

NIJMEGEN, nī'mā-gen. A city of the Netherlands. See **NIMEGUEN**.

NIJNI-NOVGOROD, nyēzh'nyē nōv'gō-rōd. A city in Russia. See **NIZHNI-NOVGOROD**.

NIKA (nē'kā) **BIOT**. An insurrection against the Emperor Justinian at Constantinople in 532. It was occasioned by the oppressive taxation and the fights between the Blue and the Green factions of the Circus. Justinian favored the Blues at first, but soon both Blues and Greens joined in a popular uprising. Justinian yielded to their demands for reform, and this encouraged the mob, who set fire to the city. Saint Sophia and many public buildings were burned. The mob forced Hypatius to assume the Imperial insignia, and Justinian wished to flee, but was dissuaded by Theodora. Finally Belisarius (q.v.) attacked the rioters in the hippodrome, and put down the rebellion by the slaughter of as many as thirty thousand. See **JUSTINIAN**.

NIKE (Gk. νίκη, victory). The Greek goddess of victory, corresponding to the Roman Victoria. She was the daughter of Styx and Pallas, and sister of Zelos (zeal), Cratos (power), and Bia (force). Having assisted Zeus in his combat with the Titans, she was taken to live with him on Olympus. She is usually represented with wings and bearing a wreath and palm branch, and is often found in sculpture in connection with other divinities, especially with Athena, who is also called Nike.

NIKE APTEROS (Gk. Νίκη Ἀπτερος, Wingless Victory), or **ATHENE NIKE**, **TEMPLE OF**. A beautiful small temple of simple Doric architecture standing on a bastion flanking the entrance to the Athenian Acropolis. The temple was erected as part of the scheme of beautification of the city undertaken by Pericles, and was built by Callicrates, the architect of the Long Walls. It was torn down by the Turks in the latter part of the seventeenth century, and the material was used in the construction of a bastion. Lord Elgin took some of the slabs of its frieze to London. In 1835, when the bastion was destroyed, the stones of the building were recovered, and the temple was rebuilt on the original foundation, missing portions being supplied by terra-cotta casts. The temple, 18 by 27 feet, consists merely of a small cella, with four

Ionic columns, 13½ feet high, in the front and rear. The sculptures of its frieze represented an assembly of divinities, combats between Greeks and Persians, and a combat between Greeks and Greeks. The balustrade surrounding the precinct of the temple was adorned with reliefs of sacrifices in honor of Athene, to whom the temple was consecrated under the name of Nike Apteros, in order to distinguish her from the usual winged representations of Nike.

NIK'ISCH, ARTHUR (1855—). An Hungarian musical conductor, born at Lébény Szent-Miklós. He was educated under Dessoff and Hellmesberger at the Vienna Conservatory, and on the conclusion of his course entered the Court orchestra as a violinist. His first engagement as a conductor was at the Leipzig Theater. Here he became noted for conducting without score, while his ability and technical skill won him a leading place. From 1889 to 1893 he was conductor of the Boston Symphony Orchestra, succeeding William Gericke, and being in turn succeeded by Emil Paur. He returned to Pesth, where he was appointed the director of the Royal Opera House and conductor of the city Philharmonic Society concerts. His most important musical engagement and the scene of his greatest success was as the successor of Reinecke (1895) in the conductorship of the Gewandhaus concerts of Leipzig.

NIKITA, né-ké'tá, LOUISE (1872—). The professional name of Louisa Margaret Nicholson, an American singer, born in Philadelphia. She studied in Paris under Maurice Strakosch, and sang there and in Germany with considerable success. Her operatic début was in 1889 as Zerlina in *Don Giovanni*, and in 1894 she became prima donna at the Paris Opera. Her best-known rôles are in *Fille du régiment*, *Manon*, *Traviata*, *Lakmé*, and *Pagliacci*.

NIKITIN, nyé-ké'tyén, IVAN SAVITCH (1824-61). A Russian lyric poet, born at Voronezh. He began to write for the press in 1850; attracted attention by his patriotic poem *Russia* in 1853; and in 1856 had a volume of poems published under the patronage of Count Tolstoi. His greatest popularity was won by his poem *Kulak*, or 'The Money-Lender' (1858), a remarkable picture of peasant life. Besides his lyrics, Nikitin wrote two novels. A collected edition of his works was published at Moscow (6th ed. 1892).

NIK'KO (Jap., Sun's Brightness). A town and tourist resort in the Prefecture of Tochigi, Japan, about 80 miles northwest of Tokio, famous for its natural beauties, as well as for the mortuary shrines of Iyéyasu, the founder of the Tokugawa family, and of Iyémitsu, his grandson (Map: Japan, F 5). As a holy place its reputation dates from the eighth century, but the gorgeous mortuary shrines were not built until 1617, since which time they have been embellished by the lavish gifts of vassals, the wonders of Hidari Jingoro's wood carving, magnificent gifts of works of art in bronze, granite, and other stones, with offerings from the Dutch, Loo-Chooans, Koreans, etc. The name Nikko is also applied to the surrounding region.

NIKLA URSS, né'klá úrs (Rum., Nicholas the Bear). A popular name for a Rumanian patriot, Juon Hora (q.v.).

NIKOLAYEV, nyé'kó-lá'yév. An important naval and commercial river port in the Government of Kherson, South Russia, situated on the river Bug, 42 miles northwest of Kherson (Map: Russia, D 5). The river at Nikolayev is of sufficient width and depth for the largest vessels. The town has two gymnasias, a naval school, an observatory, a theatre, and a number of parks. Nikolayev is among the largest commercial ports of Russia. It is especially important in the export of grain, the imports being comparatively insignificant. The harbor is strongly fortified, and the navy yard with its wharves and various shops covers a large area. The industrial establishments, except those connected with the navy yard, are few and consist of tobacco factories, tallow-melting establishments, etc. The city forms a separate administrative district under a military Governor, who is also commander-in-chief of the Black Sea fleet. There are many consular representatives at Nikolayev.

Population, in 1897, 92,060, of whom about 75 per cent. were Greek Orthodox, and about 17 per cent. Jews. Nikolayev was founded by Potemkin in 1784. Until 1860 it was only a naval port, which played a prominent part in the building up of the Russian navy.

NIKOLAYEVSK, nyé'kó-lá'yéfsk. A town in the Government of Samara, Russia, situated on the Great Iriz, a tributary of the Volga, 110 miles south-southwest of Samara (Map: Russia, G 4). It carries on a brisk trade in agricultural products and animals, and produces brick, leather, and tallow. In the district of Nikolayevsk are a number of prosperous German colonies. The town was founded by the Raskolniki (dissenters) in 1782. Population, in 1897, 12,500, chiefly Raskolniki, and including about 1900 Tatars.

NIKOLSBURG, né'kóls-böörk. A town of Moravia, Austria, situated about 30 miles south of Brünn (Map: Austria, E 2). On a rock near the centre of the town stands the castle of the princes of Dietrichstein, to whom the town has belonged since 1575. There are a number of churches, a higher gymnasium, a library, and a natural history museum—the two last in the castle. In the vicinity of the town is produced good wine. Nikolsburg is noted for the peace concluded there between Ferdinand II. and Bethlen Gábor in 1622, and the armistices between Prussia and Austria and Prussia and Bavaria in 1866. Population, in 1900, 8091.

NÍ'KON (1605-81). A patriarch of the Russian Church. He was born near Nizhni-Novgorod, became a priest and monk, and in 1646 was appointed, by the Czar Alexis Mikhailovitch, Archimandrite of the Novospasky Monastery at Moscow. In 1648 he became Metropolitan of Novgorod, and in 1652 was elevated to the patriarchate. In 1658, having lost the favor of the Czar, he retired to the Monastery of the Resurrection of Christ, which he had himself built, and in 1666 was deposed by a council called to consider his case, and banished as a common monk to a monastery at Bielozerk. Czar Feodor Alexeyevitch granted him permission to return to the Monastery of the Resurrection of Christ, but he died on the journey thither. Nikon was an ardent upholder of monasticism, and was noted for his benevolent life and character, showing much kindness to the poor and unfortu-

nate. He tried to uplift the people, promoted education, and attempted to introduce many reforms into the Church, the most important of which was the effort to revise the Church books and correct them according to the old Eastern liturgies. This effort met with opposition from some who were opposed to change, and led to a division in the Church. See RASKOLNIKS. Consult Palmer, *The Patriarch and the Tear* (London, 1871-76).

NIKOP'OLI, or NICOP'OLIS. An ancient and fortified town in the north of Bulgaria, situated on the right bank of the Danube, about 24 miles north-northeast of Plevna (Map: Balkan Peninsula, E 3). It is commanded by a citadel and has an old castle and a Byzantine church. The surrounding country produces good wine, and there is some trade between Nikopoli and Wallachia. Nikopoli is noted for the defeat here in 1396 of a large Christian army under Sigismund of Hungary by the Turks under Bajazet I. The fortress was occupied by the Russians in 1810, and the fortifications were partly demolished. In 1829 a Turkish fleet was defeated by the Russians near Nikopoli, and in 1877 the town was nearly destroyed by the Russian army. The Nikopolis ad Istrum, founded by Trajan, with which Nikopoli is sometimes identified, is now believed to have been situated a few miles down the river.

NILE (Lat. *Nilus*, from Gk. *Νεῖλος*, *Neilos*, Nile; possibly connected with Heb. *nahal*, stream, Egyptian *H'pī*), THE. The largest river of Africa, and the longest in the world excepting the Missouri-Mississippi, its length from the Victoria Nyanza to the Mediterranean being about 3670 miles. Authorities have definitely ascertained that the fountainhead of the Nile is a little stream situated just north of latitude 3° S., in longitude 29° 30' E., near the northern extremity of the mountains bordering the northeast coast of Lake Tanganyika. This stream, rising among the mountains at a height of 6114 feet above the sea, gives birth to the Ruvuvu River, which is the mother branch of the Kagera or Alexandra Nile, emptying into Victoria Nyanza on its west coast. The area of the Nile's basin has been estimated at from 1,082,000 to 1,780,000 square miles. The general course of the river is from south to north, and though it has some largely developed sinuosities, its delta is almost directly north of the Albert Nyanza, which the Nile enters and from which it emerges, the delta and lake being separated by a distance of about 2000 miles.

The Nile has some special features that may be mentioned before describing it. While the river and its tributaries bring down from the tropics an enormous quantity of water, little of it reaches the sea, except at high flood, as nearly all the water that does not evaporate in the long journey northward is spread over the fields of Egypt, where it serves the double purpose of supplying moisture and fertilizing sediment. Its upper and its lower courses are navigable. Its middle course is not navigable except at very high flood, and then only with difficulty. The six cataracts of the Middle Nile extend along 1100 miles, with long stretches of smooth water between them; but this entire section of the river may be regarded as unavailable for very important navigation. These Nubian cataracts afford abun-

dant water power, but it has never been utilized. Like all large rivers flowing north and south, the Nile tends to impinge most strongly upon its right bank, owing to the revolution of the earth from west to east. The boundary of the Nile basin is more clearly outlined in the south than in the north. The river differs from all other great African rivers in that it passes through various climatic zones and departs very little from its main direction.

The Nile may be divided into four sections—the Upper, Middle, and Lower Nile, and the Delta, each having its distinctive aspects. The Upper Nile extends from the lakes to the confluence of the Blue and White Niles at Khartum. It is distinguished as being the region of tributaries, all of them being included excepting the Atbara, which is not perennial. It is also the region of heavy tropical rains. Three great reservoirs receive the numerous affluents in the equatorial regions. The Nile issues from the largest of these reservoirs, the Victoria Nyanza, which is nearly equal to Scotland in area, and lies 3900 feet above the sea. The river, issuing from the middle of the north shore of the lake, plunges 13 feet over Ripon Falls, and is 1200 feet wide where its waters start on their journey north. This is the Victoria or Somerset Nile. It flows to the northwest, passes through the small Gita and Kioga lakes, down the Karuma rapids, thunders over Murchison Falls (120 feet high, 270 miles from the outlet), and then pursues a peaceful course for about 30 miles till it empties into the northeast corner of Albert Nyanza, only to emerge at the northern apex of the lake as the Bahr-el-Jebel, a deep and majestic stream, bound on its long journey to the Mediterranean. South of Albert Nyanza is Lake Albert Edward, sending its waters, collected chiefly from the great mountain mass of Rowenzori, through the Semliki River to Albert Nyanza, which is 1600 feet below the level of Lake Victoria. The headwaters of the Upper Nile are thus collected in the Albert Nyanza. From the Albert Nyanza the river descends with slow current and scarcely any slope to Dufilé, where it passes between two mountain walls. Soon after leaving the mountains the slope becomes greater, the river foams over the Fola Rapids, leaves the plateau of Central Africa, enters the grass lands, and below Bor its banks are lost in the wide-spreading swamps on either side, and the channel splits into several branches, the Bahr-el-Jebel, the Bahr-el-Seraf, and others, which meet again in Lake No or farther down the river. In Lake No, the Bahr-el-Jebel meets the large tributary from the west, the Bahr-el-Ghazal (Gazelle River), and they leave the lake as the Bahr-el-Abiad or White Nile, which owes its name to the fact that in the sluggish current through the swamp region and in Lake No the sediment settles, leaving the river light in color, and this is accentuated farther down by the white waters of the Sobat tributary.

This area of swamps and branches is the vast region of the sudd (barrier), where all the channels are often completely choked by dense masses of vegetation. The current brings down fresh masses of weed and the sectional area of the river channel is quickly reduced. The velocity of the current is consequently increased, and the succeeding portions are sucked under the original block, thus adding to its thickness. By degrees, under the severe action of the water,



SCENE ON THE NILE

the whole becomes compressed into a dense and solid mass, which covers the river surface from bank to bank, and underneath which the stream rushes as through a sluice gate. These blocks at times attain a thickness of 15 feet below the water and 4 or 5 feet above it. The surface in places is so solid that hippopotami and even elephants can cross it without danger. Navigation of the river is thus rendered impossible. In 1899-1900, after the reconquest of the Sudan, the Government attempted with much success to open navigation in the main channel by cutting down into the sudd, tearing the sections away by steamboats, and setting the masses thus separated afloat. This region is very unhealthy and the inhabitants are few. It is believed that the swamp and sudd region embraces an area of about 12,000 square miles. All the streams are reunited 62 miles below Lake No and receive on the right bank the Sobat River, coming from the southern extension of the Abyssinian highlands, a navigable river for 212 miles from its mouth. Below the Sobat, the White Nile takes a definite northern course and flows, a mighty, though sluggish stream, to Khartum, where the White and the Blue Niles mingle their waters.

The Blue Nile is a very different river. It rises in the Alpine heights of Abyssinia, descends to the White Nile between its high banks with a very rapid current, and in the flood time it is reddened by the quantities of alluvia with which it is surcharged. The White Nile gives to Egypt the larger quantity of water; the Blue Nile spreads over the fields the fertile sediment that enriches them. Thus each had its distinctive function in creating Egypt out of the desert sands. Khartum, at the junction of these rivers, is at the heart of the great hydrographic system, and is naturally the metropolis of the Eastern Sudan. The Blue Nile, from its great reservoir, Lake Tsana, 5840 feet above the sea, has a winding course of 839 miles down the plateau and over the plain to Khartum. Much land in its valley is suitable for agricultural development. The river needs scientific regulation so that it may best serve the interests of Egypt. Under the agreement with King Menelek of Abyssinia (1902) for the delimitation of the boundary between his country and the Sudan, the Egyptian Government has authority to regulate the flow of water in the upper river. The Cape to Cairo Railroad will follow the Blue Nile for a considerable distance above Khartum, to avoid the swamp region of the White Nile.

From a little below Khartum to the Mediterranean the river flows through one of the most arid deserts in the world, without receiving a single tributary excepting the Atbara, 180 miles below Khartum, which drains the northern highlands of Abyssinia, but is nearly dry in summer. Throughout this long course, the valley of the Nile is merely a cleft in the desert plateau, the alluvial plain along the river being bounded by barren cliffs, which here and there rise to 1000 feet. The volume of the river is greatly depleted by evaporation in this part of its course. The second section of the river, the Middle Nile, extends from Khartum to Assuan, a distance of 1124 miles. It is a region of cataracts, there being 351 miles of rapids, with a total fall of 656 feet, and 773 miles of navigation, with a fall of 312 feet. The cataracts, in their order as the

river is descended, may be briefly described: The Sixth Cataract, beginning 52 miles below Khartum, is a little over one mile long, and the drop in the river is 20 feet. The Fifth Cataract begins 28 miles north of Berber, is 100 miles long, has three principal rapids, and the descent is over 200 feet. Abu Hamed is a little below the foot of this cataract. The Fourth Cataract is between Abu Hamed and Dongola, and drops 160 feet in 68 miles. The very fertile region of Dongola is between the Fourth and the Third cataracts. The Third Cataract, with two rapids, is 45 miles long and the fall in the river bed is 36 feet. The Second Cataract is 73 miles farther down the river, is 124 miles long, with four rapids, and it falls 216 feet. The town of Wadi-Halfa lies at its foot. The First Cataract is 214 miles farther down the Nile, is three miles long, drops 16 feet, and Assuan lies at its foot. The fact that below Assuan lies the great region of irrigation, fertility, and dense population, and that this portion of the Nile is hemmed in by high hills, marked Assuan as the best place to build a great dam across the river to keep back at flood time much of the water which hitherto had gone to waste, so that it might be utilized in the dry season and give Egypt perennial irrigation.

The third section of the river is the Lower Nile, extending from Assuan to the head of the Delta, an open waterway, navigable by large vessels, with Cairo near its foot. The current is slow during the low river in summer—less than two feet a second. The velocity in flood is from $3\frac{1}{4}$ to $6\frac{1}{2}$ feet per second. Along the lower part of this section a divergent channel known as the Bahr-Yusuf (Joseph's Canal) extends parallel to the Nile on the west side, finally discharging its waters in the depressed area of the Fayum (q.v.). The fourth section of the river is the Delta or 'Garden of Egypt.' It is pierced in all directions by irrigation canals and navigable channels. When the Nile is in flood, its tendency is to increase the height of its banks by deposits of loam and sand. These banks are artificially strengthened and the river thus kept to a definite course. The river reaches the sea through the Rosetta and Damietta mouths, and the canals that cover the Delta like a network carry their surplus waters into a chain of salt lakes that extends behind the sandy shore. As a drainage outlet, a navigable highway, and a source of power the Nile is surpassed by many other rivers. Its unique distinction is that it has turned Egypt from a desert into one of the richest agricultural lands, supporting a population of about 600 to the square mile. There are periods of exceptional flood and low water; but the extraordinary regularity with which, as a rule, the river rises and falls contributes to the security of farming.

The heavy rains in the basin of the White Nile during April drive the waters of that marshy region down upon Egypt, where they appear at Cairo about June 15th. A fortnight later the real flood begins, for the May rains in Abyssinia fill the Blue Nile with the richest muddy water. The rise is sometimes as rapid as three feet a day, the flood being heightened by the large volume brought down by the Atbara. The maximum flood reaches Assuan about September 1st, and it would be at Cairo a few days later were it not that the water is diverted to the land and the whole Nile Valley is a great lake. For this

reason the maximum flood at Cairo appears only about October 1st. The rains cease in Abyssinia about the middle of September, the floods of the Blue Nile and the Atbara disappear, and then the great lakes and marshes of Central Africa are the main supply of the river until the following June. This routine of the waters is marked by marvelous regularity. The time between an early and a late flood is not more than three weeks. The height of the flood at Assuan is usually about 25 feet above the minimum supply. If the water rises 29 feet above the minimum, the crops of Egypt are in danger. If it rises only 20 feet above the minimum, large areas cannot be flooded. The mean flood discharge at Cairo is about 280,000 cubic feet per second (about equal to the average flow of the Niagara River), the maximum about 400,000 feet. The general slope of the valley on each side is away from the river. Along each edge of the river is an earthen embankment too high to be stopped by the floods. Along the valley is a series of embankments, one end of which is at the river edge and the other on the sides of the hills that wall in the valley. The whole country is thus divided into a series of oblongs surrounded by artificial embankments on three sides and by the slope of the desert hills on the fourth. There are 120 of these oblongs, varying in extent from 60,000 to about 3000 acres. It is easy to cut short, deep canals in the banks which fill as the flood rises and carry the mud-charged water into these basins of irrigation. There the water remains for a month or more, three to four feet deep, depositing its mud. At the end of the flood the water is passed off through sluices from one basin to another and ultimately back into the river. In November seed is sown, and so saturated is the soil that the grain sprouts and thrives and the harvest is gathered in April or May without a drop of rain or any fresh irrigation. After the crop is reaped the fields remain dry and cracked in the fierce summer heat until the next flood comes on. A little below Cairo is a great dam or barrage across the river, by means of which all available water in the Nile before it begins to rise in June is diverted into canals that carry it to the cotton fields of the Delta. This barrage makes it possible to irrigate Delta crops in the dry season, so that to a large extent two crops a year are raised there. The water in the Delta would not be sufficient if a strict system of control were not maintained by which each cultivator is supplied in turn every fifteen or twenty days.

The great need has long been to store the waters during flood time (when a large part of them run to waste) so that they might be turned over the fields during the months of low Nile, thus giving to Egypt the benefits of irrigation at all seasons, and making it possible to raise two or three crops annually where only one or two were grown. Near Assuan, the gateway to Lower Egypt, the work on the great and much desired reservoir was begun. It was completed and formally opened in December, 1902. The work consists chiefly of an enormous wall or dam of masonry nearly 2 miles long and averaging 60 feet in height. The wall is pierced by 180 openings, each containing sluices through which the low Nile may pass and the retained flood waters may escape as they are needed for irrigation. A roadway runs along the top of the wall. It is estimated by Sir William Garstin that the vol-

ume of water impounded by the dam will reach the enormous total of 37,612,179,000 cubic feet. He estimates also that in the distribution of this reserve supply 70,000 acres in Upper Egypt, between Assuan and Assiut, will receive perennial irrigation; also 458,000 acres now irrigated as basins in Middle Egypt between Assiut and Cairo; that, further, 52,000 acres in the Fayum now untitled may be reclaimed; and that in Lower Egypt or the Delta the additional water will insure the cotton crop against drought, and reclaim an area of 120,000 acres now uncultivated. In the Province of Ghizeh likewise an area of 106,000 acres of basin cultivation will be converted into perennially irrigated land. Since the dam at Assuan closes the Nile to navigation, a canal 6540 feet in length with four locks is being constructed around it. Mail steamers and any stern-wheeler now on the Nile may pass through the canal, and sailing vessels may pass Assuan all the year round, though heretofore they have been able to get through the cataract only during high Nile. Below Assuan a barrage has also been constructed at Assiut for the purpose of raising the level of the river in summer, so that water may be delivered at that point at a higher level, increasing the discharge into the Ibrahimia Canal, which carries the supplies to the basins as far north as Minieh and Beni-Suef. These great works will add enormously to the productivity of Egypt, will increase the value of all the farm lands, and will augment the revenues of the Government. See EGYPT and EGYPTIAN SUDAN.

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(ib., 1899); Willcocks, *The Nile Reservoir Dam at Assuan and After* (ib., 1901).

NILE GROUP. A large marble group, one of the most important Alexandrine works of art, representing the river god reclining and leaning on a Sphinx. About and over his body sixteen children are climbing and playing, emblematic of the sixteen cubits to which the Nile rises before overflowing the surrounding country. The god holds in his left hand a cornucopia with flowers and fruits, in his right a bunch of grain, types of the fructifying power of the inundation. The group was found near the Church of Santa Maria sopra Minerva, Rome, in the time of Leo X., and is now in the Vatican.

NILES, nilz. A city in Berrien County, Mich., 92 miles east of Chicago, Ill.; on the Saint Joseph River, and on the Cleveland, Cincinnati, Chicago and Saint Louis and the Michigan Central railroads (Map: Michigan, G 7). It derives excellent power from the river and has extensive manufactures of all grades of paper, furniture, windmills, steel tanks, flour, etc. There is also a large fan and lithographing establishment. The surrounding country is chiefly agricultural, and the river scenery is unusually fine. The government, as provided by general charter of 1896, is vested in a mayor, annually elected, and a unicameral council. The water-works and electric light plant are owned and operated by the municipality. Population, in 1890, 4197; in 1900, 4287. On or near the site of Niles stood Fort Saint Joseph, the capture of which by the Spaniards in 1781 was the basis of Spain's claim (in 1782-83) to a large tract of Western territory. The foundations of the old fort are still visible. Early records show that a French mission was here established as early as 1697, and a complete census of a settlement in 1767 is extant. Niles was settled permanently in 1828, ten years later was incorporated as a village, and in 1859 it received a city charter.

NILES. A city in Trumbull County, Ohio, 58 miles southeast of Cleveland; on the Mahoning River, and on the Erie, the Pennsylvania, and the Baltimore and Ohio railroads (Map: Ohio, J 3). It is primarily a manufacturing centre, these interests being represented by tin mills, automatic press works, sheet mills, boiler works, and manufactories of electric and steam cars, incandescent lamps, chinaware, iron roofing, metal lath, office supplies, foundry and blast furnace products, mine and mill supplies, and galvanized iron. Niles, first incorporated in 1864, is governed, under a charter of 1895, by a mayor, elected every two years, and a unicameral council. The city owns and operates the water-works and electric light plant. Population, in 1890, 4289; in 1900, 7468.

NILES, HEZEKIAH (1777-1839). An American journalist and publisher. He was born in East Bradford, Chester County, Pa., where he was educated in the village schools. He learned the printers' trade, and in 1800 established himself in the printing and publishing business in Wilmington, Del. Failing in business, he removed to Baltimore, Md., where he became associated with George Bourne in the editing of *The Evening Post*. In 1811 he began the publication of a weekly, largely devoted to politics and the discussion of public affairs, which he

called *Niles's Register*. This journal he continued until his death, removing the publication office in 1837 to Washington and renaming the paper *Niles's National Register*. In 1838 the office was moved back to Baltimore, and there the publication of the paper was continued after Niles's death until 1849 by his son, W. O. Niles, and others. The files of the paper from 1811 to 1849 constitute an invaluable source for the study of American political history during that period.

NILES, JOHN MILTON (1787-1856). An American journalist, politician, and Cabinet officer. He was born in Windsor, Conn., received a common school education, and studied law by himself. In 1817 he settled at Hartford, Conn., and established the *Times*, which, under the editorial control of Niles, whose connection with it lasted for thirty years, became one of the most influential newspapers in New England. It was one of the earliest papers in the section to give its support to Andrew Jackson for the Presidency, and after his election Niles received the appointment to the Hartford postmastership as a reward. In 1835 he was appointed United States Senator to fill a vacancy, serving until 1839. In 1840 he was appointed Postmaster-General in Van Buren's Cabinet, remaining in office until Harrison's inauguration. From 1843 to 1849 he was a member of the United States Senate. He published: *The Independent Whig* (1816); *Gazetteer of Connecticut and Rhode Island* (1817); *Life of Commodore Oliver Hazard Perry* (1820); *A History of the Revolution in Mexico and South America, with a View of Texas* (1829); and *The Civil Officer* (1840).

NILES, NATHANIEL (1741-1828). An American politician and theologian, born in South Kingston, R. I. He graduated at Princeton in 1766, later studied medicine and law, taught school in New York City, then studied theology, and preached in various Congregational churches in New England. While living at Norwich, Conn., he invented a process by which bar iron could be made into wire by the use of water power, and also established a wool-card manufactory. About the close of the Revolution he settled in Orange County, Vt., and founded West Fairlee. He was frequently a member of the Vermont Legislature, and in 1784 was Speaker; was later a judge of the State Supreme Court; was a Representative in Congress from 1791 to 1795; was six times a Presidential elector, and also helped, as a 'censor,' to revise the State Constitution. Shortly after the battle of Bunker Hill he composed a song, *The American Hero*, which proved popular, and he later contributed essays to the *Theological Magazine*, and published a considerable number of books on theological and other subjects.

NILGAI, nil-gi' (Pers., Hind. *nilgau*, *nilgar*, *lilgar*, blue ox, from *nil*, Skt. *nilá*, blue + *gau*, Skt. *gau*, ox, cow). An East Indian antelope (*Bos-elaphus tragocamelus*) with a somewhat ox-like head and body, but with long, slender limbs, and of great activity and fleetness. It is one of the largest of antelopes, and stands about 4½ feet high at the shoulder. The horns of the male are about as long as the ears, smooth, black, pointed, slightly curved forward. The female has no horns. The neck is deep and compressed, not rounded, as in most of the antelopes. The general color is brownish gray. A slight mane runs

along the neck and the elevated forward part of the back, and the breast is adorned with a long hanging tuft of hair. The nilgai inhabits the bushy parts of India, where it has long been regarded as one of the noblest kinds of game. It is capable of domestication, but is said to manifest an irritable and capricious temper with advancing age. Consult Blanford, *Fauna of British India: Mammals* (London, 1889), and works on sport in India. See Plate of ANTELOPES.

NILGIRI (nêl-gê'rê) **HILLS**, or **NEILGHERRY HILLS**. An almost isolated plateau or mountain group in Southern India, Presidency of Madras (Map: India, C 6). It is situated about 40 miles from the west coast, 200 miles north of Cape Comorin, and rises in general to heights of between 3000 and 6000 feet above the surrounding plains, the highest point being Mount Dodabetta, with an altitude of 8760 feet. Granite ridges connect it with the neighboring Ghat Mountains, and it is itself composed of granite covered with a rich layer of soil. The slopes are covered with dense, hot, and unhealthful forest jungles, but the uplands consist of beautiful grassy plains with a temperate-zone flora and a delightful climate, which has made the Nilgiri Hills one of the principal sanatoriums in India for European invalids, who are chiefly concentrated in the town of Utakamand. The native inhabitants are Dravidian herdsmen.

NILOMETER (Gk. *Νειλομέτριον*, *Neilometrion*, from *Νεῖλος*, *Neilos*, Nile + *μέτρον*, *metron*, measure). A construction for measuring the height of the Nile. Two such constructions have survived from antiquity. The first is situated on the island of Roda, south of Cairo. This *mikyās*, as it is called in Arabic, is a square well, 16 feet in diameter, with an octagonal graduated pillar of marble in the centre, marking 17 cubits of 21.386 inches. The official guarding it announces that the water has risen high enough to cut the dams and to begin the irrigation when the river has risen to 15¾ cubits. Taxation was formerly regulated in accordance with the height of the inundation. This construction is due to the Caliph Suleiman, A.D. 715-717, but has been restored repeatedly since the ninth century. The other nilometer is situated on the island of Elephantine (q.v.), near the First Cataract. It consists of a well with a staircase of stone, and is very correctly described by Strabo. It was restored to official use in 1870.


NILSSON, nil'son, CHRISTINE (1843-). A Swedish soprano. She was born near Wexiö, and although her parents were in humble circumstances, she became proficient on the violin, learned the flute, and attended fairs and other places of public resort, at which she sang, accompanying herself on the violin. While performing in this manner at a fair in Ljungby in 1857, her voice attracted the attention of F. G. Tornerhjelm, who sent her to Stockholm, where she received instruction from Franz Berwald. She made her début at Stockholm in 1860, and then went to Paris to continue her musical education, under Masset and Wartel. In 1864 she appeared at the Théâtre Lyrique of Paris, as Violetta in *La Traviata*, with such success that she was engaged for three years. She made her first appearance in London in 1867, where she immediately became a favorite. In 1868 she sang the


part of Ophelia in the opera *Hamlet*, by Ambroise Thomas, at the Grand Opéra in Paris. During the same year she sang in England at the Handel festival at the Crystal Palace. In 1870 she came to America, appearing in concerts and operas, and achieved popularity wherever she was heard. She was married in 1872 to Auguste Rouzaud, a merchant of Paris. After leaving Saint Petersburg, where she had been very successful, she returned to America with the Strakosch Italian opera troupe. She also sang Elsa in Wagner's *Lohengrin*. The death of her husband in 1882, after she had retired from the operatic stage, caused her to return to it, but her marriage to Count Miranda in 1887 brought about her permanent retirement in 1888. What her voice lacked in volume was compensated for in smoothness, sweetness, and evenness of tone.

NILSSON, nil'son, SVEN (1787-1883). A Swedish zoölogist and archæologist, born near Landskrona. At twenty-five he became assistant professor of natural history at Lund. He was appointed director of the Zoölogical Museum of that city in 1819, and returned there after four years in a like post at Stockholm. He resigned in 1856. Nilsson wrote, on Scandinavian fauna and antiquities: *Ornithologia Suecica* (1817-21); *Prodromus Ichthyologiae* (1832); *Observationes Ichthyologicae* (1835); *Skandinavisk fauna* (1820-53); and *Skandinaviska Nordens urinvånare* (1838-43; in German translation by Mestorf, 1863-68).

NIMBLE FLY. A fly of the family Dexiidae, a group allied to the parasitic family Tachinidae, so called from its rapid movements. Their legs are unusually long, and in their early stages they are parasitic in various insects, especially in beetles and also in snails. About fifty species inhabit North America.

NIMBUS. See CLOUD; CLOUDINESS.

NIMBUS (Lat., cloud). In art, especially in sacred art, the name given to the disk or halo which enriches the head of the sacred personage who is represented. Its use is occasional in non-Christian religious art, especially the Hindu, and it was not unknown to classic and Oriental art. The nimbus, strictly so called, was first systematically used in Christian art, appearing first in the fifth century. Later, in Christian art, it became almost a necessary appendage of all representations of God or of the saints. It is of two kinds—either circumscribed by a well-defined outline, or radiating in vanishing lines. It took various forms. The square or oblong shape indicated a saintly person, such as a pope, still living, and was used mainly between the fifth and ninth centuries. The square form was symbolic of the material and earthly. The common form was the circular, symbolic of the spiritual and perfect. The earliest figure to receive the nimbus was that of Christ, and this nimbus almost immediately took a peculiar form, which was ordinarily given to Him up to the sixth century, and this was the monogram 

or  in the shape of a cross, called the Constantinian monogram (see LABARUM), formed of the first two letters of the Greek word for Christ, circumscribed in the circle and appearing above and on either side of His head. This became, after the sixth century, the ordinary cruciform

nimbus which was the rule up to the Renaissance, when the nimbus went out of fashion for all figures except occasionally in the form of a poised circlet or band. The interior of the nimbus, of whatever form, is gilt, either plain or in rays, excepting occasionally that of the Virgin, made of blue or some other color or starred. Up to the Renaissance the nimbus forms a circle against the background, but Renaissance artists tilted it or poised it naturalistically. God the Father was not represented until the late Middle Ages, and He was given a circular nimbus, but the Renaissance often gave it a triangular radiating shape. The dove of the Holy Ghost also had a circular nimbus. So had all duly canonized saints, for it was a symbol of the blessedness of eternal life in heaven. In later art the nimbus became lighter and more aerial, melting, as it were, into the picture; and in Raphael's saints it occasionally fades into the very faintest indication of a golden tinge around the head. Mosaic paintings, frescoes, illuminated manuscripts, and altar-pieces are the principal classes of monuments illustrating the use of the nimbus. See ICONOGRAPHY.

NIMEGUEN, nîm'e-gên (Dutch *Nijmegen*). A city in the Province of Gelderland, Holland, on the Waal, four miles from the German frontier (Map: Netherlands, D 3). It is situated on several hills, has the form of an amphitheatre, and is, for the most part, poorly built, with steep and narrow streets. The town is strongly fortified and garrisoned. Among the noteworthy edifices are the Church of Saint Stephen, a handsome Gothic structure dating from the thirteenth century, and the town hall, with a museum of Roman antiquities. In the beautiful Valkhof Park are ruins of an ancient Imperial palace. Nimeguen is a large market for cattle and agricultural products, especially grain and wine. It is noted for its Weissbier and its eau de cologne, and has manufactures of flour, cigars, tin, and other metal ware, leather, and furniture. Population, in 1895, 37,008; in 1900, 42,756, chiefly Catholics.

Nimeguen was founded by the Romans, who made it a permanent camp, in order to keep in subjection the Teutonic tribes northeast of the Rhine. In the Middle Ages it was a member of the Hanseatic League. It was taken by the Spaniards in 1585, but was recovered six years later. The Peace of Nimeguen in 1678-79 brought to a close the war between France and the Dutch and their allies, initiated by Louis XIV.'s invasion of the Netherlands in 1672. Peace between France and Holland was concluded on August 11, 1678; between France and Spain on September 17, 1678; between France and the Emperor on February 5, 1679; and between Holland and Sweden, the ally of France, on October 12, 1679. France secured possession of Franche-Comté and a portion of Flanders. The Peace of Nimeguen was the culminating point in Louis XIV.'s career and made France the leading power of Europe.

NIMES, nêm. The capital of the Department of Gard, France, in Lower Languedoc, situated on a fertile plain at the southern base of a range of outlying hills of the Cévennes, 174 miles south-southwest of Lyons (Map: France, L 8). The climate of Nîmes is not particularly agreeable, owing to its winds and dust storms, and to its heat in summer. It is a unique city in that it contains very ancient constructions side by side with modern and handsome buildings,

streets, etc. It has splendid monuments of Roman times, and its antiquities are of almost every description. The fine Esplanade, approached by the spacious Avenue Feuchères, and flanked by the immense Roman amphitheatre, and adorned by a magnificent fountain decorated with statues by Pradier, forms a centre of striking interest. Here also are found the modern Palace of Justice, and a statue to Soleillet, the French explorer. The amphitheatre—Les Arènes—is an ellipse 438 feet long, and while smaller than the famous ones of Italy, is in a better state of preservation. Its construction is interesting. It was built at the beginning of our era and was capable of seating 24,000. Its restoration was begun in 1858.

The most striking structure in Nîmes is the far-famed Maison-Carrée, an imposing Roman temple, well preserved. It is 76 feet long and 40 feet wide, and is embellished with 30 Corinthian columns. The whole edifice is in excellent taste and possesses rich features. It is now thought to have been built early in our era. It evidently belonged in the ancient forum. After having served various degraded uses during the centuries, it was artistically restored in the eighteenth century. It contains a collection of Roman relics, some exhibiting a fine style of workmanship. Its Venus of Nîmes, however, is mediocre. The Romanesque Church of Saint Paul has splendid mural paintings by the two Flandrins. Nîmes has a Reformed Grand Temple of a very simple architectural style. The uninteresting cathedral was built of materials from ancient ruins. The Jardin de la Fontaine is a lovely garden, with a canal, cascades and basins, and a statue of Antoninus Pius, who was born in Nîmes. Among the Roman remains are the Tour Magne, 90 feet high, affording a fine view; a little Temple of Diana; and the Porte d'Auguste. The Hôtel-Dieu has an attractive façade. The Central Prison, with a capacity for 1400 persons, was an ancient citadel.

The Ecole des Beaux-Arts is modern. The city library has 75,000 volumes. This collection is installed in a former Jesuit college which has been provided with a handsome modern façade. The Maison-Carrée contains an archaeological museum. In the picture gallery in the southern part of the town are some creditable paintings. Nîmes has a Calvinistic consistory, a lyceum, a Protestant normal school for women, a Catholic seminary for priests, and industrial and art schools. The manufacturing industries are still important, though declining. Silk, wine, liquors, are extensively produced and dealt in. Nîmes also manufactures upholstery, shawls, lace, handkerchiefs, carpets, leather, and iron products. Population, in 1901, 80,605, nearly one-fourth being of the Reformed faith.

Nîmes (Lat. *Nemausus*) was the leading Roman colony in Gaul after B.C. 120, and was a provincial city of true magnificence. It fell under the scourge of the Vandals in A.D. 407, and was plundered by the Northmen in 859. It turned Calvinist at the Reformation and entered upon a troubled career. After the fall of Napoleon its citizens—or the Banded Verdets—persecuted the Protestants. Guizot and Daudet were born there. The beautiful ruined Pont du Gard is northeast of Nîmes. Consult: Pieyre, *Histoire de la ville de Nîmes, depuis 1830, jusqu'à nos jours*

(Nîmes, 1886-88); Bazin, *Nîmes gallo-romain* (Paris, 1891).

NIMRA'VUS (Neo-Lat., from *Nimr-od* + Lat. *avus*, ancestor). A fossil cat found in the John Day Miocene beds of Western North America. See SABRE-TOOTHED TIGER.

NIM'BOD (Heb. *Nimrôd*). According to Gen. x. 8 seq. (1 Chron. i. 10), the founder of the Babylonian, and later of the Assyrian Empire; also "a mighty hunter before Jehovah." No explanation of the name and legend has as yet received common assent. The mythical theory which found in Nimrod Orion or the sun is now generally abandoned, and the dispute lies between a mythological and an historical personage. (1) According to the mythological view, Nimrod is identified either with the Babylonian god Marduk, a theory which would well explain his name, through the correspondence of three radicals (see NISROCH), or he is identified with Gilgamesh (q.v.), the hero of the Babylonian epic, who appears typically in art as engaged in combat with a wild beast, and is associated with Erech, one of Nimrod's cities. (2) Advocates of the historical view seek, by reason of the exact historical details, a character in Babylonian annals whose name may be the original of Nimrod. Such a person is suggested in a certain Kassite King of Babylonia of the fourteenth century B.C., Nazi-marattash (the latter component being supposed to be a god of hunting). But at present under any theory the legend must be regarded as made up of several sources. Yet, while the name is a problem, the biblical reference is of great interest as giving a correct tradition of early Babylonian history. Cush, the father of Nimrod, is now identified with the Kassites, an Elamitic race, which ruled Babylonia for the greater part of the second millennium B.C. (See KASSITES.) The four cities of Nimrod's kingdom mentioned in Genesis x. 10 are ancient and famous. That "out of that land he went forth into Assyria [the proper translation], and built Nineveh," etc. (Gen. x. 11-12), corresponds with the facts of the ethnical and social origin of Assyria from Babylonia. Of the four cities here mentioned, Rehoboth-ir and Resen are not yet identified. In Micah v. 6, "the land of Nimrod" is in parallelism to "the land of Assyria." The characterization of Nimrod as a huntsman (an ancient and doubtless pre-Israelite saying), would be appropriate to a mythological character or to many an Oriental monarch. The mythological expression "a mighty hunter before Jehovah" would mean that Nimrod attracted the attention of the deities by his prowess, or even rivaled them in the art of hunting. Consult: Maspero, *Dawn of Civilization* (London, 1894); Sayce, *Patriarchal Palestine* (London, 1895).

NIM'RUD. The modern name of a mound on the east bank of the Tigris, about 20 miles below Mosul (Map: Turkey in Asia, K 4), marking the ruins of an ancient Assyrian city identical with Calah (q.v.) mentioned in Gen. x. 11. It is one of a group of cities which clustered around Nineveh and may be regarded as a suburb of the latter. The chief discoveries were made at Nimrud by Layard in 1845-47 and 1849-51, though there were also later excavations by George Smith and Rassam. The city was a quadrangle about five miles in circumference, surrounded by a wall

with towers. The most important buildings discovered were: (1) a stage-tower (*zikkurat*) at the northwest corner of the mound; (2) temples near the tower, in which valuable inscriptions were found; (3) the so-called northwest palace built by Assurnazirpal (B.C. 885-860), and restored by Sargon (B.C. 722-705), 350 feet square; the sculptures found here were particularly fine and instructive, and there was a rich harvest of small objects of art, utensils of daily life, tools, armor, and the like; (4) the centre palace (of Shalmaneser II., B.C. 860-825, rebuilt by Tiglath-pileser III., B.C. 745-727); here was found one of the most interesting of all Assyriological monuments—the famous black obelisk of Shalmaneser II., now in the British Museum, which gives an account of the campaigns of the King during thirty-one years of his reign; (5) the southwest palace (Esarhaddon's, B.C. 681-668), built with materials taken from the northwest and centre palaces; (6) the southeast palace (Asshuretililani's, after B.C. 625); (7) a temple of Nebo, at first wrongly called the tomb of Sardanapalus. The history of Calah has been traced back to Shalmaneser I. (c.1300 B.C.), who calls himself its builder. It was afterwards neglected for a time, but was rebuilt by Assurnazirpal and was the capital of the Empire for two centuries. About B.C. 700 it gave way to Nineveh, and was destroyed by the Medes and Babylonians when they conquered Assyria. For bibliography, see NINEVEH; see also ASSYRIA; ASSYRIAN ART.

NIMWEGEN, nîm'wâ-gen. A city of the Netherlands. See NIMEGUEN.

NINDE, nînd, WILLIAM XAVIER (1832-1901). A bishop of the Methodist Episcopal Church. He was born at Cortland, N. Y., and graduated from Wesleyan University, Middletown, Conn., in 1855. After teaching for a year at Rome, N. Y., he entered the ministry. In 1861 he was sent to a church in Cincinnati, Ohio, and remained a pastor in that city until 1868, when he went abroad for travel through Europe and the East. The remainder of his pastoral life was spent in Detroit at the Central Methodist Episcopal Church. His terms here were divided by a period spent as professor of practical theology in Garrett Biblical Institute at Evanston, Ill. This institution called him to its presidency in 1879, and here he remained until 1884, when he was chosen a bishop of the Methodist Episcopal Church. He was one of the organizers of the Epworth League and its first president. He died at Detroit, Mich. Consult the memoir by his daughter (New York, 1902).

NINDEMANN, nîn'de-mân, WILHELM FRIEDRICH CARL (1850—). A German-American Arctic explorer, born at Gingst, island of Rügen. When seventeen, he came to the United States. He joined the *Polaris* expedition, and in 1872, when the vessel was caught in the ice, with eighteen of the crew he was carried on an ice field for nearly seven months. He was rescued off Labrador by the *Tigress*; volunteered on that vessel and afterwards on the *Jeannette* in the search for the *Polaris*; and after the loss of the *Jeannette* was sent south for help by De Long, in the quest for whom he later joined. Nindemann wrote in German a description of his Arctic voyages (1885).

NINE-EYES. In England, a lamprey (q.v.).

NINEKILLER. One of several similar names applied to shrikes, this one expressing a German rustic notion that the bird murders nine victims in a series. Compare BUTCHER-BIRD.

NINETY-SIX. A village in Abbeville County, S. C., about 80 miles southwest of Camden, said to have been so named from its having been located 96 miles from Keowee, the principal town of the Cherokees. During the Revolutionary War, it was an important strategic point, and in 1781, while occupied by a Loyalist force of about 550, under Lieutenant-Colonel Cruger, was unsuccessfully besieged by a force of Americans, under General Greene, from May 21st to June 19th, when, on receiving news of the near approach of a greatly superior British force under Lord Rawdon, General Greene withdrew. The loss of the Americans, incurred chiefly during an assault on June 18th, was about 185 in killed and wounded; that of the Loyalists was about 85. On June 29th the place was evacuated by Lord Rawdon. Consult Dawson, *Battles of the United States* (New York, 1858).

NINEVEH. The later capital of the great Assyrian Empire. The etymology of the name (written *Ninua* and *Ninā* in cuneiform inscriptions) is unknown. A popular etymology connected it with *nānu*, 'fish,' and made Nineveh the 'fish-city.' Presumably the word is connected in some way with *Ninā*, a Babylonian goddess, subsequently identified with Ishtar (q.v.). Nineveh was situated on the east bank of the Tigris, opposite the present Mosul (Map: Turkey in Asia, K 4), where for centuries its ruins were indicated by a number of mounds, the two principal ones being known as Koyunjik and Nebi Yunus, the latter the traditional site of the preaching of the prophet Jonah and crowned by a famous Mohammedan shrine. References in Arabic geographers and early European travelers show that the location was always preserved in local tradition, although the value of this tradition was called in question in the eighteenth century. Its trustworthiness was established by Claudius James Rich, whose examination of the mounds in 1821 marks the beginning of scientific investigation; he gave the first accurate description and prepared excellent maps (published, after his death, in 1836). The first excavations were made at Koyunjik by Paul Botta in 1842-43. At this early stage of Assyriological investigation sculptures or other large objects which could be sent to Europe and arouse popular wonder were the main desiderata; and when three months' labor had brought to light nothing but fragments of reliefs and inscriptions, Botta considered the work disappointing and abandoned Koyunjik for Khorsabad (q.v.). Layard, while excavating at Nimrud (q.v.) in 1845-47, dug a few trenches at Koyunjik and made a tentative examination which located the so-called southwest palace (Sennacherib's). During his second expedition (1849-51) he made a more thorough examination of this palace, brought to light numerous valuable sculptures, and discovered the famous library of Assurbanipal. After Layard's departure operations were continued by Rassam (1852-54), while Victor Place was also attempting to excavate at the same mound, the work of the two investigators not always proceeding in a spirit of friendly coöperation. Rassam discovered the north palace (Assurbanipal's), the sculp-

tures of which belong to the finest specimens of Assyrian art. He also found here the second half of Assurbanipal's library, including the Babylonian account of the deluge. The examination of the palace was continued for a short time after Rassam's departure by Loftus and Boucher. The next attempt at Koyunjik was made by George Smith during two brief periods aggregating not more than three months together in 1873-74, and resulted mainly in the recovery of inscriptions from Assurbanipal's library, popularly considered disappointing after the brilliant successes of Layard and Rassam, but in reality as important as any discoveries yet made. Rassam, during his four campaigns in 1878-82, made further excavations at Koyunjik; owing to the unfortunate attempt to do too much and the unsystematic and unscholarly methods followed, the results were not all that could have been desired. Rassam also excavated at this time at Balawat (q.v.), about fifteen miles east of Mosul, like Khorsabad and Nimrud one of the many cities grouped around Nineveh, and attempted without success to examine Nebi Yunus. It is known that the latter mound contains memorials of Adadnirari III. (B.C. 812-783) and palaces of Sennacherib (B.C. 705-681) and Esarhaddon (B.C. 681-668), but this mound has not yet been examined. Much also still remains to be done at Koyunjik. The earliest explorations of Layard were carried on at the expense of Sir Stratford Canning and Layard himself; other investigations have been supported by the British Museum, where most of the antiquities discovered are now stored. Besides ornaments, seals, and similar small objects of great importance as works of art, colossal statues were found, and small bas-reliefs representing incidents of war, hunting scenes, sacrificial rites, religious processions, building operations, and other events of daily life. The inscriptions on clay cylinders, obelisks, slabs, statues, and tablets of stone and other material have furnished data for tracing the history of the Assyrian empire with considerable detail from about B.C. 1100 to the fall of Nineveh.

The ancient city was a strongly fortified town, an irregular trapezium in shape. The walls have been traced and found to have been about a mile and one-quarter in length on the north, something less than three miles on the east, about half a mile on the south, and two and one-half miles along the Tigris on the west. A remarkable gate was discovered by Layard near the centre of the northern wall; on the city side there were colossal man-headed bulls and winged human figures. The river Khosar flowed through the city from west to east, dividing it into two nearly equal parts. The superficial area was about 1800 acres. According to a statement of the Book of Jonah (iv. 11), the population when the city was at the height of its glory has been estimated at 600,000. This is probably too great. Commander Jones calculated in 1852 that the population of the city and suburbs cannot have exceeded 350,000, while the city itself may have been the home of about 175,000 souls. The statement that "Nineveh was an exceeding great city of three days' journey" (Jonah iii. 3) does not seem greatly exaggerated, if the suburbs be taken into account.

The first certain mention of Nineveh is in the code of Hammurabi—latter half of the twenty-

third century B.C. (See HAMMURABI.) The name occurs in certain Babylonian inscriptions which are at least 500 years older, but it is not certain that the reference is to the Assyrian capital. The earliest seat of the Assyrian rulers was at Asshur (Kileh Shergat, on the west bank of the Tigris, about 50 miles below Mosul). The seat of government was first transferred to Calah (Nimrud, q.v.). Shalmaneser I. (c.1300 B.C.), who calls himself the builder of the latter city, is known to have restored a temple of Ishtar at Nineveh, which is also mentioned in an inscription of Shamshiadad (c.1800 B.C.) and in the code of Hammurabi. From the time of Asshur-belkala (c.1090 B.C.) to the reign of Asshur-nazirpal (B.C. 885-860) Nineveh was the capital. The latter King returned to Calah, but in the days of Sennacherib (B.C. 705-681) Nineveh regained its position. Sennacherib's predecessor, Sargon II. (B.C. 722-705), seems to have given the preference to Khorsabad. Under Sennacherib and his successors Nineveh attained to its greatest prosperity and fame. It fell before the combined efforts of Medes and Babylonians, the Median King, Cyaxares (B.C. 625-585), entering into an alliance with the Babylonian King, Nabopolassar (B.C. 625-605), for the destruction of the Assyrian Empire. The last days of Nineveh are obscure. That the city held out for a considerable time by virtue of its strong fortifications is probable. The year of its fall is uncertain; a probable date is B.C. 607. According to tradition its King, Sinsharishkun, ended his life in the flames which consumed his capital. The destruction of the city was complete. Xenophon with the Ten Thousand Greeks passed by its site about two centuries later, and does not even mention its name. It is probable, however, that the 'great uninhabited cities' which he calls Mespila and Larissa (*Anab.* iii. 4, 7-12) were Koyunjik and Nebi Yunus, respectively.

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NINE WORTHIES, THE. Nine heroes of history and romance, long popular in mediæval art and story. They are mentioned in the preface to Caxton's *Malory's Morte Arthure*, as the "Nine Worthy and the best that ever were;" to wit, three Paynims, three Jews, and three Christian men. These are Hector of Troy, Alexander the Great, Julius Cæsar, Joshua, David, Judas Maccabæus, King Arthur, Charlemagne, and Godfrey of Bouillon. These heroes were a familiar and popular subject in tapestries and paintings, and figured also in masks and pageants. Dunlop mentions in *History of Prose Fiction* a rare romance, the "Triumphes des neuf Preux," in which the author had a vision of the nine worthies. Brunet intimates that the original was of Spanish origin. The nine are mentioned also in English literature. Shakespeare parodies them in *Love's Labor's Lost*, and Dryden alludes to them in *The Flower and the Leaf*.

NING-PO, nīng'pō' (Chin., Calm Waves). A treaty port in the Province of Che-kiang, China, on the river Tatsish, 12 miles from the sea (Map: China, F 4). The inclosed space is about five miles in circumference. The brick walls, 25 feet high and 22 feet thick at the base, are pierced by six gates. The city is famous for its temples, pagoda, stone bridges, and a library, the fourth in point of number of volumes in the Empire. The gold and silver work, confectionery, lacquer work, and carving are noted all over China. The Portuguese settled in Ning-po, but were driven out in 1545 after a massacre, in which 800 out of 1200 Europeans were slain. The city was occupied by the British forces for six months in 1841-42, and was opened to foreign trade in 1842. It is an important centre of Christian missions. Ning-po has little direct trade and is principally a distributing station for Shanghai. Its total trade, chiefly imports, amounted in 1900 to more than \$10,000,000. The principal articles of commerce are green tea, cotton, opium, silk, and sugar. Population, estimated at 255,000.

NIN'IAN, SAINT. The Apostle of the Picts. He lived in the latter half of the fourth and the beginning of the fifth century. Whether Christianity had been introduced among the Picts before the time of Ninian has been a subject of

controversy. However this may be, it is certain that when Ninian appeared among them, the Picts were in the main a pagan people. He was a Briton, and of noble birth, but had been educated at Rome, and there ordained a bishop in 394. The exact time of his preaching in Scotland is unknown. His labors appear to have commenced in Cumbria, and to have extended over the greater part of the district as far north as the Grampian Hills, his see being fixed at Candida Casa, or Whithorn, in the modern Wigtonshire. His death is placed by the Bollandists in 432; his festival is September 18th. His *Life*, by Ailred, is in Forbes, *Historians of Scotland*, vol. v. (Edinburgh, 1874).

NINIGRET (c.1610-c.1677). A sachem of an Algonquian tribe of Indians, the Niantics. He assisted the English colonists in the Pequot war of 1637, but soon afterwards began to scheme for their expulsion or extermination. A visit to the Dutch on Manhattan Island in 1652-53 caused him to be suspected of plotting against the United Colonies, whose commissioners, in April, 1653, declared war against him, but were unable to prosecute it, owing to the opposition of Massachusetts. Ninigret, however, soon attacked the Long Island Indians, allies of the English, and the commissioners, after summoning him in vain to Hartford, sent Major Samuel Willard against him with a force of 310 men. Ninigret took refuge in a swamp, but subsequently (1662), in conjunction with several other chiefs, sold a large part of his territory to the colonists. Several of his successors from whom land titles were secured by Rhode Island were also called Ninigret.

NIÑO, né'nyô, PEDRO ALONSO (c.1455-c.1505). A Spanish navigator, born at Moguer. He had sailed to the west coast of Africa several times in Portuguese vessels before 1492, when he became pilot of one of Columbus's three ships. In June, 1496, Niño sailed to Santo Domingo with supplies, and on his return nearly ruined the fortunes of Columbus by his braggadocio and his tardiness in reporting at court. After sailing on Columbus's third voyage, he planned with Cristóbal de la Guerra, a Spanish merchant, the first successful commercial voyage to the New World (1499). Niño died soon after his return, after having been accused of cheating the Crown of a part of its share in the profits of the voyage.

NINON DE L'ENCLOSE, né'nôn de län'-klô', or LENCLOS (1616-1706). A Parisian courtesan, remarkable for beauty, grace, and intellectual culture, as well as for keen wit. Her career began at sixteen. Among her many lovers were successively the Count de Chatillon, the Marquis de Villarceaux, the Marquis de Sévigné, the Marquis de Gersay, Marshal Condé, the Duc de la Rochefoucauld, Marshal d'Albret, Marshal d'Estrées, Abbé d'Effiat, Gourville, and La Châtre. She counted among her friends Queen Christina of Sweden, Madame Scarron (afterwards Madame de Maintenon), and Madame de La Fayette. Her salon seemed for a time a rival of the Hôtel de Rambouillet. Molière and Scarron are said to have taken literary counsel with her. Her beauty lasted into old age. Consult: Douxmesnil, *Mémoires* (Rotterdam, 1752); and the *Works* of Saint-Evremond (Amsterdam, 1706), but especially the contemporary 'portrait' in Mlle. de Scudéry's *Clélie* (Paris, 1556-60), where she figures as 'Clarisse.'

NIOBE, ni'ô-bè (Lat., from Gk. Νίβη). In Greek legend, the daughter of Tantalus, King of Lydia, and (according to the most popular version) the sister of Pelops. She was the wife of Amphion, King of Thebes, and bore him many children, the numbers varying usually between twelve and twenty. In her pride she boasted her superiority to Leto, the mother of Apollo and Artemis. The angry goddess moved her children to avenge the insult, and Apollo with his arrows slew the sons, while Artemis killed the daughters in the palace. Niobe in her grief prayed the gods, who in pity transformed her into a stone image on Mount Sipylus in Lydia. The story appears in the epic, and was retold by tragedians, poets, and chroniclers with many divergencies in detail. The fullest version which has survived is by Ovid (*Metam.*, vi. 146 sqq.). Representations of the story on vases and reliefs are not numerous, but it is the subject of one of the most famous groups of ancient statues. Consult: Stark, *Niobe und die Niobiden* (Leipzig, 1863); Amelung, *Führer durch die Antiken in Florenz* (Munich, 1897).

NIOBIUM (Neo-Lat., from Lat. *Niobe*, daughter of Tantalus; so called from its close resemblance to the metal tantalum, from Lat. *Tantalus*, father of Niobe). A metallic chemical element, same as columbium (q.v.).

NIOBRARA, ni'ô-brä'rä. A river rising in Laramie County, Wyo., flowing east through northern Nebraska, and emptying into the Missouri River at Niobrara, after a course of about 450 miles (Map: Nebraska, C 1). It is a shallow and rapid stream, and is not navigable. In its upper course it flows through a sandy region, after which it traverses a deep, rocky cañon; but in the lower part it winds through fertile bottom lands.

NIOBRARA STAGE. The name given to a division of the Cretaceous system (q.v.). The rocks, including sandstones, limestones, and chalks, are exposed in Kansas, South Dakota, and in the States farther westward, and attain a maximum thickness of 2000 feet.

NIORT, nyôr. The capital of the Department of Deux-Sèvres, France, on the Sèvre-Niortaise River, 49 miles by rail southwest of Poitiers (Map: France, F 5). Its chief points of interest are the Church of Notre Dame, with its famous tower and elaborate interior, the Church of Saint Andrew, Museum of Art and Natural History, Museum of Antiquities and the Public Garden. The inhabitants of the adjoining region are engaged in cattle-raising and farming, and the town has a large trade in gloves, oil, brushes, and leather; there are also extensive nursery interests. Niort dates from 1155; was under the rule of England for a short period; and as a Protestant stronghold endured many hardships during the Religious Wars. Madame de Maintenon was a native of Niort. Population, in 1901, 23,897.

NIPA (Neo-Lat., from the native name). A genus of plants referred by most botanists to the order Palmæ. *Nipa fruticans*, the only species recognized, common in the East Indian Archipelago, is a low-growing tree, which flourishes with the mangrove in places inundated by the tide. It abounds in saccharine sap, from which a kind of palm wine and also excellent sugar are made. The leaves are employed for roofing

and are exported from Tenasserim for this purpose.

NIPH'ER, FRANCIS EUGENE (1847—). An American electrical engineer and physicist. He was born at Port Byron, N. Y.; graduated from Iowa State University in 1870; and, after four years as instructor of physics in that institution, was chosen professor of physics and of electrical engineering in Washington University. Nipher organized the Missouri weather service (1877) and the Magnetic Survey of the State (1878); became a prominent member of the Saint Louis Academy of Science; and contributed to its *Transactions* articles on physics and meteorology. His more interesting researches include his proof that a photographic plate over-exposed may be developed as a positive, and that between positive and negative there is a zero value which cannot be developed.

NIPIGON, nîp't-gôn (or **NEPIGON**), LAKE. A lake of Ontario, Canada, 35 miles north of Lake Superior (Map: Ontario, M 8). It is about 60 miles long from north to south, and 45 miles wide. A coast line with bold headlands and deep bays gives a total length of shore of 580 miles. It is 813 feet above Lake Superior. A great number of mountain streams flow into it, and its waters flow out through the Nipigon River, 40 miles in length, southward, to Nipigon Bay, an arm of Lake Superior. The lake is very deep, studded with islands, and well stocked with fish.

NIPISSING, nîp'is-sing (still-water place, or little-water place). An Algonquian tribe, formerly residing about the lake of the same name in Northern Ontario, Canada. When first known to the French, early in the seventeenth century, they were one of the most prominent and influential tribes of Canada, and were regarded by the Jesuit missionaries as the typical Algonquian tribe, and their language as the standard for the whole linguistic stock. On the destruction of the missions by the Iroquois about 1650 they were forced to fly to the north and west, almost to the extreme western end of Lake Superior. They afterwards returned and settled, some in their old country on the lake shores, others at the Three Rivers, and also with the Catholic Iroquois at the Lake of Two Mountains, near Montreal, where they still have a village. It is impossible to give any reliable statement of the past or present number of the Nipissing, as they are generally included in the estimates with the other tribes known collectively as Algonquian (q.v.). The Indians now on a reservation on Lake Nipissing are officially classed as Ojibwa (q.v.).

NIPISSING (or **NEPISSING**), LAKE. A lake in Ontario, Canada, nearly midway between Lake Huron and the Ottawa River, with a length of about 55 miles, and a maximum breadth of 28 miles (Map: Ontario, D 1). Its waters are mostly received from the north through Sturgeon River, which connects it with a chain of smaller lakes. The only outlet is French River, by which the lake discharges into Georgian Bay, an inlet of Lake Huron. There are a number of small islands. The vicinity is inhabited by Indians. There is a regular steamer service on the lake, and its waters and shores are extensively resorted to for angling and

shooting. Le Caron, a Récollet priest, was the first European to visit the lake, in 1614.

NIP'MUC (fresh-water people). A collective term for the small inland tribes of Algonquian stock formerly living in central Massachusetts and the adjacent sections of Connecticut and Rhode Island. Their chief seats were at the headwaters of the Blackstone and the Quinebaug rivers, and about the ponds of Brookfield. Their villages had no apparent political connection, and the various bands were subject to their more powerful neighbors, the Massachusetts, the Wampanoag, the Narraganset, and the Mohegan, or even tributary to the distant Mohawk. There were seven villages of "praying Indians" among them in 1674, but on the outbreak of King Philip's War the next year almost all of them joined the hostiles, and at its close some of them fled to Canada or westward to the Mohican, and others to the districts about the Hudson.

NIP'PER, SUSAN. A character in Dickens's novel *Dombey and Son*, the nurse of Florence Dombey, sharp-tongued but faithful.

NIPPERDEY, nîp'për-dî, KARL LUDWIG (1821-75). A German philologist, born in Schwerin, September 13, 1821. He studied at the universities of Leipzig and Berlin, and after teaching in the former university, became professor at Jena, 1852. He published a number of translations and critical studies of Latin prose, among them works on Cæsar, Nepos, and the *Annales* of Tacitus. These works passed through many editions, the translation of Nepos having reached its tenth edition in 1896, and the translation of the *Annales* of Tacitus, with exegetical notes, having passed through the ninth edition in 1892. Consult Schöll's collection of his works, under the title of *C. Nipperdeii Opuscula* (1877), and the biography by the same author (1875). Nipperdey committed suicide, January 2, 1875.

NIPPLES. See BREAST.

NIPPOLD, nî'pôlt, FRIEDRICH (1838—). A German Church historian. He was born at Emmerich and studied at Halle and Bonn. After 1865 he served as professor of Church history at the universities of Heidelberg, Bern, and Jena. Nippold became a representative of liberal theology, and took a prominent lead in the modern Church movement. His numerous theological treatises include *Handbuch der neuesten Kirchengeschichte* (1857), which is his chief work, and *Amerikanische Kirchengeschichte* (1892).

NIPPON, or **NIHON**, nê'hôn'. The Japanese pronunciation of the name "Jih-pen" (sun-origin) given to 'Japan' by the Chinese. 'Japan' is a corruption of the same words. The name was employed first officially by the Japanese Government about A.D. 670. Before that time various high-sounding titles had been used, and two native names still survive in literature, 'Yamato,' strictly speaking, the name of a province, and 'O-mi-kuni' (Great August Country). 'Nippon' was misapplied by Occidentals for a time as the name of the largest island of the archipelago.

NIPPUR (modern name, NUFFAR). One of the most important cities of ancient Babylonia, situated on the northeast edge of the district now occupied by the Afoj tribes of Arabs, be-

tween the Tigris and the Euphrates, about 100 miles southeast of Bagdad. The Talmud identifies it with Calneh (Gen. x. 10). Nippur was famous as the seat of worship of the god Bel (or En-lil), who at an early period acquired a unique position as the chief deity of the Babylonian Pantheon. This is indicated by his name, which signifies 'lord' par excellence. The close connection in ancient Babylonia between political supremacy and religious prominence justifies the supposition that for a considerable period Nippur, the city of Bel, also exercised control over at least a large portion of the Euphrates Valley. The religious sanctity of the place, however, outlasted its political history, and for many centuries after Nippur had yielded its political supremacy to other centres it continued to be a favorite place of pilgrimage, and the kings of both Babylonia and Assyria vied in rendering homage to the great Bel by restoring ruined portions of his temple. The chief temple was known as Ekur, 'Mountain House,' and there was also a stage-tower (*zik-kurra*), rising to a considerable height, with a shrine of Bel at the top. Besides Bel and his consort, Belit, other gods were worshiped at Nippur, and temples or shrines were erected to them, so that there came to be a large sacred complex, shut off from the rest of the city by a double wall.

Systematic explorations at Nippur have been conducted by the University of Pennsylvania, beginning in 1888 under the direction of the Rev. Dr. John P. Peters, the founder and organizer of the expedition, and continued at intervals till 1900. During 1893-96, and again in 1898-1900, the work was in charge of J. H. Haynes, who was joined in the field during the spring of 1900 by Prof. H. V. Hilprecht. As a result a considerable portion of the temple area and adjoining grounds has been laid bare, the character and plans of the ancient buildings have been determined, and a large number of inscriptions, historical and votive, as well as over 30,000 commercial and literary tablets, have been found. The larger number of the tablets were discovered in a section of the mound containing an edifice or edifices used for the legal and literary archives of the temple. Through the historical and votive inscriptions, of which two volumes have been published by Professor Hilprecht (*Old Babylonian Inscriptions, Chiefly from Nippur*, Philadelphia, 1893-96), the history of Nippur has been traced to a date, according to some, as early as c.4500 B.C., according to others to c.3200 or 3000 B.C. Much light has been shed on the general course of events from this early period down to the rule of the Kassites in Babylonia (c.1700-1200 B.C.), who appear to have been particularly attached to the cult of Bel of Nippur. A third volume by Professors Hilprecht and Clay (*Business Documents of Mursili, Sons of Nippur*, Philadelphia, 1898) consists of 120 tablets of a commercial character, illustrating business methods in Babylonia during the Persian period. Consult, besides the works already mentioned: Peters, *Nippur, or Explorations and Adventures on the Euphrates* (New York, 1897); Hilprecht, *Explorations in Bible Lands during the Nineteenth Century* (Philadelphia, 1903).

NIRGUA, nêr'gwâ. A town of the State of Carabobo, Venezuela, 110 miles southwest of

Caracas (Map: Venezuela, D 2). It is situated in the richest district of the State, in a region producing coffee, cacao, sugar, tobacco, and cotton, as well as live stock. Nirgua was founded in 1554, and in 1565 rich gold deposits were discovered in the vicinity. The population of the municipality, in 1891, was 8394.

NIRUKTA, nê-rōōk'tâ (Skt., explanation, from *nis*, out + *ukta*, p.p. of *vac*, to speak). The name of that one of the six *Vedāngas* (see *VEDA*) which explains difficult Vedic words. There must have been several works of this character in a remote period of Hindu antiquity, which bore the name Nirukta, for 'Nirukta authors' are quoted either generally or by name in several Sanskrit authors; but the work which is especially called *Nirukta*, and which, thus far, is the only surviving representative of this important division of the Vedāngas, is that of Yaska, who was a predecessor of Panini (q.v.). His work consists of three parts—the *Nāighaṇṭuka*, where, for the most part, synonymous words are given; the *Nāigama*, which contains words that usually occur in the Vedas only; and the *Dāivata*, which contains words chiefly relating to deities and sacrificial acts. A commentary on this work has been composed by the same Yaska, and it likewise bears the name of Nirukta. In this, Vedic passages are quoted in illustration of the words to be explained, and the comment given by Yaska on these passages is the oldest known instance of a Vedic gloss. Besides the great importance which Yaska's *Nirukta* thus possesses for a proper understanding of the Vedic texts, it is valuable also on account of several discussions which it raises on grammatical and other questions, and on account of the insight it affords into the scientific and religious conditions of its time. The text and commentary of the *Nirukta* have been edited by Roth (Göttingen, 1852), and by Samassami, *The Nirukta, with Commentaries* (Calcutta, 1882-91).

NIRVANA, nêr-vā'nâ (Skt. *nirvāṇa*, extinction, from *nis*, out + *vāna*, a blowing, from *vā*, to blow). In Buddhist doctrine, the term denoting final deliverance from transmigration. It implies, consequently, the last aim of Buddhism, since transmigration is tantamount to a relapse into the evils or miseries of *saṃsāra*, or the world. But as Hinduism, or the Brahmanical doctrine, professes to lead to the same end, the difference between *nirvāṇa* and *mōkṣa*, *apavarga*, or the other terms of Brahmanism designating eternal bliss, and consequent liberation from metempsychosis (q.v.), rests on the difference of the ideas which both doctrines connect with the condition of the individual after that liberation. According to the Brahmanical doctrine, man has a soul, and Brahma being the existing and everlasting cause of the universe, eternal happiness is to the Brahmanical Hindu the absorption of the soul into that cause whence it emanated, never to depart from it again. On the other hand, as the ultimate cause of the universe, according to Buddhism, is non-entity, the deliverance from transmigration is, to the Buddhists, the return to non-entity, or the absolute extinction of individuality. Buddhism acknowledges no soul. In Brahmanism the separate soul is reabsorbed into the All-soul. In Buddhism, individuality ceases. But to some Buddhists, as also to the Jains, nirvana became a term significant rather of emancipation, eter-

nal blissful repose. Further changes naturally followed. We are told, for instance, that nirvana is quietude and identity, whereas samsara is turmoil and variety; that nirvana is freedom from all conditions of existence, whereas samsara is birth, disease, decrepitude, and death, sin and pain, merit and demerit, virtue and vice; that nirvana is the shore of salvation for those who are in danger of being drowned in the sea of samsara; that it is the port ready to receive those who have escaped the dungeon of existence, the medicine which cures all diseases, and the water which quenches the thirst of all desires. To Buddha, who received the term from earlier Hinduism and did not invent it, nirvana meant, first of all, the extinction of desire, of anger, of ignorance. Whether it was also synonymous with annihilation he refused to state, although this may be inferred.

The later Buddhist interpretations show that it was impossible to retain the notion of a non-psychic individuality persisting after death, and that the goal of extinction steadily faded before the older and more permanent notion of eternal felicity in one form or another. The first of these later views is that which confounds with nirvana the preparatory labor of the mind to arrive at that end, and therefore assumes that nirvana is the extinction of mentality, or even of self-consciousness. The erroneousness of this view is based on the fact that the mind, even though in a state of unconsciousness, as when ceasing to think, or when speculating, is still within the pale of existence. Thus, to obviate the mistaken notion that such a state is the real nirvana, Buddhist works sometimes speak of the "nirvana without a remainder of substratum" in contradistinction to the "nirvana with a remainder;" meaning by the latter expression that condition of a saint which, in consequence of his bodily and mental austerities, immediately precedes his real nirvana, but in which, nevertheless, he is still an occupant of the material world.

The second heterodox view of nirvana is that which, though acknowledging in principle the original notion of Buddhist salvation, clearly represents a compromise with popular prejudice. It belongs to a still later period of Buddhism, when this religion, in extending its conquests over Asia, had to encounter creeds which abhorred the idea of an absolute nihilism. This compromise coincides with the creation of a Buddhist pantheon, and with the classification of Buddhist saints into three classes, each of which has its own nirvana; that of the two lower degrees consisting of a vast number of years, at the end of which, however, those saints are born again; while the absolute nirvana is reserved for the highest class of saints. Hence Buddhist salvation is then spoken of, either simply as *nirvāṇa*, the lowest, or as *parinirvāṇa*, the middle, or as *mahāparinirvāṇa*, final and absolute extinction of individuality; and as those who have not yet attained to the highest nirvana must live in the heavens of the two inferior classes of saints until they reappear in this world, their condition of nirvana is assimilated to that state of more or less material happiness which is also held out to the Brahmanical Hindu before he is completely absorbed into Brahma.

When, in its last stage, Buddhism assumes

an Adi, or primitive Buddha, as the career of the universe, nirvana, then meaning the absorption into this Buddha, ceases to have any real affinity with the original Buddhist term, and becomes identified with the *mōkṣa*, or salvation by absorption, of the pantheistic philosophers. See also BUDDHISM and LAMAISM. Consult: Oldenberg, *Buddha, His Life, His Doctrine, His Order* (London, 1882); Hopkins, *Religions of India* (Boston, 1895); Dahmann, *Nirvana, eine Studie zur Vorgeschichte des Buddhismus* (Berlin, 1896).

NISAN. In the Jewish calendar, the first month of the ecclesiastical year. See ABIB.

NISARD, né-zār', Désiré (1806-88). A French literary critic and historian, born at Châtillon-sur-Seine, Côte-d'Or. Nisard began literary life as a liberal journalist. He supported the July Monarchy after a brief period of vigorous radicalism as editor of *Le National* and fellow-worker of Armand Carrel. In 1835 he was made Supervisor of Normal Schools, and, with official promotions, grew yearly more conservative and even reactionary. From 1842 to 1848 he was Deputy, and, after temporary eclipse at the Revolution of 1848, recovered under Napoleon III. favor and office, which he used so servilely, in lecturing at the Collège de France, as to provoke student riots and require police protection (1855). In recompense for this he was made Commander of the Legion of Honor (1856), Director of the Normal School (1857), and Senator (1867). He had belonged to the Academy since 1850. His more noteworthy works are *Histoire de la littérature française* (1844-61); *Etudes* (1859); and *Nouvelles études* (1864). As critic he stands for classic as opposed to romantic ideals. He neglects the Middle Ages and the Renaissance, and regrets alike the perversity of the eighteenth century and the degeneracy of the nineteenth. His objective method and martinet spirit delighted only in the clear precision of the Classic School. Thus he is the opposite of Sainte-Beuve and the forerunner of Brunetière. Nisard died March 15, 1888, at San Remo. Consult his *Souvenirs et notes biographiques* (1888).

NISCEMI, nè-shā'mé. A town in the Province of Caltanissetta, Sicily, 30 miles southeast by south of the city of Caltanissetta (Map: Italy, J 10). A ruined castle is the chief object of interest. In 1790 the town suffered from an earthquake, the ground sinking in one place to the depth of 30 feet. Population (commune), 1881, 11,962; 1901, 14,689.

NISH, nèsh, or **NISSA**, nis'sá. The second city of Servia, situated on the Nishava, a tributary of the Morava, about 130 miles southeast of Belgrade (Map: Balkan Peninsula, D 3). It is fortified and divided into a Turkish and a Servian town. It is gradually assuming a European aspect. Its educational institutions include a gymnasium and a training school for teachers. Situated at the junction of the Vienna-Belgrade-Constantinople and the Nish-Saloniki railway lines, as well as at the converging point of several important roads, Nish is of great commercial and strategic importance. It was prior to 1901 the seat of the National Assembly. Population, in 1895, 21,524, including about 2000 Mohammedans.

Nish is the Niassus of the Romans, a prominent city, according to Ptolemy, and the birthplace of Constantine the Great. It fell in 1456 into the hands of the Turks, under whom it was an important stronghold. It was the scene of a severe defeat of the Servians by the Turks in 1809, and was captured by the Servians under Milan in 1878.

NISHAN EL-AAMAN, nī-shān' ēl ā-mān' (Ar. *nishān al-āman*, order of the best). A Tunisian order with one class founded by Mohammed-es-Sadok in 1859 in commemoration of the adoption of the Constitution.

NISHAN EL-IFTIKHAR, nī-shān' ēl if'tī-kār' (Ar. *nishān al-iftihār*, order of honor). A Tunisian order of merit, civil and military, modeled on the French Legion of Honor, founded by Ahmed Bey. It has five classes. The decoration is a star with the Bey's monogram.

NISHAN EL-IFTIKHAR. A Turkish order, conferred on foreigners for services to the Turkish State. It was founded by Sultan Selim III. and renewed in 1827. The decoration is an ornate medallion with the Sultan's monogram suspended from the star and crescent.

NISHAN-I-IMTIAS, ēm'tē-ās' (Ar.-Pers. *nishān-i-Imtiyās*, order of excellence). A Turkish order of merit conferred on civil and military officials who have displayed at least three of the qualities the names of which appear on the decoration: patriotism, zeal, bravery, and fidelity. It was founded in 1879 by Sultan Abdul Hamid.

NISHAN-I-SHEFKAT, ē-shēf-kāt' (Ar.-Pers. *nishān-i-shifqat*, order of clemency). A Turkish order with three classes, conferred on women for services in war and in times of distress. It was founded by Sultan Abdul Hamid in 1878. The decoration is a sun with laurel wreath and star suspended from a crescent.

NISHAPUR, nīsh'ā-pūr'. A town of North-eastern Persia, in the Province of Khorasan (Map: Persia, G 3). It is situated in a fertile and populous plain 40 miles west of Meshed, and is surrounded by half-ruined walls. It was formerly one of the most important cities of Persia, but has greatly declined. It still has some trade in turquoises. Population, about 11,000. Nishapur was the birthplace of Omar Khayyam.

NISIBIS (Lat., from Gk. *Nisibis*). The capital of ancient Mygdonia, the northeastern part of Mesopotamia. It was situated in a fertile district, and was of importance, both as a place of strength and as an emporium of the trade between the East and the West. Nisibis is mentioned in the cuneiform inscriptions under the name Nasibina. It seems to have been rebuilt by Seleucus, and during the Macedonian rule was known as *Antiochia Mygdonia*. It was taken in B.C. 149 by the Parthians, and in their wars with Rome changed hands more than once, being captured by Lucullus (B.C. 68) and again by Trajan (A.D. 116). After its third capture by Lucius Verus, A.D. 165, it remained the chief bulwark of the Roman Empire against the Persians, till it was surrendered to them by Jovian after the death of Julian in 363. Nisibis is still the name of a Turkish village near the ruins of the ancient city.

NISI PRIUS (Lat., unless before). A term applied to certain trial courts, consisting of one judge and a jury, which have jurisdiction for

the trial of civil cases. The term originated in England through the practice of inserting in writs of venire (q.v.), by which jurors were summoned, a clause directing them to appear at the Court of Common Pleas at Westminster on a certain date, unless before (*nisi prius*) that time one of the judges in Eyre (circuit) should hold court in their county. It also became common, when cases from a distant county were commenced at Westminster, to fix a certain day on which they were to be tried unless before that time court was held in that county, and this was entered on the record, being known as the '*Nisi prius* clause.' This practice was sanctioned by the statute of 13 Edw. I., c. 30, known as the "*Statute of Nisi Prius*." The sessions held by these circuit judges came to be known as *Nisi Prius* Courts, and this continued until after the sittings of the judges became fixed and certain, when the alternative phrase was omitted from the venire; and thereafter the use of the term as applied to the courts was gradually discontinued. To-day the cases tried before the judges of the King's Bench Division of the High Court of Justice in London are known as *nisi prius* actions, and this seems to be the only use of the term which has judicial sanction in England at present, although in the country districts the name is still popularly applied to the proceedings in the civil courts held in the various circuits under the Judicature Acts (q.v.). In a few of the United States the term is applied to certain civil courts, the sessions of which are held by judges who travel from one county to another, in a fixed circuit of several counties, during the year; but the original significance of the term has become obsolete. See **CIRCUITS**; **COURT**; **JUDICATURE ACTS**, and consult the authorities there referred to.

NISQUALLI, nīz'kwā-lē. A Salishan tribe of North American Indians originally occupying the territory about the river of the same name at the southern end of Puget Sound, Washington. With the Puyallup (q.v.) and several smaller bands, all speaking dialects of the same language, they participated in the Medicine Creek Treaty of 1854 and were assigned to a reservation, but have recently been given industrial allotments and are now citizens. They subsisted chiefly upon wappato and camas roots, wild berries, and salmon. They lived in great communal houses of cedar planks and used cedar dugout canoes of elaborate workmanship and ornamentation. Slavery was a regular institution, and head-flattening was practiced, but not scalping. They buried their dead in canoes raised upon posts. They took part in the general Indian war in Washington in 1858. They number now only about 100 souls.

NIS'ROCH (Heb. *Nisrōk*). According to II. Kings xix. 37 (Is. xxxvii. 38), the god in whose temple Sennacherib was assassinated by his sons. No such god, however, has been discovered in the Assyrian pantheon, and the word is manifestly a corruption. It has been variously identified with Asshur, Nusku, and others, but most probably it represents Marduk, the chief of the later Babylonian pantheon. (See **MERODACH**.) For a like corruption, see **NIMBOD**. Consult Cheyne, *Sacred Books of the Old Testament* (London, 1896, et seq.).

NISSA, nī'sā. A city of Servia. See **NISH**.

NISSEN, HEINRICH (1839—). A German archaeologist. He was born at Hadersleben, studied at Kiel and Berlin, and became professor of ancient history at Marburg (1869), Göttingen (1877), Strassburg (1879), and Bonn (1884). Nissen especially devoted himself to the critical study of early Roman history. He wrote *Kritische Untersuchungen über die Quellen der vierten und fünften Dekade des Livius* (1863), *Das Templum* (1869), *Pompejanische Studien* (1877), *Italische Landeskunde* (1883), and *Griechische und römische Metrologie* (1887) in Iwan Müller's *Handbuch der klassischen Altertumswissenschaft*.

NISUS (Lat., from Gk. *Nīses*). (1) In Greek mythology, a King of Megara, and son of King Pandion of Athens. His daughter Scylla fell in love with Minos, King of Crete, when the latter, on his expedition against the Athenians, besieged Megara, and betrayed the city to him. She slew her father by cutting off a purple lock of hair, on the preservation of which his life depended, but Minos punished her treachery by dragging her after his ship and drowning her. She was changed into the bird called Ciris, in which form she was constantly pursued by Nisus, transformed into a sea-eagle. The legend is treated by Vergil in the *Ciris*, and by Ovid, *Met.*, viii. 145. (2) A companion of Æneas and friend of Euryalus, with whom he was slain in the war against Turnus.

NITHARD (c.795-843). A Frankish historian, son of Bertha, daughter of Charles the Great. He was a warrior and a statesman and sided with Charles the Bald in the quarrels between the sons of Louis the Pious. Nithard fought in the great three days' fight at Fontenoy in 841, and was killed two years after in a battle with the Northmen near Angoulême. His Latin history deals with the dissensions of the sons of Louis the Pious; it is valuable, but strongly partisan, and is remarkable as one of the few documents of the Middle Ages written by a layman. The work is edited by Pertz (*Hanover*, 2d ed., 1870). Consult: Pätz, *De Vita et Fide Nithardi* (Halle, 1865), and Meyer von Knonau, *Ueber Nithards vier Bücher Geschichte* (Leipzig, 1886).

NITHSDALE, nith'dal, WILLIAM MAXWELL, Earl of (1676-1744). A Scotch Jacobite, the Willie of 'Kenmure's up and awa'. He participated in the Jacobite rising of 1715. He was captured after Preston, and was rescued from the Tower by his wife, who took his place in prison while he escaped in her clothes. He made his way to Rome, where he joined the Pretender. The Countess of Nithsdale wrote the story of his escape published in the first volume of the *Transactions of the Societies of Antiquaries of Scotland*.

NITO'CRIS. A Queen of Egypt (Nitaqert, or Nitaqrit), the last ruler of the Sixth Dynasty. She was sister of Menthuophis, whom she succeeded, and whose murder she avenged by drowning all she suspected of connection with the plot, after having called them together for a feast. The third in size of the great pyramids was enlarged by Nitocris, and there she was buried. About her beauty legends grew up; the Greeks called her Rhodopis, translating the Egyptian epithet, red-cheeked; they argued she must have been a Greek, made her a courtesan, and told how the King married her, having

fallen in love with her lost slipper—the earliest form of the legend of Cinderella. Another legend in the Middle Ages makes her a beautiful spirit who haunts the pyramid and drives men mad for the love of her.

NITRATE OF SODA. See MANURES AND MANURING.

NITRATES. See NITRIC ACID.

NITRE. See SALTPETRE.

NITRIC ACID (from Neo-Lat. *nitrum*, nitre, natron, Lat. *nitrum*, from Gk. *νίτρον*, *nitron*, *λίτρον*, *litron*, natron, of Semitic origin, cf. Heb. *neter*, natron, from *natar*, to loose), HNO_3 . A powerfully acid compound of hydrogen, nitrogen, and oxygen. Geber, in his *De Inventione Veritatis*, described a method of preparing the acid by heating potassium nitrate with alum and copper sulphate, and Glauber was probably the first to prepare it by the action of free sulphuric acid upon saltpetre (the acid was long known as '*spiritus nitri fumans Glauberi*'). In 1669 Mayow described nitric acid as containing two components, one from the air and one from the earth. In 1776 Lavoisier demonstrated that one of its constituents was oxygen, and in 1785 Cavendish showed the composition of the acid by synthesizing it from oxygen and nitrogen in the presence of water. However, the true composition of its molecule was not recognized until long afterwards, when chemists had realized that acids in general were compounds necessarily containing hydrogen. (See CHEMISTRY.) Nitric acid does not occur in a free state in nature, but after thunder storms traces of it are found in rain water, and according to Boussingault, amounts of nitric acid up to 0.66 mg. to the liter have been found in the rain falling on the Alps. It occurs largely, however, combined in the form of alkaline nitrates, in Chile and elsewhere, the formation of the nitrates being supposed to originate in the putrefaction of nitrogenous organic matters: the latter are assumed to be converted into ammonia, and this to be oxidized in presence of the hydroxide of potassium, sodium, or calcium, into the corresponding nitrate. Nitric acid may be made by the action of strong sulphuric acid on the nitrate of sodium or potassium, the former being generally employed on a commercial scale on account of its cheapness. Cast iron retorts are charged with about 670 pounds of dry sodium nitrate, about 530 pounds of strong sulphuric acid are added, and heat is applied. The volatile nitric acid, on forming, passes into a series of large bottles provided with inlet and outlet tubes ('Woulff's bottles') and containing small amounts of water. Nitric acid is, however, not the only product, a certain amount of peroxide of nitrogen being formed at the same time. Some of this dissolves in the nitric acid, imparting to it a more or less intense red coloration. Another portion of the peroxide is caused to come into contact with moist air, in a tower attached to the last of the large bottles, and thus this portion of the peroxide is converted into nitric acid. Sodium sulphate remains as a by-product of the process in the cast-iron retorts. The acid product generally contains about 55 per cent. of nitric acid, the rest being water and small amounts of chlorine, iodic acid, oxide of iron, sulphuric acid, sodium sulphate, and peroxide of nitrogen, the non-volatile of

these impurities being carried over mechanically during the process of distillation. Most of the impurities may be readily gotten rid of by a second distillation, the first portion of the distillate and a small last portion containing nearly all the impurities, while the large intermediate portion is practically pure, although it still contains a large percentage of water and a small amount of nitrogen peroxide. A third distillation, this time after mixing the liquid with an equal volume of concentrated sulphuric acid, yields a nitric acid of over 99.5 per cent. strength. To free this from peroxide of nitrogen, it is gently warmed, then removed from the source of heat, and a current of dry air is passed through it until the temperature has been reduced to that of the surroundings. Thus nitric acid is purified for use in chemical laboratories. For many purposes in the arts, however, the acid need be neither very strong nor very pure. Pure nitric acid is a colorless liquid with a specific gravity of 1.53 at ordinary temperatures. The pure acid, as well as its strong aqueous solutions, decomposes slowly under the influence of light, with formation of water, oxygen, and peroxide of nitrogen, the latter coloring the acid yellow. A similar decomposition, only more rapid, is effected by heat, at temperatures above 86° C. (187° F.). A given amount of nitric acid may be decomposed entirely by sealing it up in a glass tube and raising the temperature to 260° C. (500° F.). Under reduced pressures nitric acid may be distilled without decomposition; thus, it may be entirely freed from nitrous acid by several distillations under a pressure of 15 millimeters of mercury, at the temperature of 45° C. (113° F.).

Nitric acid is used in large quantities in chemical laboratories, in both analytical and synthetic work. Its uses in the manufactures are very extensive indeed. It is used in the manufacture of explosives, of coal-tar colors, and of commercial nitrates, including those of silver, lead, iron, aluminum, barium, and strontium. A mixture of nitric and hydrochloric acids is known as *aqua regia* (q.v.). Nitric acid is one of the most powerful oxidizing agents and in a concentrated state readily oxidizes sulphur, phosphorus, carbon, most metals, and many organic substances. The oxidation of turpentine, for example, when added to strong nitric acid, is rapid enough to be accompanied by an evolution of light and of heat of a very high temperature. The following may be mentioned among the *physiological effects* of nitric acid: the strong acid is a powerful caustic, staining the skin yellow and causing erosions and ulcers; even a 10 per cent. solution in water will cause swelling if applied to the skin. In highly dilute form the acid is sometimes administered internally, the effect being an improved appetite and an increased secretion of urine. If continued, however, the administration of the acid will cause the gums to turn spongy and to bleed, and will loosen the teeth. Whether given internally or employed in the form of baths, nitric acid will further cause dyspepsia, foul breath, headaches, debility, etc. It has been successfully given in cases of intermittent fever, to allay thirst in diabetes, and for a variety of other purposes. Externally it is used as an ingredient of gargles, in the treatment of chilblains, for the

removal of warts, etc. *Aqua regia* is sometimes used for the same purposes as nitric acid alone. For a convenient method of detecting nitric acid, see below under *Nitrates*.

NITRATES. The salts of nitric acid, i.e. the compounds resulting from the substitution of metals for the hydrogen of nitric acid, are termed nitrates. The most important of these is *nitrate of silver*, AgNO_3 , which is extensively used in photography and in medicine. It is made by dissolving metallic silver in gently heated 30 per cent. nitric acid, the pure salt crystallizing out on cooling. It may be purified by fusing, when the nitrates of other metals that are likely to be present are reduced and rendered insoluble, so that pure silver nitrate may be dissolved out of the fused mass on cooling. Silver nitrate is very soluble in water and dissolves in four times its weight of cold alcohol. It forms colorless tabular crystals of the rhombic system. It melts at 198° C. (388.4° F.) without decomposition; but if heated to redness it is reduced to metallic silver. Fused silver nitrate, usually in sticks rendered firm by the addition of a little potassium nitrate, or silver chloride, is used as a cauterizing agent, being commonly known as *lunar caustic*. When applied to the skin, silver nitrate combines with albumin to form an insoluble white albuminate of silver. When used, the sticks are moistened with water and rubbed over the surface of the skin. The nitrate is thus used in diphtheria, croup, chronic ulceration and simple inflammation of the larynx and trachea, simple chronic laryngitis, whooping cough, various forms of neuralgia, in various diseases of the eye, in erysipelas, for burns, etc. The stain left by it on the skin may be removed by the use of potassium cyanide. Internally nitrate of silver is sometimes given in certain diseases of the stomach and the heart and in bronchitis, and it has been found useful in certain diseases of the nervous system; for example, in paralysis and epilepsy. In cases of poisoning by silver nitrate, the patient should swallow a large amount of a solution of common salt, which transforms the nitrate into the insoluble and harmless silver chloride, and induces vomiting; the solution of salt should be followed by moderate amounts of milk. Nitrates of lead, iron, and aluminum are used in dyeing and calico printing. *Lead nitrate*, $\text{Pb}(\text{NO}_3)_2$, may be obtained by dissolving metallic lead, or oxide or carbonate of lead, in dilute nitric acid, the salt crystallizing out on slow evaporation. It is soluble in water, but is insoluble in strong alcohol. It is sometimes used in medicine, especially as an application for sore nipples. *Nitrate of iron*, or ferric nitrate, $\text{Fe}_3(\text{NO}_3)_9$, is likewise sometimes used in medicine, its solution being prepared by the action of nitric acid on freshly obtained moist ferric hydroxide. *Barium nitrate*, $\text{Ba}(\text{NO}_3)_2$, and *strontium nitrate*, $\text{Sr}(\text{NO}_3)_2$, are used in making fireworks. The nitrates of potassium and sodium will be found described under *SALTPETRE*. Nitric acid and its salts may be most readily detected in solutions by the use of the alkaloid brucine: a little brucine in solution and a few drops of strong sulphuric acid are added to the liquid under examination, which turns pink if it contains nitric acid or a nitrate. The nitrates also include a number of organic substances, the most important of which are nitroglycerin and gun-cotton (qq.v.). See also *NITROGEN*.

NITRIFICATION. The term applied to the formation of nitrates in soils and manures through the agency of micro-organisms. It includes three different stages, viz., (1) *ammonization*, the transformation of organic nitrogen compounds into ammonia; (2) *nitrozation*, or the conversion of ammonia into nitrites; and (3) *nitration*, or the formation of nitrates from the nitrites. Modern investigation has shown that all three of these changes are due to the activity of micro-organisms, the first being brought about by a variety of organisms of the putrefactive class, the most prominent being *Bacillus mycoides* and *Proteus vulgaris*, while the second and third are the work of specific organisms (*nitrosomas*, nitrous organisms, and *nitrobacteria*, nitric organisms), which have been isolated and studied with some minuteness. The retrograde action known as denitrification, by which nitrates are reduced to the less highly oxidized forms and even to free nitrogen, has also been shown to be the work of micro-organisms, mainly *Bacillus denitrificans* I. and II., although a large number of other organisms bring about denitrification. The first of the denitrifying organisms named works best in absence of oxygen; the second is aerobic and works most energetically in connection with *Bacillus coli-communis*. The discovery of the true nature of nitrification was made by Schloesing and Müntz in 1877. Since that date the nature of the organisms causing nitrification and the conditions best suited to their activity have been carefully studied by many other investigators. These studies have shown that the activity of the nitrifying organisms is limited by a certain range of temperature, viz. from slightly above freezing to about 50° C., the organisms being most active, according to Schloesing and Müntz, at a temperature of about 37° C. Other essential conditions are an adequate supply of air (oxygen), for which reason activity is generally confined to the surface layer of soil and moisture, and the presence of certain mineral plant food constituents, especially phosphoric acid and a salifiable base (lime as carbonate).

Nitrification will go on only in a slightly alkaline medium, but excessive alkalinity is as fatal to the process as acidity. Winogradsky, Warington, and Frankland have demonstrated the interesting fact that the nitrifying organisms do not require organic matter, but can grow in a purely mineral medium, deriving their carbon from carbon dioxide. The organisms are widely distributed and very abundant in all soils except such as are deficient in lime compounds and are acid. Müntz found them in abundance on the bare surfaces and in the cracks and fissures of rocks at the summit of mountains in the Pyrenees, Alps, and Vosges. They are also found in well water, river water, and sewage. As a rule they do not occur in rain or in the air. They decompose carbon dioxide most readily, and hence cause nitrification most rapidly in the dark.

While nitrification probably goes on to some extent during the winter, the conditions are usually most favorable to rapid nitrification during the summer months, especially in fields lying in bare fallow. The rate is of course very variable. Warington found it in an unfertilized Rothamsted soil to be 1.3 pounds of nitric nitrogen per day per acre to a depth of nine inches. Similar soil fertilized with sulphate of ammonia showed nearly twice this rate. Much higher

rates than these have been reported. Ammonium salts, since they have already passed the first stage of nitrification, are considered more readily nitrifiable than organic substances which must first be converted into ammonium compounds. Müntz and Girard place them first in order of nitrifiability; then follow guano, green manures, dried blood and meat, powdered horn, poudrette, wool, and leather. Frequently, however, the rate of nitrification of ammonium salts is found to be much slower than that of organic manures. This may be due to a deficiency of lime or to other unfavorable conditions, but Withers and Fraps report experiments in which the order of nitrification of different fertilizing materials in presence of an abundance of calcium carbonate was: dried blood, cottonseed meal, dried fish, bat guano, tankage, ammonium sulphate, bone. A portion of the nitrogen of soil humus is readily nitrifiable, while a part strongly resists the action of nitrifying organisms. The rate of nitrification in barnyard manure in the soil is very variable, but is probably greater than that of soil nitrogen. The old-time nitre beds or plantations were simply examples of rapid nitrification under peculiarly favorable conditions.

The constant production of nitrates in the soil and the readiness with which they are washed out in the drainage furnish a strong argument in favor of the practice of a system of cropping which keeps the soil covered with vegetation as constantly as possible. The conditions favorable to denitrification are exactly the opposite of those which favor nitrification, viz. excess (and deficiency) of water and a limited supply of air (oxygen). Under certain conditions denitrification is especially rapid in barnyard manure and results in considerable losses of nitrogen from this material.

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NITRITE OF AMYL. See AMYL NITRITE.

NITRITES. The salts of nitrous acid (q.v.).

NITRO-BENZENE, or NITRO-BENZOL, $C_6H_5NO_2$. An aromatic nitro-compound manufactured from the benzene derived from coal-tar, and in its turn transformed into the aniline that is used in making dye-stuffs. Nitro-benzene is an oily yellow liquid of specific gravity 1.2 at 0° C. (32° F.) and boiling at 205° C. (401° F.); it may be distilled without decomposition. It has a sweet taste, is insoluble in water, but dissolves freely in alcohol and ether. Its odor is very similar to that of oil of bitter almonds, which has led to its use in perfumery, under the name of *essence of mirbane*. Most of the nitro-benzene of commerce is, however, transformed into aniline. On a large scale nitro-benzene is made by gradually adding a quantity of benzene to a mixture of concentrated nitric and sulphuric acid placed in a large iron vessel, the tempera-

ture being kept low by cooling with water, and the mixture being constantly stirred with the aid of some special arrangement with which the vessel is provided. After all the benzene has been added, the temperature is raised for a short time to about 80°C . (176°F). Then the mixture is diluted with water and distilled with a current of steam. For laboratory purposes nitro-benzene may be purified by washing with dilute soda, drying, and subjecting to a process of fractional distillation. Nitro-benzene is a very poisonous substance, its vapors, if inhaled, being capable of causing coma and death in a few hours.

NITRO-CELLULOSES. See GUNCOTTON.

NITROGEN (from Neo-Lat. *nitrum*, nitre, natron, Lat. *nitrum* + Gk. *-γενής*, *-genēs*, producing, from *γίγνομαι*, *gignesthai*, to become). A gaseous element discovered by Rutherford in 1772, who found that when a small animal was allowed to breathe air in a confined space for a time, and the carbon dioxide thereby produced removed by absorption, a gas still remained which was incapable of supporting respiration. On account of its presence in nitre, Chaptal named it nitrogen (French *nitrogène*); and owing to its incapacity for supporting life, Lavoisier named it *azote* (1787). It is one of the most widely distributed of the elements, and is found free in the atmosphere, of which it forms about four-fifths by volume. Considerable quantities of it occur in volcanic gases and in the air-bladders of certain fishes, the bone cavities of birds, and in plants. It is likewise found in meteorites, and its presence has been demonstrated in the atmosphere of the sun. In combination it is found associated with oxygen as nitric and nitrous acids, with hydrogen as ammonia, and with oxygen, hydrogen, and carbon in many substances of organic origin. It is an essential constituent of animal and vegetable organisms, and is found in many minerals, as saltpetre and soda nitre. The separation from nitrogen of the other gases contained along with it in atmospheric air was considered a very easy matter before the discovery of argon (q.v.). In fact, the water-vapor of the air can be readily removed by the use of strong sulphuric acid or burnt lime or any other good dehydrating agent; the carbonic acid of the air can be removed by means of the caustic alkalis or alkaline earths; the oxygen can be removed by passing air over red-hot copper, by burning phosphorus in the air, and by similar methods. But argon is itself an inert substance that cannot be removed by any known chemical reagent. Nitrogen might possibly be isolated from it by liquefying the mixture and subjecting it to fractional distillation. But an easier and more certain way of obtaining pure nitrogen consists in causing it to be liberated from certain of its compounds. Thus pure ammonium nitrite breaks up, on heating, into pure nitrogen and water. Similarly, nitrogen may be obtained by heating a mixture of potassium nitrite and ammonium chloride, or by heating equal parts of potassium nitrite and ammonium sulphate with a mixture of three parts of water and two parts of glycerin.

Nitrogen (symbol, N; atomic weight, 14.04) is a colorless, tasteless, and odorless gas. By the application of pressure at low temperature (see CRITICAL POINT), nitrogen has been liquefied, and the liquid has been caused to freeze. In the gaseous

state it is slightly soluble in water. It combines directly with but very few elements, although indirectly it can be made to form compounds with a large number of the elementary bodies. Nitrogen combines with oxygen to form the following five oxides: (1) *Nitrogen monoxide*, or nitrous oxide, N_2O , called also 'laughing gas,' was originally obtained by Priestley in 1772, by the action of moist iron filings on nitric oxide (NO). It is now usually prepared by the distillation of ammonium nitrate, and is a colorless gas of pleasant odor and sweetish taste. It is a valuable anæsthetic (q.v.), and is largely employed for producing insensibility during short operations. It may be considered as the anhydride of hyponitrous acid (q.v.). (2) *Nitrogen dioxide*, or nitric oxide, NO , was first obtained by Van Helmont, who failed, however, to recognize it as a distinct chemical substance. Its properties have been clearly known since 1772, when Priestley succeeded in isolating it, and its composition was correctly determined by Cavendish in 1784. It is formed when various substances (hydrogen, illuminating gas, wood, coal, etc.) are burned in the air. It may be prepared by the action of cold dilute nitric acid on metallic copper (concentrated nitric acid yields laughing gas). In the absence of oxygen it remains colorless; but it readily combines with oxygen to form red fumes of nitrogen tetroxide. Still, if heated alone to 520°C ., nitric oxide decomposes with formation of laughing gas, free nitrogen, nitrogen trioxide, and nitrogen tetroxide. Solutions of ferrous salts absorb considerable quantities of nitric oxide. (3) *Nitrogen trioxide*, N_2O_3 , may be obtained by heating nitric acid with starch in a large retort, drying the gaseous product over calcium chloride, and liquefying it by means of freezing mixtures. At 10°C . it is a dark blue liquid and it boils below 0°C . Within a few degrees above that point its vapors decompose into nitric oxide and nitrogen tetroxide. The decomposition, however, is partial, and even at as high as 150°C . the trioxide is not yet completely decomposed. The trioxide has been recommended as a disinfectant; for this purpose a mass containing one part of sodium nitrite, two parts of acid sodium sulphate, and two parts of gypsum, is kept dry when not used; on mixing it with water it yields the trioxide of nitrogen. Nitrogen trioxide is the anhydride of nitrous acid (q.v.). (4) *Nitrogen tetroxide*, or nitrogen peroxide, has the formula N_2O_4 , at lower temperatures and NO_2 at high temperatures. (See DISSOCIATION.) The tetroxide is formed when dry nitric oxide comes in contact with oxygen. It may be prepared by passing a perfectly dry mixture of two parts (by volume) of nitric oxide and one part of oxygen into a U-tube immersed in a freezing mixture at -20°C ., and if the mixture is absolutely dry the tetroxide is thus obtained in the form of colorless crystals. Above -20°C . it is usually a liquid of yellow color, the color becoming more and more intense as the temperature rises. The vapor is the more intensely colored, the more it is dissociated. (See DISSOCIATION.) The boiling-points of the liquid, as given by different observers, are between 22° and 28°C . (5) *Nitrogen pentoxide*, N_2O_5 , was discovered by Sainte-Claire Deville in 1849. It may be prepared by the action of phosphorus pentoxide on nitric acid completely dehydrated by repeated distillations with

sulphuric acid and freed from nitrogen trioxide by passing a current of dry air. The nitrogen pentoxide thus obtained is passed into a suitable receiver kept in a freezing mixture; when a crystalline mass has formed in the receiver, the portion remaining liquid is decanted off; then the crystals are allowed to melt, the liquid is again caused to solidify, and any portion remaining liquid is again rejected. By repeating this operation several times, it is easy to obtain perfectly pure nitrogen pentoxide. The colorless rhombic crystals of this substance may be preserved very long by keeping out of contact with the air and away from light. They melt at about 30°C . and the liquid boils at about 45°C ., but slightly above this temperature the substance undergoes decomposition. If exposed for some time to the light the crystals melt and may decompose with explosive violence. Nitrogen pentoxide is the anhydride of nitric acid.

The compounds of nitrogen with hydrogen include ammonia, NH_3 , hydrazine, N_2H_4 , and hydrazoic acid, N_3H . The most important of the compounds of nitrogen with the halogens is nitrogen trichloride, NCl_3 , which may be considered as ammonia in which all the hydrogen has been replaced by chlorine. It is prepared by passing chlorine gas into a warm solution of ammonium chloride. It is a yellowish, volatile, extremely explosive, oily substance, which must be handled with extreme caution and the preparation of which should not be undertaken by any one not thoroughly accustomed to experimenting with dangerous substances. Its explosion may be brought about by the action of heat or light, or by contact with phosphorus, turpentine, and other substances.

NITROGLYCERIN, or **GLONOLIN**, $\text{C}_3\text{H}_5\text{O}_2(\text{NO}_2)_3$. An explosive substance discovered by Sobrero in 1846. Although Sobrero pointed out the possibilities of the substance as an explosive agent, it found no other than a limited use, in dilute alcoholic solution, as a remedy for headache, under the name of 'glonoin.' Its use as an explosive remained undeveloped until 1862, when Alfred Nobel (q.v.) discovered means of controlling its explosive properties and devised a practical method of making it on a large commercial scale. Nitroglycerin is made by running from 210 to 230 pounds of pure glycerin into 1500 pounds of mixed acids, consisting of three parts by weight of concentrated sulphuric, and two parts by weight of concentrated nitric acid. As considerable heat is set free by the reaction it is necessary that the glycerin should be added slowly and intimately mixed with the acids. This is accomplished by injecting the glycerin into the acid mixture, stirring the whole, and cooling it by means of cold water run through pipes which are coiled within the leaden vessel ('the converter') in which the conversion is carried out. When all of the glycerin is converted into nitroglycerin, the entire charge of the converter is run into a tank, where, on standing, the nitroglycerin separates in a layer on top of the acids. The nitroglycerin is then drawn off, washed with water until nearly free from acid, then with a dilute solution of sodium carbonate until it is neutral in reaction, and then run through a filter by which it is dried.

Pure nitroglycerin is a colorless, odorless,

transparent oily liquid, but as made on a commercial scale it is colored various shades of yellow. Solidified nitroglycerin melts at 8°C . (40.4°F .). Its specific gravity in the liquid state is 1.599; when frozen, 1.735. It gives off vapors to a slight extent at the ordinary temperature, and it may be completely evaporated by continuous exposure at a temperature of 70°C . (158°F .). It is soluble in methyl alcohol, ethyl alcohol, ether, benzene, and many other organic liquids, but it is nearly insoluble in water. When the vapors of nitroglycerin are inhaled or the substance is taken into the stomach, it produces most violent headaches. Some persons are so sensitive to its action that they are poisoned by it when nitroglycerin touches the skin. The production of undecomposed vapor of nitroglycerin, when the substance is exploded, seriously interferes with its use in tunnels, mines, and other confined places. The common antidote is black coffee. Pure nitroglycerin will keep indefinitely at common temperatures; but if continuously exposed to temperatures above 45°C . (113°F .) it undergoes decomposition, which progresses the more rapidly the higher the temperature. At 180°C . (356°F .) it explodes violently. It is also decomposed by contact with sulphuric acid, or with an alkali, and decomposition due to the presence of acid has repeatedly given rise to accidental explosions of this substance. It may be exploded by percussion, concussion, or fire, but the surest and safest way of firing it is by exploding a detonator containing mercuric fulminate in contact with it.

The name nitroglycerin, as applied to the substance discovered by Sobrero, is a misnomer, and conveys a false impression as to its accepted constitution; for instead of being, as supposed when the name was given, a nitro-substitution compound, it has been shown by Berthelot to be a nitric ester, namely, the tri-nitrate of glyceryl ($\text{C}_3\text{H}_5\text{O}_2$), a radicle forming part of the molecule of glycerin.

Nitroglycerin is used directly in 'shooting' oil wells to make them yield more freely, and in blasting under water; but its liquid state renders it unsuitable and even dangerous for general use as an explosive. Its largest uses are in the manufacture of dynamite, blasting gelatin, and some varieties of smokeless powders, notably cordite and ballistite. Medicinally, nitroglycerin is used in a weak dilution to reduce arterial tension and relieve the heart of strain, by dilating the arterioles and capillaries. Its action is similar to, though less rapid and fugacious than that of amyl nitrate, and less persistent than that of the nitrite of sodium or potassium. It is employed in a certain type of asthma, in chorea, epilepsy, angina pectoris, and gastralgia. It has been recommended in certain forms of Bright's disease. Although the manufacture of nitroglycerin did not begin in the United States until 1867, and its progress was at first slow, in the year 1900 there were manufactured here 35,482,947 pounds, of which amount 31,661,806 pounds were used in the manufacture of dynamite, blasting gelatin, and smokeless powder. Consult: Mowbray, *Trinitro-Glycerin* (New York, 1874); Nobel, Roux, and Sarrau, *Les explosifs modernes* (Paris, 1876); Guttmann, *The Manufacture of Explosives* (New York, 1895). See EXPLOSIVES.

NITRO-HYDROCHLORIC ACID, **NITRO-MURIATIC ACID**, or **AQUA REGIA**. See **AQUA REGIA**.

NITROPHILOUS PLANTS (from Lat. *nitrum*, natron + Gk. *φίλος*, *philos*, loving, from *φίλειν*, *philein*, to love). Plants which thrive best in soils rich in nitrogenous materials. The term is objectionable, since it implies qualities about which there is great doubt. Certain plants found particularly in the neighborhood of manure piles have been supposed to prefer soils rich in nitrogenous substances, but the evidence upon which this based is very slight. It is, of course, true that all plants require nitrogenous food, which is particularly hard to get in certain cases, and especially in the case of plants which have no symbiotic fungus relation. It may be, therefore, that autophytes require larger amounts of nitrate or ammonia than do mycotrophic plants. See **ROCK PLANTS**.

NITROUS ACID (from Lat. *nitrosus*, full of natron, from *nitrum*, natron), HNO_2 . An acid compound of hydrogen, nitrogen, and oxygen, known chiefly by its salts, which are called *nitrites*. The acid itself is not known in an isolated state, being a very unstable compound; even in an aqueous solution rapidly decomposing into nitric acid and nitric oxide (NO). Nitrites, however, are very stable bodies and are usually formed by the reduction of nitrates. Small quantities of ammonium nitrite are found in our atmosphere, and other nitrites are contained in the juices of certain plants. In nature the nitrites are formed usually by the decomposition of organic matter, and generally indicate contamination with sewage. One of the most important nitrites is that of potassium, which is formed either by fusing potassium nitrate or by heating that salt with lead or copper. Certain organic compounds of nitrous acid are of considerable importance.

NITROUS ETHER, or **ETHYL NITRITE**, $\text{C}_2\text{H}_5\text{NO}_2$. A pale yellow fluid, lighter than water, and evolving an agreeable odor of apples. On evaporation, it produces a great degree of cold; it boils at 64.4°F . (18°C .), and it is very inflammable. It does not mix with water, but is readily miscible with alcohol. When kept in contact with water it soon decomposes, and an acid mixture of a very complicated character is formed. It is usually prepared by the action of nitric acid on alcohol. The *spirit of nitrous ether* or *sweet spirit of nitre* used in medicine is a mixture of nitrous ether with about four times its volume of rectified spirit. It is used, in conjunction with other medicines, as a diuretic, especially in the dropsy which follows scarlatina; and it is employed, in combination with acetate of ammonia and tartarized antimony, in febrile affections.

NITROUS OXIDE. Nitrogen monoxide, or laughing gas, N_2O . It is made by heating solid ammonium nitrate in a flask. The result is water and nitrous oxide, $\text{NH}_4\text{NO}_3 = 2\text{H}_2\text{O} + \text{N}_2\text{O}$. Laughing gas possesses the peculiar property of intoxicating animals. It may be inhaled pure or mixed with atmospheric air for a considerable period with safety. When first inhaled there is a feeling of exhilaration experienced, which is succeeded by profound anæsthesia, during which minor surgical and dental operations may be performed. There is no resulting depression, and in cases

where the inhalation is not continued over twenty minutes the patient experiences absolutely no unpleasant sensations, and is able to go about his avocations without loss of time, on recovering consciousness. It is the custom with many American surgeons to secure anæsthesia by the use of nitrous oxide and then substitute ether as the anæsthetic, in all operations where over fifteen or twenty minutes are requisite for the completion of the work. This expedient prevents the nervous excitement consequent upon the administration of ether from the first, diminishes shock, and prevents much of the nausea consequent to ether anæsthesia. The term laughing gas is used because the patient is apt to laugh or exhibit other emotion if but a little gas is administered, and then the inhalation is intermitted. See **NITROGEN**.

NITTIS, GIUSEPPE DE (1846-84). An Italian painter, born at Barletta, Naples. He was a pupil of the Naples Academy, but found his style rather by diligent observation of nature, and in 1868 went to Paris, where he studied under Brandon, Gérôme, and Meissonier. After exhibiting genre scenes and landscapes he devoted himself chiefly to the painting of city views, the result of extensive travels, and distinguished for keen observation, elegant drawing, and extraordinary transparency of color. In 1878 he was awarded a first-class medal for a "Corner of Boulevard," "Triumphal Arch," a water color, and "In the Bois de Boulogne," a pastel. His frequent studies in the open air led him gradually to a conception of nature much akin to that of the Impressionists, and from 1879 on he cultivated especially the pastel. Of his Parisian views the "Place des Pyramides" (1876) and "Place du Carrousel" (1883) found their way into the Luxembourg Museum, and several genre scenes are in private collections in New York City and Philadelphia.

NITZSCH, KARL IMMANUEL (1787-1868). A German theologian. He was born at Borna, Saxony. He studied for the church at Wittenberg, where he took his degree in 1810, and where, in 1813, he became parish minister. In 1822 he was called to Bonn as ordinary professor of theology and university preacher. In 1847 he succeeded Marheineke at Berlin, and as professor, university preacher, and upper consistorial councilor, he exercised with prudence and moderation a wide ecclesiastical influence. He belonged to the school, of which Neander was the chief representative, which sought to reconcile faith and science by pointing out their distinctive spheres; in theology he subordinated dogma to ethics, and became one of the leaders of the *Vermittlungstheologie*. Besides numerous smaller treatises on dogmatics, the history of dogmas and liturgies, three larger works call for special mention: his *System der christlichen Lehre* (1829; 6th ed. 1851; Eng. trans., *System of Christian Doctrine*, Edinburgh, 1849); his *Praktische Theologie* (1847); and his *Predigten*, or sermons, of which several collections have appeared.

NIU-CHWANG, nŭ'chwāng', or YING-TSE. The only treaty port of Manchuria, China, situated in the Province of Shing-king, about 13 miles from the mouth of the Liao River, which falls into the Gulf of Pe-chi-li, and on the eastern branch of the Trans-Siberian line (Map: China, F. 3).

It has greatly increased in importance since the construction of the Trans-Siberian line, and the recent Russian acquisitions in the southern part of the peninsula, which make Niu-chwang the only port of Manchuria open to foreign trade. The vicinity of Niu-chwang is not very productive agriculturally, but important coal mines have lately been opened along the railway line, and the city acquires additional importance from its railway connection with Tien-tsin and Peking. The chief exports are beans, bean cake, and oil, which go largely to Japan. The imports consist mostly of cotton goods, which come largely from the United States, petroleum, and opium. The value of the exports in 1900 was nearly \$8,000,000, of which the exports to foreign countries amounted to about \$2,700,000. The imports for the same year were valued at over \$7,000,000, of which foreign imports amounted to over \$5,000,000.

Niu-chwang has a considerable foreign colony, and many consular representatives, including two from the United States. The population of the city is estimated at 50,000. Niu-chwang, or rather the small town of the same name, about 40 miles from the coast, was opened to foreign trade by the treaty of 1858. The present port was taken by the Japanese in 1895, and was originally a part of the territorial concessions of China, but Japan was forced to relinquish it. Since the uprising of Manchuria against Russia in 1900 Niu-chwang has been occupied by Russia, and its administration is still to a large extent in Russian hands, although the date set for its evacuation (April 8, 1903) is passed.

NIUE, nê-oo'ā, or SAVAGE ISLAND. A small coral island in the Pacific Ocean, situated about 350 miles southeast of the Samoan Islands, in latitude 19° S., longitude 170° W. Area, 36 square miles. It is 200 feet high, consisting of coral limestone, and has a fertile soil. The chief export is copra. Population, in 1901, 4050, all Christians. In 1900 Niue was taken under British protection as a dependency of New Zealand.

NIVELLES, nê'vâl' (Flem. *Nyrel*). A town in the Province of Brabant, Belgium, 18 miles south of Brussels (Map: Belgium, C 4). Its most important edifice is the Romanesque Church of Saint Gertrude, dating from 1048 and containing interesting relics. Nivelles has manufactures of linen, cotton, and lace, and carries on an active trade in grain and live stock. The town grew up around the ancient convent founded in the seventh century by the daughter of Pepin of Landen. Population, in 1900, 11,475.

NIVERNAIS, nê'vâr'nâ'. A former province in the middle of France. It was ruled in the Middle Ages by the Counts of Nevers (q.v.), who were succeeded by the Duke of Nevers. It is at present included almost entirely in the Department of Nièvre.

NIVÔSE, nê'vôz' (Fr., snow month). The fourth month in the French Republican calendar. It ran from December 21st to January 19th in the years I., II., III., V., VI., and VII.; from December 20th to January 20th in the years IV., VIII., IX., X., XI., and XIII.; and from December 23d to January 21st in the year XII.

NIX (Ger. *Nix*, OHG. *nichus*, *nihhus*, Icel. *nykr*, AS. *nicor*, water-goblin, water-beast, Eng. *Nick*, name of the Devil; connected with Gk. *νικτωρ*, *niptein*, Skt. *nij*, to wash). The common name for all water spirits in the Teutonic mythology. They are represented as of human form, or sometimes as passing into that of a fish or of a horse. They love music and dances, and possess the gift of prophecy, like the Greek muses, sirens, and other water-gods. The nix taught, in return for a good gift, the art of playing on a stringed instrument; and in the evening sunshine the nixes, combing their long hair, were wont to mingle in the dances of mortals; but their company was dangerous, for, though sometimes wearing a mild appearance, they were more frequently cruel and malignant.

NIX'ON, JOHN (1733-1808). An American soldier. He was born in Philadelphia, and was the son of a shipping-merchant. Upon the passage of the Stamp Act, in 1765, he became active in opposing the encroachments of the English Government upon American liberties, signed the non-importation agreement, and was a member of the first committee of correspondence in Pennsylvania. In April, 1775, he became lieutenant-colonel of the 3d battalion of the 'Associators,' and he was also a member of the Committee of Safety. From May to July, 1776, he had charge of the defenses of the Delaware at Fort Island, after which he was placed in command of Philadelphia. On July 8th he made the first public proclamation of the Declaration of Independence from the steps of the Philadelphia Court House. He resigned from the army in 1780, and in the same year became a director of the so-called 'Bank of Pennsylvania.' Afterwards he assisted in organizing the Bank of North America, of which he was president from 1792 till his death in 1808.

NIXON, LEWIS (1861—). An American naval architect, born in Leesburg, Va. He graduated at the United States Naval Academy in 1882, being first in his class; then spent three years in the Royal Naval College, Greenwich, England, where he specialized in ship-building and graduated in 1885; and having been appointed naval constructor in the United States Navy, in 1884, went on several tours of inspection through European navy yards, before his return to America. He was superintending constructor of the navy at Cramp's shipyard and assistant constructor at the Brooklyn Navy Yard, and in 1890 designed the battleships of the *Indiana* class. When these vessels were contracted for by the Cramps of Philadelphia Nixon became their superintending constructor, resigning from the navy. Five years afterwards he left the Cramps and leased the Crescent Shipyard, Elizabeth, N. J., where, with only four hundred feet of water front, he built many vessels. He became connected with many other manufacturing concerns, and in 1898 was appointed president of the New York East River Bridge Commission. In 1901 he was named head of Tammany Hall, but resigned the post in May of the next year after five months' service. He became president of the United States Shipbuilding Company of New York City in 1902.

NIZA, *Sp. pron.* nê'thâ, MARCOS, or MARCO DE, known as FRAY MARCOS (c.1495-c.1550). An

Italian missionary and explorer in the service of Spain, born at Nice, whence his name. He became a Franciscan monk, was sent to America in 1531, and went first to Peru, then to Guatemala, and finally to Mexico. In 1539, under the immediate direction of Francisco Vasquez de Coronado, Governor of 'New Galicia,' he, accompanied by a number of natives and a negro, Estevanico (or Stephen), who had been with Cabeza de Vaca on his journey across the continent, made an extended journey of exploration into the Northwest to investigate the stories told by Cabeza de Vaca. He penetrated into territory now forming part of Arizona, thus earning the title 'Discoverer of Arizona,' by which he is sometimes known, and on his return made a report, *Descubrimiento de las siete ciudades*, in which he gives the first positive account of the Seven Cities of Cibola. The exact route taken by Fray Marcos is not known, but it is fairly certain that he crossed Sonora and Arizona to the region of Zuñi, and that the seven cities to which he referred were Zuñi pueblos. After his return, Fray Marcos was made provincial of his Order, and in 1540-42 accompanied Coronado in the latter's famous expedition into what is now Arizona and New Mexico, as a result of which Fray Marcos's accounts of the great wealth of Cibola were proved to be fabulous.

NIZAMI, né-zâ'mê (1141-1203). A Persian poet, whose full name was Nizam ed-Din abu Mohammed Ilyas. He was one of the canonic seven epic poets of Persia. His place of birth is uncertain; from his early home, Ganjah, he is called Ganjavi. The poet's early years were spent in asceticism, and his first poem, *Makhzân al-'asrâr*, or 'Treasury of Mysteries,' is didactic in tone and strongly influenced by the Sufi poets, although it shows in the narrative parts traces of the *Shâh-Nâmâh* of Firdausi. It was written when Nizami was forty. Soon after he wrote *Khusrû wa Shirin* (1180), which dealt with the love of Khusru Parwiz and his rival, the architect Farhad, for Shirin, an Armenian princess (possibly an Irene of Byzantium), and the Shah's success. The poem won Nizami high favor at court, which did not corrupt his independence. The *Divân*, a collection of ethical poems, dates from 1188. With the old theme of Laila and Majnun, a Bedouin tale of lovers separated by family feud, their brief joy on earth and their happy meeting in Paradise, the poet returned to his own field of the romantic epic. The *Iskandar-Nâmâh*, an account of the legendary adventures of Alexander the Great, is an attempt to rival Firdausi; its latter part is ethical and makes Alexander a searcher for truth. In 1197 Nizami wrote his great romance, the *Haft Paikâr*, or 'Seven Beauties,' in which seven princesses, the daughters of Behram Gur, each tell a story. Nizami died at Ganjah. His five poems called *Panj Ganj*, or the 'Five Treasures,' were prototypes of several quintuples or series of five. The *Makhzân al-'asrâr* was edited by Bland (London, 1844); the *Khusrû wa Shirin* was translated by Hammer (Leipzig, 1809); the *Lailâ wa Majnûn* was edited at Lucknow in 1888 and translated by Atkinson (London, 1836); the *Haft Paikâr* was edited and translated by Erdmann (Kazan, 1844); the first part of the *Iskandar-Nâmâh* has been edited repeatedly, as at Lahore in 1889, and

translated by Clarke (London, 1881), and in part by Rückert (Nuremberg, 1824); the second part was edited by Sprenger (Calcutta, 1852-69). Complete editions of Nizami's works have been issued at Bombay in 1834 and 1839, and at Teheran in 1845. Consult Bacher, *Nizamis Leben und Werke* (Leipzig, 1872).

NIZAM'S DOMINIONS. A native State of India. See HYDERABAD.

NIZHNI-NOVGOROD, nyêzh'nyê nôv'gô-rôd. A government of Russia, bounded by the Government of Kostroma on the north, Vyatka, Kazan, and Simbirsk on the east, Penza and Tambov on the south, and Vladimir on the west. Area, about 20,000 square miles (Map: Russia, F 3). The government is divided by the Volga and the Oka into two parts, of which the northern is low, marshy, and covered with thick forests, while the southern is more or less elevated and intersected by many river valleys. The district is watered by the Volga, the Oka, the Vetluga, and a number of smaller rivers, most of them navigable. The climate does not differ essentially from that of other parts of Central Russia. The mean annual temperature is about 40°. Of minerals Nizhni-Novgorod has iron, alabaster, and various kinds of clay. Agriculture is the foundation of the economic life of the region. Rye and oats are the chief agricultural products. The forests cover nearly 40 per cent. of the total area.

In the development of the house industry the Government of Nizhni-Novgorod is inferior only to few parts of Russia. In the northern section wooden articles are the chief manufactures, while in the southern part locks, knives, and other small articles of iron are manufactured. Leather and leather products are manufactured all over the district. Large numbers of the inhabitants are also engaged in navigation. The factory system is only slightly developed. The census of 1895 gives for the Government of Nizhni-Novgorod 361 establishments, employing over 20,000 persons and yielding an output of over \$10,000,000. The chief products are flour, machinery, chemicals, leather, spirits, etc. The commerce is practically confined to the capital, Nizhni-Novgorod. Population, in 1897, 1,600,304, including a considerable number of Mordvins (q.v.) and Tatars.

NIZHNI-NOVGOROD. Capital of the government of the same name, and a great commercial centre of Russia, situated at the confluence of the Oka with the Volga, 273 miles east of Moscow (Map: Russia, G 3). It consists of the upper town with the Kremlin, the lower town along the Oka and the Volga, and the fairgrounds with the adjoining suburb on a sandy tongue formed by the confluence of the two rivers and connected by a bridge with the town proper. The upper town, situated on hilly ground, contains the principal buildings—the Kremlin, surrounded by a wall dating from the sixteenth century and inclosing two cathedrals, the ancient palace now occupied by the Governor, the arsenal, and the law courts. The town has about 60 Greek Orthodox churches, a number of monasteries, a mosque, and an Armenian church. Among the ecclesiastical edifices are the church in the Monastery of the Annunciation, containing a holy image of great antiquity (933), which attracts many pilgrims, the thirteenth-century Cathedral of the Archangel, with a fine treasury, and the

Cathedral of the Transfiguration, rebuilt in 1834 and holding the tombs of the princes and princesses of Nizhni-Novgorod. The chief secular buildings are the palace of the Governor, the Museum of Art, housed in one of the Kremlin towers, and the theatre. The educational institutions include a theological seminary, an institution for the sons of noblemen, a military academy, two gymnasia, a *Realschule*, and a number of special schools.

The fair to which the city chiefly owes its fame and importance was transferred to Nizhni-Novgorod from Makariev (about 55 miles below the city) in 1817. The value of the merchandise brought annually to the fair averaged somewhat over \$16,000,000 for the decade of 1817-26, about \$96,000,000 for 1877-86, and about \$89,000,000 for 1887-96. The construction of railways and the general modernization of commercial methods in Russia during the last part of the nineteenth century have naturally detracted from the importance of the fair. It is still, however, a great factor in the economic life of the country, and derives additional interest from the fact that it is the most important representative of a commercial system which is rapidly disappearing from civilized countries. The central industrial governments of Russia are represented at the fair by their different manufactures, the regions of the Lower Volga by fish, and that of the Kama by salt. The Caucasus sends petroleum, wine, and native manufactures; the southwestern governments, sugar; and the region along the middle course of the Volga, grain and lumber. From Siberia come furs, tallow, and oil; from China, tea; from Central Asia, furs and raw cotton; from Persia, fruit; and from Western Europe manufactures and groceries. The fair, which opens in the last week of July and lasts till about the middle of September, attracts over 100,000 merchants from every part of the Empire.

There are thousands of shops, the material of construction being stone, and a splendid fair palace was erected in 1890. The grounds are lighted by electricity and traversed by an electric railway line. The industries of the city are comparatively unimportant. The chief products are beer, locomotives, machinery, and candles. There are a number of important financial institutions. Population, in 1897, 95,100, which is increased during the fair to about 200,000.

The town was founded by the Grand Prince of Suzdal, Yuri Vsevolodovitch, in 1221. It was attacked repeatedly by the Tatars and the neighboring princes and suffered much from famine and pests. It was annexed to the Principality of Moscow about the close of the fourteenth century.

NIZHNI-TAGILSK, tá-gilsk'. An important mining and iron manufacturing centre in the Government of Perm, Russia, situated in the Ural Mountains, 88 miles northwest of Ekaterinburg (Map: Russia, K 3). In the vicinity are extensive iron, copper, gold, and platinum deposits and large iron foundries and steel mills. The first iron mill in this region was founded by Nikita Demidoff in 1725. Population, in 1897, about 30,000.

NIZHNI-TCHIRSK, chírsk. A town in the territory of the Don Cossacks, South Russia, situated on the Don, 210 miles northeast of Novo-Tcherkask. It lies in a vine-growing district and has an important annual fair lasting for ten days. Population, in 1897, 15,196.

NJORD, nyërd. In Scandinavian mythology, the father of Frey. See *ÆSIR*; *FREY*.

NOACK, nō'ák, AUGUST (1822—). A German historical painter, born at Darmstadt. A pupil of Sohn, Lessing, and Schadow at the Düsseldorf Academy in 1839-42, he studied afterwards in Munich and Antwerp. In 1855 he settled in his native city and was appointed grand ducal court painter, and in 1871 professor at the Polytechnicum. Besides a "Visit of Landgrave Philip the Magnanimous to Luther" (Rostock Gallery), and "The Disputation at Marburg" (Darmstadt Gallery), he painted several fine altarpieces.

NOAH, nō'á (Heb. *Nō(a)ch*). According to the Book of Genesis, the son of Lamech, who appears in the Old Testament in a double capacity: (a) the chief survivor of the Deluge, which involved the destruction of all mankind (Gen. vi. ix. 17), and hence the second father of mankind; and (b) the first agriculturist to plant vines (ib., ix. 20-27). According to critical scholars, in the biblical study of Noah two traditions have been connected with him and combined, the one a story of a destructive flood which came to the Hebrews from the Babylonians (see *DELUGE*), the other a tradition as to the beginnings of civilization, of which 'wine' is a general symbol in the Old Testament. This second tradition belongs to the same category as the tracing of the arts to Tubal Cain and Jubal (Gen. iv. 21-22) and of the building of cities to Cain (ib., 17); it is of a 'scholastic' character, whereas the other rests upon popular mythology and legendary lore. The attachment of various originally independent stories to one and the same personage is a common phenomenon in the process of myth and legend formation. The hero of the Babylonian deluge story bears two names—Pir-napishtim ('source of life'), and Atra-hasis or Hasis-atra ('very clever' or 'very pious'). Both names are symbolical, and it is possible that a connection with Noah appears in the character of the latter as the father of the new mankind—in this sense the 'source of life'—and in the description of Noah (Gen. vi. 9) as *šaddik tamim*, 'pious exceedingly,' which is almost a literal translation of *Hasis-atra*. It is not absolutely certain, however, that the name of the hero in the Hebrew story was Noah. Gen. v. 29 suggests that it was Naham or Nahman.

NOAH, BOOK OF. See *APOCRYPHA*, section on *Old Testament*.

NOAH, MORDECAI MANUEL (1785-1851). An American journalist and politician, born in Philadelphia. He was appointed Consul-General at Tunis in 1813, at a time when the second war with England offered the Barbary Powers almost irresistible inducements to prey on American commerce. After his return to the United States the following year he edited the *National Advertiser* (a Democratic paper) and the *Courier and Enquirer*. He established the *Evening Star* in 1834, but soon withdrew from connection with the daily press and became one of the founders of the weekly *Sunday Times*. He held at various times the offices of sheriff of New York County, surveyor of the port of New York, and a judge of the Court of Sessions. He was a Jew, and in 1820 attempted to found a Jewish colony on Grand Island in the Niagara River. He wrote a number of dramas and other works, including

Travels in England, France, Spain, and the Barbary States (1819); and a *Discourse on the Restoration of the Jews* (1845).

NOAILLES, nō'a'y'. A noble French family of Limousin, which dates from the eleventh century. **ADRIEN MAURICE**, Duke de (1678-1766). A Marshal of France, born in Paris, the eldest son of Anne Jules, Duc de Noailles (1650-1708), who was Marshal also. The son bore the title of the Comte d'Ayen, entered the Musketeers in 1692, and served in Catalonia in 1694-95 and in Flanders in 1696-97. In 1715 the Duke entered the council of regency and became president of the Conseil de Finance, a post which he lost three years afterwards by his opposition to Law. After fifteen years of retirement, he received a command under the Duke of Berwick in the war of the Polish Succession, and in 1734, after his chief's death, was made Marshal of France. In the same year he captured Philipsburg, and in the next, at the head of the Sardinian forces, drove the Imperial army out of Italy. His last campaign was in the War of the Austrian Succession, and at Dettingen, in 1743, he was defeated. Entering the Conseil d'Etat, he took control of France's foreign policy, went to Madrid in 1746, prepared the campaigns of 1747 and 1748, and retired in 1756. His two sons, **LOUIS** (1713-93) and **PHILIPPE** (1715-94), were also Marshals of France.—**LOUIS MARC ANTOINE**, Vicomte de (1756-1804), born in Paris, was associated with Lafayette (their wives were sisters) in the aid given to the American colonies in their struggle for independence. In 1789, at the opening of the French States-General, he was a Deputy among the nobles representing Nemours, and made the memorable proposition for the abolition of titles and feudal privileges of all kinds. During the excesses of the Jacobins he went to the United States, but returned to France as soon as the persecution of the old nobility ceased, and a few years later was made brigadier-general in Santo Domingo, where he died from wounds received in the capture of an English sloop of war near Havana by one of the most remarkable feats of naval daring on record.—**PAUL**, Duke de Noailles (1802-85), joined the Court of Louis Philippe in 1830. He published a *Histoire de la maison royale de Saint-Louis établie à Saint-Cyr* (1843) and a *Histoire de Mme. de Maintenon* (1848-50), and became a member of the Academy in 1849. His son, **JULES CHARLES VICTURNIEN** (1826-95), devoted himself to the study of economics and published *Cent ans de république aux Etats-Unis* (1886-89).

NO AM'MON. The name given to Thebes, the capital of Upper Egypt, in the Hebrew text of Nahum iii. 8. The shorter form No occurs in Jer. xlv. 25 and Ezek. xxx. 14, 15, 16. The Greek version has *μῆρος Ἀμμων*, 'part of Ammon,' in Nahum, and elsewhere *Διοσπολίς* (*Diospolis*), the common later designation of Thebes; Jerome translated *Alexandria populorum*, probably influenced by the description of the city in Nahum as "situated among the rivers having the waters round about her, whose strength was the sea and water her walls." As the Assyrians called the city *Ni*, and the Egyptians themselves after the Twenty-first Dynasty called it *Nt* (probably pronounced *Ne-t*, *Ne*, with the feminine ending *t*; cp. early Coptic *Nē*), it is probable that the Hebrew consonants were also pronounced *Nē*.

Net means 'city.' The addition of Ammon renders the reference to Thebes certain. Nahum probably thought of the capture and sack of Thebes by Assurbanipal in B.C. 663. See **THEBES**.

NOBBE, nō'be, **FRIEDRICH** (1830—). A German agricultural chemist and plant physiologist, born in Bremen. He studied at Jena and Berlin, in 1861 became a professor in the Industrial School at Chemnitz, and in 1868 in the Academy of Forestry and Agriculture at Tharandt. There he established, with the assistance of the Agricultural Union of Leipzig, an experiment station for plant physiology. In 1869 he inaugurated scientific seed-testing, and the publication of the results of his investigations in this subject led to the system of European seed control, with its numerous stations conducted both independently and as branches of the agricultural experiment stations. Among his publications are *Ueber die organische Leistung des Kalium in der Pflanze* (with Schröder and Erdmann, 1871), and *Wider den Handel mit Waldgrassamen für die Wiesenkultur* (1876).

NOBEL, **ALFRED BERNARD** (1833-96). A Swedish inventor and philanthropist, born at Stockholm. As a child he went with his father to Saint Petersburg, where he was educated. In 1850-54 he studied mechanical engineering in the United States as a pupil of the distinguished John Ericsson, and in 1863 took out the first patent for the manufacture of an explosive composed of nitroglycerin and common gunpowder. In 1864 he was granted a second patent. The use of nitroglycerin was for a number of years attended by such serious accidents that the preparation was very widely discarded. In 1867, however, Nobel invented dynamite, or giant powder, composed of 75 per cent. of nitroglycerin and 25 per cent. of kieselguhr, a finely pulverized siliceous material derived from the shells of fossil infusorians. This compound could be handled with less risk than could gunpowder, and was not influenced by heat or damp. In 1876 the inventor patented an improvement known as explosive gelatin. Further inventions by Nobel—the total number reported filed in Great Britain is 129—include ballistite, a propellant which was among the earliest of modern smokeless powders, and artificial gutta-percha. In 1875, by his own statement, he controlled fifteen dynamite factories in various parts of the world, including those near San Francisco and New York City, in the United States. Much of his experimentation in his later years was conducted in his great laboratory at San Remo, near Nice. He subscribed half the amount necessary for the equipment of the aeronaut Salomon Andrée (q.v.), and gave much to general charities, but is best known as the founder of the Nobel prize fund of \$9,200,000 (reduced by taxation to about \$8,400,000), the annual interest on which is yearly to be divided into five equal parts, to be distributed to the five most deserving persons in as many departments of human activity. Award is made for (a) the most important invention or discovery in physics; (b) the most important discovery or improvement in chemistry; (c) the most important discovery in physiology or medicine; (d) the most remarkable literary work of an idealistic nature; and (e) the most or best work done in the interests of universal peace. The first four prizes are awarded by the Acade-

mies of Sweden, the fifth by the Norwegian Storting. The first awards were announced on December 10, 1901: In physics, to Wilhelm Röntgen, of Munich University, Germany, discoverer of the Röntgen rays; in chemistry, to J. H. Van 't Hoff, of Berlin University, founder of a new system of stereo-chemistry; in physiology and medicine, to Emil Behring, of Marburg University, discoverer of anti-toxin for diphtheria; in literature, to Armand Sully-Prudhomme, of the French Academy, author of *Justice* (1878) and other poems, and *De l'expression dans les beaux-arts* (1884) and other prose works; in peace work, divided between Henri Dunant, prime mover of the Geneva Convention, and Frédéric Passy, founder of the Universal Peace Union.

NOBILITY (OF. *nobilite*, *nobilited*, Fr. *nobilité*, from Lat. *nobilitas*, nobility, from *nobilis*, noble, from *noscere*, to know; connected with Gk. *γινώσκω*, *gignōskein*, Skt. *jñā*, to know, and ultimately with Eng. *know*). A class possessing by hereditary transmission social rank and privileges, and often political privileges as well, greater than those belonging to the mass of the people, and aristocracy of birth or privilege. In the most primitive societies, when the stronger and abler men became chiefs of tribes or clans there was frequently a body of supporters who acquired prestige from the power of their leader. The ancient empires—Egypt, Babylonia, Assyria—which had developed out of earlier tribal conditions, had a noble class, priests and warriors, surrounding and upholding the throne, except when the aristocracy became too strong and ambitious and overthrew the despot who trampled on its privileges. In the empires acquired by conquest the warriors who had shared success for the conqueror became through his gratitude or his necessity a special caste, above the conquered, and handed down to their descendants the privileges they had won. In more advanced stages of society wealth or political influence have often purchased rank for their possessors, and in the highest civilization intellectual ability has been rewarded by hereditary rank. There was another type of nobility in ancient Athens and Rome, where a population early in possession retained privileges above all other comers, forming at once parties and privileged orders in the State—the eupatrids and the patricians. Among the ancient Germanic tribes class distinctions went back to the beginnings of the race, for at our first knowledge of them they were divided into nobles, freemen, and slaves. The constant warfare of centuries had effaced these distinctions to a considerable extent at the time of the Germanic invasions. The nobility of the nations of modern Europe has its origin in the feudal aristocracy. See FEUDALISM.

The Frankish Kingdom in Gaul was divided into governments, each under the authority of a chieftain called a count or *comes*—a designation derived from the *comes* of the Roman Empire—whose Teutonic equivalent was *graf*, an official of the Crown in the time of Charles the Great, but acquiring in the later confusion hereditary rights. (See COUNT; GRAF.) A higher dignity and more extensive jurisprudence was conferred on the *dux* or duke (q.v.), a term also of Roman origin, and implying the duty of leading the armies of the country. In the Lombard Kingdom of Italy the same term was applied to the great officers who were intrusted with the military

and civil administration of cities and their surrounding provinces. The marquis (q.v.) was the guardian of the frontier marches. (See MARCH.) In the subinfeudations of the greater nobility originated a secondary sort of nobility, under the name of vavasours, castellans, and lesser barons; and a third order below them comprised vassals, whose tenure, by the military obligation known in England as a knight's service, admitted them within the ranks of the aristocracy. In France the allegiance of the lesser nobles to their intermediary lord long continued a reality; in England, on the other hand, William the Conqueror obliged not only his barons, who held in fief of the Crown, but their vassals also, to take an oath of fealty to himself; and his successors altogether abolished subinfeudation. (See BARON; KNIGHT.) In Continental Europe, the nobles, after the tenth century, assumed territorial names from their castles or the principal town or village on their demesne; hence the prefix *de*, or its German equivalent *von*, still considered over a great part of the Continent as the criterion of nobility or gentility. In England, on the contrary, many of the most distinguished family names of the aristocracy had no territorial origin. In the later Carolingian Empire the powerful nobles encroached more and more on the royal authority; and in course of time many of them openly asserted an independence and sovereignty with little more than a nominal reservation of superiority to the King. By the end of the ninth century the Empire had been parceled into separate and independent principalities, under the dominion of powerful nobles. During the entire history of the Holy Roman Empire the Crown never succeeded in vindicating its power against the feudal princes. In France the royal authority gradually revived under the Capetians, the great fiefs of the higher nobility being one by one absorbed by the Crown. In England the resistance of the nobles to royal encroachments was the means of rearing the great fabric of constitutional liberty. All those who, after the Conquest, held *in capite* from William belonged to the nobility. Such of them as held by barony (the highest form of tenure) are enumerated in Domesday. Their dignity was territorial, not personal, having no existence apart from baronial possession. The *comes* was a baron of superior dignity and greater estates; and these were in England the only names of dignity till the time of Henry III. The rest of the landholders, who held by other tenures than barony, also belonged to the nobility or gentry.

After the introduction of heraldry, and its reduction to a system, the possession of a coat of arms was a recognized distinction between the noble and the plebeian. On the Continent the term noble still generally refers to those to whom or their ancestors arms have been granted. In England it is now more common to restrict the words noble and nobility to the five ranks of the peerage constituting the greater nobility, and to the head of the family, to whom alone the title belongs. Gentility, in its more strict sense, corresponds to the nobility of Continental countries.

The higher nobility, or nobility in the exclusive sense, of England, consists of the five temporal ranks of the peerage—duke, marquis, earl, viscount, and baron (in the restricted significa-

tion of the word), who are members of the Upper House of Parliament. See PARLIAMENT.

The once powerful feudal nobility of France had been reduced in the time of Louis XIV. to a mere aristocracy of courtiers through the steady growth of the royal power. Immediately before the Revolution 80,000 families claimed nobility, many of them of obscure station, and less than 3000 of ancient lineage. The Revolution overthrew all distinction of rank. On June 18, 1790, the National Assembly decreed that hereditary nobility was an institution incompatible with a free State, and that titles, arms, and liveries should be abolished. Two years later the records of the nobility were burned. A new nobility was created by the Emperor Napoleon I. in 1808, with titles descending to the eldest son. The old nobility was revived at the Restoration. All marquises and viscounts are of pre-Revolution titles, none having been created in later times.

Commercial pursuits have in different countries been considered more or less incompatible with nobility. In England this was less the case than in France and Germany, where for long a gentleman could not engage in any trade without losing his rank. A sort of commercial 'Bürger-Adel,' or half-gentleman class, was constituted out of the patrician families of some of the great German cities, particularly Augsburg, Nürnberg, and Frankfurt, on whom the emperors bestowed coats of arms. (See FUGGER; WELSER.) In semi-feudal Italy there was on the whole less antagonism between nobility and trade than north of the Alps. The aristocracy of Venice had its origin in commerce; and though untitled, they were among the most distinguished class of nobles in Europe. On the other hand, in Florence, in the fourteenth century, under a constitution purely mercantile, nobility became a disqualification from holding any office of the State. In order to be admitted to the enjoyment of political honors the nobleman had to be struck off the rolls of nobility; and an unpopular plebeian was sometimes ennobled in order to disfranchise him. A little later there grew up, side by side with the old nobility, a race of plebeian nobles—as the Ricci, the Medici—whose pretensions were originally derived from wealth, and who eventually came to be regarded as aristocrats by the democratic party.

In Spain the term *hidalgo* (*hijo d'algo*, son of somebody, not *filius nullius*) indicates nobility. The *hidalgo* alone has in strictness a right to the title *don*, which, like *sir* of the British knights and baronets, requires the adjunct of the Christian name. When the Christian name is omitted the title *señor* instead is prefixed with the addition of *de*. Members of the higher nobility bear the title of *grandee* (q.v.); formerly the title was *rico-hombre*, and the ceremonial of creation consisted in granting the right of assuming the pennon and caldron (*peñón y caldera*)—the one the rallying ensign of command, the other of maintenance of followers. In contradistinction to the *grandees*, the class of nobility below them are called *los titulados de Castilla*.

In Russia what nobility existed before Peter the Great was of a patriarchal, not a feudal kind (see BOYAR), but in his anxiety to assimilate everything to a Western standard, the Czar took the existing aristocracies of States quite differently situated as the model to which

to approximate the fortunate of his own subjects. Consult: Menestrier, *Les diverses espèces de la noblesse* (Paris, 1683); id., *Le blason de la noblesse* (ib., 1683); Escherny, *Essai sur la noblesse* (ib., 1814); Duvergier, *Mémorial historique de la noblesse* (ib., 1839-40); Magny, *Le nobiliaire des maisons nobles de l'Europe* (ib., 1854-94); Kotzebue, *Vom Adel* (Leipzig, 1792); Laine, *Noblesse de France* (Paris, 1825-50); Langlois, *Les origines de la noblesse en France* (ib., 1902); Cerini, *La noblesse allemande et ses origines* (ib., 1899); Stranz, *Geschichte des deutschen Adels* (new ed., Waldenburg, 1851); Rose, *Der Adel Deutschlands* (Berlin, 1883); Vehse, *Geschichte des österreichischen Hofes und Adels* (Hamburg, 1851); Gneist, *Adel und Ritterschaft in England* (Berlin, 1853); Lawrence, *On the Nobility of the British Gentry* (London, 1824; 4th ed. 1840).

NOBLE, nō'b'l, ALFRED (1844—). An American civil engineer, born at Livonia, Wayne County, Mich. He served during the Civil War in the Army of the Potomac (1862-65), graduated at the University of Michigan in 1870, and in that year began practice as a civil engineer. From 1882 he devoted his attention to bridge engineering. He was resident engineer of the Washington Bridge, New York City, the Cairo (Ill.) Bridge over the Ohio, and the Memphis (Tenn.) Bridge over the Mississippi; and assistant chief engineer of the bridges over the Missouri at West Alton (Mo.), and Leavenworth (Kan.), and over the Mississippi at Alton (Ill.). In 1895 he was appointed a member of the Nicaragua Canal Board, from 1897 to 1899 was a member of the United States Board of Engineers of deep waterways, to make surveys and prepare plans and estimates in connection with a ship-canal route from the Great Lakes to the Atlantic seaboard, and from 1899 to 1901 was on the Isthmian Canal Commission. He became president of the Western Society of Civil Engineers in 1898. His writings include papers contributed to the *Proceedings* of the Chicago Academy of Sciences, and of the Western and American Societies of Civil Engineers.

NOBLE, nō'b'l, Sir ANDREW (1832—). A Scottish physicist and artilleryman, born at Greenock and educated at the Edinburgh Academy and the Royal Military Academy, Woolwich. In 1858 he was appointed secretary to the Committee on Rifled Cannon, and to the Plates and Guns Committee in 1859, when he was also made assistant inspector of artillery. In 1860 he left the public service to enter that of Sir W. G. Armstrong at the Elswick Arsenal. There he had wider opportunities for experimental research, and his invention of the chronoscope in 1862, which made possible the measurement of the initial velocity produced by various powders, led to an increase in the substitution of rifles for smooth-bores. In 1900 Captain Noble was a member of the committee appointed by the Government to inquire into the properties of smokeless powder. Besides foreign honors, he received the Royal Society medal in 1880, was knighted in 1893 and made a baronet in 1902.

NOBLE, FREDERICK ALPHONSO (1832—). An American Congregational clergyman, born in Baldwin, Me. He graduated at Yale in 1858, and at Andover Theological Seminary in 1861. His first pastoral charge was in Saint Paul,

Minn., where he remained for six years. After occupying churches in Pittsburg, Pa., and New Haven, Conn., he was called to the Union Park Church, Chicago, in 1879, and preached there until his resignation in 1901. His publications include: *Divine Life in Man* (1896); *Discourses on Philippians* (1897); and *Our Redemption* (1898).

NOBLE, JOHN WILLOCK (1831—). An American lawyer and Cabinet officer, born at Lancaster, Ohio. After a year at Miami University, he entered Yale, where he graduated in 1851. He then studied law at Columbus and Cincinnati, removed to Saint Louis in 1855, and a year later settled in the practice of his profession at Keokuk, Iowa. There he took a prominent part in politics, and in 1859-60 was city attorney. In 1861 he enlisted in the Third Iowa Volunteer Cavalry as a private, gradually rose to the rank of colonel, and was brevetted brigadier-general at the close of the war. Settling again at Saint Louis after the war, he was United States District Attorney for the eastern district of Missouri from 1867 to 1870. He was Secretary of the Interior in the Cabinet of President Harrison from 1889 to 1893, after which he resumed his law practice in Saint Louis.

NOBLESVILLE, nō'b'lz-vīl. A city and the county-seat of Hamilton County, Ind., 22 miles north by east of Indianapolis; on the White River, and on the Chicago and Southeastern and the Lake Erie and Western railroads (Map: Indiana, C 2). It is the centre of an agricultural section, and has a valuable supply of natural gas. Among its industrial establishments are a strawboard mill, foundries, enameling works, carbon works, flouring mills, grain elevators, etc. Settled in 1824, Noblesville was incorporated first in 1839. The government is administered under a charter of 1890, which provides for a mayor, elected every four years, and a unicameral council. Population, in 1890, 3054; in 1900, 4702.

NO-BODY CRAB, or SEA-SPIDER. See **PAN-TOPODA**.

NOBUNAGA, nō'bōō-nā'gā (1533-82). A Japanese soldier and ruler, who brought order out of anarchy in the latter half of the sixteenth century. Born of an humble family, he was free from the hatreds and jealousies of the nobles, and won his way by his own powers as an intrepid and skillful soldier. He was victorious in many contests, and, notably, he humbled the militant Buddhist priests, destroying two strongly fortified monasteries and putting the monks to the sword. Buddhism never regained its political power. As an aid in the contest with Buddhism he welcomed the Jesuit missionaries, his own son becoming a Christian. But his favor was wholly for political purposes. Nobunaga was a jovial, pleasure-loving man, a patron of the fine arts and of wrestling. His private life was stained not only by the vices common to the military men of his age, but by treachery. In consequence of his failure to respect a pledge given by one of his lieutenants he was assassinated, his murder being speedily avenged. In a desperate age Nobunaga began the work which was carried to its completion by his greater successors, Hideyoshi (q.v.) and Iyeyasu (q.v.). Consult: Brinkley, *Japan* (Boston, 1901); Griffiths, *The Mikado's Empire*, new ed. (New York, 1883).

NOCERA DE' PAGANI, nō-chā'rā dā pā-gū'né. A city in Italy. See **NOCERA INFERIORE**.

NOCERA INFERIORE, en'fā-rē-ō'rā, or **NOCERA DE' PAGANI**. A city in the Province of Salerno, Italy, 20 miles east by south of Naples by rail (Map: Italy, G 1). It is the see of a bishop, has a cathedral, ruins of a castle, formerly an Angevine stronghold, and large modern factories of linen and woolen goods. The town was the ancient Nuceria Alfaterna, destroyed by Hannibal in 216 B.C., but rebuilt by Augustus. Population (commune), in 1881, 15,858; in 1891, 19,796.

NOCTES AM'BROSIA'NÆ (Lat., ambrosial nights). The name of a long series of critical, political, and poetical disquisitions in dialogue published in *Blackwood's Magazine* from 1822 to 1835, purporting to be the word-for-word report of the meetings at Ambrose's Tavern, Edinburgh, and elsewhere, of several of the literary celebrities of the day. For the first three years they were the work of many hands, but after 1825 they were mostly by 'Christopher North,' John Wilson (q.v.). The scheme was evidently taken from the symposia of the ancients. The *Noctes* had an immense vogue, but they are now little read. Their great creation is the character of the Ettrick Shepherd, an idealized portrait of James Hogg (q.v.).

NOCTILUCA (Lat., that which shines by night). An enormous monad-like form representing the order Cystoflagellata, of the class Mastigophora (q.v.). It is a highly phosphorescent organism, so small as to be scarcely seen with the naked eye, being from $\frac{1}{4}$ to 1 mm. (.01 to .04 inch) in diameter, and occurs in great numbers on the surface of the sea, including American harbors. It has a nearly spherical, jelly-like body, with a groove on one side, from which issues a curved filament or flagellum, used in locomotion. Near the base of this flagellum is the mouth, having on one side a tooth-like projection. Connecting with the mouth is a short œsophagus or gullet, which passes into the digestive cavity, in front of which lies a nucleus. Beneath the outer skin or firm membrane surrounding the body is a gelatinous layer, containing numerous granules. The young result from a division or segmentation of the entire mass of the protoplasm of the body, forming small oval bodies with a long lash. The germs or zoospores are somewhat like those of other flagellate infusoria, but very unlike the adult.

The only other representative of this order is *Leptodiscus medusoides*, which darts through the water by the contractions of its umbrella-shaped body. It was discovered at Messina, but has not yet been detected in American waters.

NOCTUIDÆ (Neo-Lat. nom. pl., from Lat. *noctua*, night-owl, from *nox*, night). A large and important family of moths, containing all of those forms known as owl moths (q.v.). Their larvæ include the cutworms (q.v.).

NOCTURNE, nōk-tŭrn' (Fr., night piece). The name given by John Field (q.v.) to a composition of a soft, dreamy character somewhat free in form. The greatest master of the nocturne is Chopin, who has filled this form with the loftiest contents.

NODDY (probably from *nod*, OHG. *knoton*, *nuoton*, dialectic Ger. *notteln*, to shake). A brownish black tern (*Anous stolidus*) widely

diffused in both hemispheres, and familiar to sailors, as it not infrequently alights on vessels, and suffers itself to be taken by the hand. At its breeding-places also, where not accustomed to the visits of man, it scarcely gets out of the way, and the female sits undisturbed on the nest; hence it commonly shares with the booby the reputation of unusual stupidity. The noddy is rare in the North Atlantic, but very abundant in warmer latitudes, and on some of the keys of the West Indies breeds in immense numbers, and the eggs are collected as food.

NODE (from Fr. *node*, from Lat. *nodus*, knot). A small, circumscribed swelling which occurs upon the surfaces of the bones of the head and extremities. Nodes are nearly always due to syphilis.

Another variety of node occurs in one form of arthritis deformans, and is called Heberden's *nodosities*. These bony tubercles appear upon the dorsal and lateral surfaces of the terminal phalanges of the fingers, and are incurable. They are most common in women and neurotic persons.

NODE. An astronomical term used in connection with planetary orbits. If we disregard certain small perturbations (q.v.) of planetary motion, we may say that each planet moves in an elliptic curve, having the sun in one of its foci. This curve lies in a plane called the plane of the orbit; and in the case of the earth this orbital plane is called the plane of the ecliptic. Now, if these orbital planes are imagined extended to the celestial sphere, they will cut out upon it great circles, one corresponding to each orbital plane. Such a great circle cut out by the plane of the earth's orbit is called the ecliptic (q.v.). If we consider the ecliptic and the corresponding great circle belonging to any other planet, we shall find that they intersect at two points on opposite sides of the celestial sphere. These two points, in the case of any planet other than the earth, are called the *nodes* of its orbit.

Thus all the planetary nodes lie on the ecliptic circle; and the position of any node is given by stating its celestial longitude. (See LATITUDE AND LONGITUDE.) This longitude of the node is one of the elements (q.v.) of a planet's orbit. Since the two nodes are directly opposite one another, their longitudes must differ by exactly 180° , so that the longitude of the one being given, that of the other is known also. By common consent, astronomers select that one of the nodes whose longitude is to be given as an element of the orbit as the *ascending* node. This is the node corresponding to the passage of the planet from the south side of the ecliptic to the north side in the course of its orbital revolution around the sun. The other node is called the *descending* node.

The effect of planetary perturbations (q.v.) is to cause the nodes to move backward on the ecliptic. The rate of motion is very slow, the most rapid being in the case of Uranus, whose node will travel once around the ecliptic in 37,000 years, while that of Mercury will consume 166,000 years in a single revolution.

NODE, NODAL POINTS. When a string or metallic cord, under strong tension, is made to vibrate, there are heard besides the principal sound secondary and shriller sounds, which are denominated overtones or harmonic sounds, and are pro-

duced by a certain portion of the cord vibrating independently. Investigation shows that every vibrating string is divided into a number of segments vibrating independently, and that the points which separate these portions from each other are at rest. These points are known as *nodal points*, and their situation may be found by placing small pieces of paper on a stretched string, and causing it to vibrate. When a string vibrating to its fundamental note, that is as a unit, is touched at its middle point with a feather, it will immediately resolve itself into segments of equal length vibrating twice as rapidly. The point where the string is touched with the feather being at rest would accordingly form a node, while the vibrating portions would be known as ventral segments. Chladni discovered that if a plate of glass or metal be clamped at the centre and then be touched by the finger at some middle point on one of the sides, and a well-resined fiddle bow be drawn across the edge, particles of fine dust or sand previously placed on the plate will arrange themselves in lines, showing that along these lines no vibration has taken place; these lines are *nodal lines*, and are found in most cases to group themselves together into geometrical figures, and occasionally to present the most beautiful designs. (See CHLADNI FIGURES.) The arrangement of the nodal lines depends on the point at which the plate is touched, and on the form of the plate itself. Similarly, a column of air vibrating in an open or closed organ pipe will divide itself into portions each in a state of vibration, and separated from one another by transverse sectional portions in which the air is at rest; these latter sections are known as *nodal sections*. In the open pipe the node is at the centre of the pipe, while in the closed pipe the node is at the end. See ACOUSTICS.

NO'DIAK (Papuan name). The Papuan spiny ant-eater. See ECHIDNA.

NODIER, nô'dyâ', CHARLES (1780-1844). A French philologist, novelist, poet, and critic, born at Besançon, April 29, 1780. He studied at Strassburg. In 1802 he published *Stella ou les proscrits*, a novel after the manner of Rousseau, and in 1803 *Le peintre de Salzbourg*, inspired by Goethe's *Werther*. In 1804 appeared *Essais d'un jeune barde*; in 1815 the *Histoire des sociétés secrètes de l'armée*. *Trilby ou le Lutin d'Argail* came out in 1822, and the Romantic School began to gather about Nodier in the salon of the Arsenal toward 1823. Nodier, like most of the romantic writers, is in love with the sensational, exotic, and fantastic, and is fond of turning history into romance. In 1830 he put forth the *Roi de Bohême et ses sept châteaux*, and in 1832 *La fée aux miettes*, a fairy tale. In 1834 he became an Academician, ten years after he had been made director of the Library of the Arsenal. He died in Paris, January 26, 1844. Nodier outgrew his sentimentalism, and became through his *Jean Sbogor* (1818), *Rutwen* (1820), *Smarra* (1821), and *Trilby*, the herald of romantic fiction in France. *Bertram ou le château de Saint-Aldebrand*, a tragedy, shows English influence, particularly that of Sir Walter Scott. His versatility is shown by his publication in 1808 of a *Dictionnaire raisonné des onomatopées* (2d ed. 1828) and by his *Dictionnaire universel de la langue française* (1823). An edition in twelve volumes of his *Œuvres* appeared in 1832-34. Con-

sult Mme. Menessier-Nodier, *Charles Nodier, épiques et souvenirs de sa vie* (Paris, 1867).

NODULAR DISEASE (from Lat. *nodulus*, diminutive of *nodus*, joint). A disease due to the presence of a roundworm (*Esophagostoma columbianum*) in the intestinal walls of sheep, which has often been mistaken for tuberculosis of the intestines. Positive diagnosis can be made only after death. Affected animals become anæmic and debilitated, the wool becomes dry, and there may be profuse diarrhœa. The larger tumors will be found to contain the small nematode worm, surrounded by a greenish, cheesy mass. The adult worm is found free in the large intestine.

NOË, nō'ā', AMADÉE DE. A French caricaturist. See his pseudonym, CHAM.

NOEL, nō'el, BAPTIST WRIOTHESLEY (1798-1873). An English clergyman. He was born at Leightmount, Scotland, and educated at Westminster and Trinity College, Cambridge. He studied first for the bar, but abandoned this profession for the Church of England. In 1827 he became minister of Saint John's Chapel, Bedford Row, London, where his eloquence won for him a large congregation from the upper classes, and he assumed a place of leadership among the preachers of evangelical tendencies. In 1846 he assisted in organizing the Evangelical Alliance. During the Gorham controversy (q.v.) of 1848-50, Noel withdrew from the Established Church and entered the Baptist denomination, at the same time publishing his grounds for so doing in an *Essay on the Union of Church and State* (1848). Later he published an *Essay on the Act of Baptism* (1850). A permanent contribution to the subject of American affairs was *Freedom and Slavery in the United States of America* (1863).

NOETIANS, nō-ē'shans. See PATRIPASSIANISM.

NOETIC CONSCIOUSNESS (Gk. νοητικός, *noētikos*, relating to perception, from νοῖν, *noein*, to perceive, from νόος, *noos*, nous, perception, mind; probably connected with γινώσκειν, *gignōskein*, to know, and ultimately with Eng. *know*). It is affirmed by many psychologists that the essential characteristic of mental process is its reference, beyond itself, to some object; so that the only possible criterion of the ultimateness and irreducibility of a mental function is the irreducibility of the mode in which it thus refers to its object. Brentano distinguishes between ideation (or noetic consciousness), judgment or belief, and interest or liking. Stout, however, has recently raised the question whether it is possible for a sentient being to exist entirely devoid of thought, i.e. to possess an anoetic consciousness. To such a consciousness the antithesis of subject and object would be meaningless; while there would seem to be no road from mere sentience to thought by any process of differentiation or complication. Stout leaves the question unanswered, except in so far as the two difficulties just raised appear to prevent, for him, any genetic passage from an anoetic to a noetic mind. The problems raised are of special interest to the epistemologist and the student of the evolution of mind. The term noetic has had a long history in psychology. Plato distinguishes be-

tween a noetic or incorporeal world of concepts, and an æsthetic or corporeal world of perceptions, the latter being but an image of the reality of the former. Aristotle uses the word in the sense of 'capable or rational apprehension.' Hamilton employs it to "express all those cognitions that originate in the mind itself," while "dianoetic denotes the operations of the discursive, elaborative, or comparative faculty." Stout restricts the phrase 'noetic synthesis' to "that union of presentational elements which is involved in their reference to a single object; or, in other words, to their combination as specifying constituents of the same thought." Consult: Stout, *Analytic Psychology* (London, 1896); Brentano, *Psychologie vom empirischen Standpunkte* (Leipzig, 1874); Sir W. Hamilton, *Lectures on Metaphysics*, vol. ii. (London, 1859).

NOGALES, nō-gā'lās. A frontier town of Mexico, situated on the boundary of Arizona and on the Santa Cruz River (Map: Mexico, D 2). It is a station on the Sonora Railroad, and is the seat of a United States consul. Population, in 1901, 2738.

NOGENT-SUR-MARNE, nō'zhān'sur-mārn'. A town of France, in the Department of Seine, situated on a bend of the Marne, three miles east of Paris, to the east of the Forest of Vincennes. The Eastern Railroad from Paris here crosses the valley of the Marne on a long, curving viaduct. The town contains numerous fine villas, and has manufactures of pottery and chemicals. Population, in 1901, 10,391.

NOHL, nōl, LUDWIG (1831-85). A German musical lecturer, scholar, and writer. He was educated for the law, but subsequently followed the profession of music. He studied under Dehn and Kiel, and in 1860 became lecturer at Heidelberg. He held several other important university and conservatory appointments, and toward the close of his life settled in Heidelberg as a lecturer at the university. His writings are standard, and have been translated into both French and English. They include: *Beethoven's Leben* (1864-77); *Briefe Beethovens* (1865); *Mozart's Briefe* (1865); *Beethoven, Liszt, Wagner* (1874); and *Beethoven nach den Schilderungen seiner Zeitgenossen* (1880).

NOILS (OF. *noiel*, *nuiel*, button, buckle, *neuel*, stone of a fruit, Fr. *noyau*, kernel, from Lat. *nux*, nut, or possibly a diminutive of OF. *nou*, knot, from Lat. *nodus*, knot). The short and broken hairs which are removed from wool in the process of combing and preparing it for worsted manufactures. The noils are used for making inferior yarns, and are valuable for felting purposes, in which they are largely employed.

NOIRÉ, nwā'rā', LUDWIG (1829-89). A German philosophical writer, born at Alzey, in Hesse. From 1846 to 1848 he pursued his studies at Giessen, after which he became a teacher at the gymnasium in Mainz. His study of the works of Spinoza, Schopenhauer, Lazarus Geiger, and the modern naturalists led him to the effort to construct a system of monistic philosophy according to which the universe is a single reality of which sensation and motion are the two aspects. In 1874 he published *Die Welt als Entwicklung des Geistes*. This was followed by *Der monistische Gedanke. Eine Konkordanz der Philosophie Schopenhauers, Darwins, Robert Mayers,*

und L. Geigers (1875). He also wrote the preface to Max Müller's English translation of Kant's *Kritik der reinen Vernunft*, which is a sketch of the history of philosophy; *Der Ursprung der Sprache* (1877); *Die Doppelnatur der Kausalität* (1876); and *Einleitung und Begründung eines monistischen Erkenntnistheorie* (1877).

NOISSEVILLE, nwäs'völ'. A village of Lorraine, about 4 miles east of Metz, noted as the scene of a battle fought between the French under Bazaine, numbering about 120,000 men, and an army of 40,000 Germans, August 31-September 1, 1870. Hoping to break the German cordon around Metz and effect a junction with the arms of MacMahon, Bazaine transported his forces to the right bank of the Moselle, and by a fierce attack succeeded in taking the villages of Montoy, Courcy, and Servigny. The Germans rallied toward the evening and recaptured Servigny. Fighting was resumed on the following day, and resulted in the retreat of the French across the river.

NOLA, nō'lā. A city in the Province of Caserta, Italy, 15 miles east-northeast of Naples by rail (Map: Italy, J 7). It is the see of a bishop. The cathedral, dating from the fifteenth century, was partly destroyed by fire in 1870. The seminary near by has interesting antique inscriptions. The ancient Nola fell into the hands of the Romans in the Samnite war, B.C. 313. The town held out against Hannibal in the Second Punic War. Augustus died at Nola A.D. 14. The first bells for Christian churches are said to have been cast here in the fifth century. Numerous coins, and beautiful vases which anciently were made here, and other antiquities have been found in the vicinity. Population (commune), in 1881, 11,931; in 1901, 14,622.

NÖLDEKE, nöl'de-ke, THEODOR (1836—). A distinguished German Orientalist. He was born in Harburg and pursued his university studies chiefly at Göttingen, where in 1861 he became privat-docent. In 1864 he was made extraordinary professor at Kiel and in 1868 full professor. In 1872 he became professor of Semitic philology in Strassburg. Nöldeke is the leading authority in general Semitic philology. Among his works may be mentioned *Geschichte des Korans* (1860); *Das Leben Mohammeds* (1863); *Die alttestamentliche Literatur* (1868); *Grammatik der neu-syrischen Sprache* (1868); *Untersuchungen zur Kritik des alten Testaments* (1869); *Die Inschrift des Königs Mesa von Moab* (1870); *Mandäische Grammatik* (1874); *Geschichte der Perser und Araber zur Zeit der Sasaniden* (1879); *Kurzgefasste syrische Grammatik* (1880); *Die semitischen Sprachen* (1887); *Aufsätze zur persischen Geschichte* (1887); *Delectus Veterum Carminum Arabicorum* (with A. Müller, 1890); *Orientalische Skizzen* (1892). He wrote besides several hundred contributions to encyclopædias and magazines and many valuable reviews, chiefly in the organ of the *Deutsche morgenländische Gesellschaft* and *Litterarisches Centralblatt*.

NOLHAC, nō'lak', PIERRE DE (1859—). A French historian, born at Ambert, Puy-de-Dôme. He received his early education in Paris, and was a student at the French school in Rome (1882-85). On his return he received the degree of doctor of letters and studied at the Bibliothèque Nationale for a year, when he was made professor at the Ecole des Hautes Etudes. His contribu-

tions to the history of Italian literature and of the French Renaissance are specially valuable. His works include: *Le dernier amour de Ronsard* (1882), an edition of the *Lettres de Joachim du Bellay* (1883); *Le "Canzoniere" autographe de Pétrarque* (1886); *La bibliothèque de Fulvio Orsini* (1887); poems entitled *Paysages d'Auvergne* (1888); *Erasme en Italie* (1888); *Marie-Antoinette* (1890); *Le château de Versailles sous Louis XV.* (1898); and *Histoire du château de Versailles* (1899). In 1892 M. Nolhac was made director of the National Museum at Versailles.

NOLI ME TAN'GERE (Lat., Touch me not). The words spoken by the risen Christ to Mary Magdalene, used as the title of a number of paintings, including those by Titian in the National Gallery, London, and by Rembrandt in Buckingham Palace.

NOLL. A popular name for Oliver Cromwell.

NOLLEKENS, JOSEPH (1737-1823). An English sculptor. He was born in London, August 11, 1737, the son of a painter. In 1750 he studied sculpture with Peter Scheemakers, and as the winner of several prizes offered by the Society of Arts, was enabled in 1760 to start for Rome. A portrait bust of Garrick was followed by a bust of Sterne and others. While at Rome he supported himself by taking active part in the traffic and restoration of antiquities. In 1770 he settled in London, where he was made a member of the Royal Academy in 1772. His portrait busts are good likenesses, and he displayed skill in the treatment of his draperies. His portraits include busts of George III., Prince and Princess of Wales, Duke and Duchess of York, Oliver Goldsmith, Dr. Johnson, and Warren Hastings, the statue of Pitt in Cambridge, the sepulchral monument of the "Three Captains," Westminster Abbey, and of Mrs. Howard, Corby Church, Cumberland. Of his ideal statues the most popular are the so-called "Venuses," the best of which are "Venus Chiding Cupid," "Venus Anointing Her Hero," and the "Seated Venus," now at Petworth. Nollekens died in London, April 23, 1823.

NOLLE PROSEQUI (Lat., will not prosecute). An entry on the records of a court by the public prosecutor in a criminal case, or the plaintiff in a civil action, to the effect that the proceedings against the defendant shall be discontinued. This method of terminating legal proceedings originated in England during the reign of Charles II., and seems to have been devised as a convenient means of nullifying certain obnoxious statutes, by thus ending any prosecution under them. The practice was subsequently adopted into the civil procedure in England to enable a plaintiff to discontinue his action, but it was later superseded by the common-law nonsuit.

In the United States to-day the practice of entering a *nolle prosequi*, or *nol. pros.*, as it is usually called, is confined almost exclusively to criminal proceedings. The right to thus discontinue a criminal prosecution is a prerogative of the State, and it generally rests in the discretion of the prosecuting officer whether to exercise it or not; but where the case has proceeded to trial, by the general rule he should make a motion to the court for leave to do so. A *nol. pros.* entered after the jury has been sworn and trial commenced will operate as an acquittal and a bar

to any future prosecution for the same offense. (See JEOPARDY.) Under modern codes of civil procedure, the method of abandoning legal proceedings is by discontinuance, or by allowing a nonsuit; but in a few jurisdictions, where common-law pleading and practice still obtains, a *nolle prosequi* seems to be a permissible way of ending an action on the part of the plaintiff. See NONSUIT; PLEADING; PRACTICE.

NOMA. See CANCUM ORIS.

NOM'AD (from Lat. *nomas*, from Gk. *νόμας*, roaming, from *νόμος*, *nemein*, to pasture, distribute). A term primarily applied to those peoples whose resources were chiefly flocks and herds. All the industries and conveniences of nomadic life grow out of this one fact. Grass and water are the chief essentials, hence nomads dwell always in regions where pasture is the best and water is not far to seek. Their habitations must admit of being transported from place to place, and hence consist of tents; their furniture is largely of skins; they clothe themselves in hides and woolen cloth. The saddle and harness, sleds and wagons, roads and land commerce, all spring out of the taming of horses, asses, cattle, sheep, goats, camels, and reindeer—the characteristic wealth of nomadic peoples.

NOMA'DA (Neo-Lat., from Gk. *νόμας*, *nomas*, roaming). A genus of bees typical of the family Nomadidae, including species which live parasitically in the nests of other bees and are called 'cuckoo-bees.' Often there is enough food both for the larvæ of the cell-maker and the larvæ of the cuckoo-bee, and both thrive and issue simultaneously as adults. The larva is smooth, tapering toward each end, and has a small head. The pupa has three conspicuous spines on the upper and posterior edge of the orbit, which seem to aid in locomotion. See CUCKOO-BEE.

NO MAN'S LAND. (1) A region 170 miles in length and about 35 in width, north of Texas, ceded to the United States in 1850 and made a part of Oklahoma in 1890. Between those years the district was under no form of government, and became a resort of outlaws.

(2) A narrow district on the line between Delaware and Pennsylvania. Although it is held to belong to Pennsylvania, some of the inhabitants perform their legal obligations in Delaware, while others do not recognize their citizenship in either State.

NOMARCHY, or **NOME.** The largest administrative division of Greece. Since 1899 the nomarchies have numbered twenty-six. They are subdivided into eparchies, which in turn are made up of demarchies. The administration of the nomarchy is in the hands of a nomarch, appointed by the Government for an indefinite term. His duties are much like those of the French prefect. Like him, he is assisted by a council elected by universal suffrage, but for a fixed term. The eparchy corresponds to the French *arrondissement* and the demarchy to the commune.

NOME (Lat. *nomus*, from Gk. *νόμος*, *nomos*, province, district, from *νόμος*, *nemein*, to pasture, distribute). The name given by the Greeks to the provinces or districts into which Egypt was divided, from the earliest historical period down to the time of the Roman dominion. It is probable that the nomes were the remains of small

independent States, which in very early times were united under a single monarchy. Each nome possessed its own god or group of gods, worshiped in the local temple, as also its own myths and religious traditions. The government of the nome was a copy, in miniature, of that of the State. At the head stood the nomarch, or governor, and under him was a regular gradation of officials, each responsible to his immediate superior. In the earlier period, each nome had its own treasury, its own courts of justice, and its own military establishment. Under the feudal system of the Middle Empire, the nomarchs were the heads of ancient noble families, and were prompt to take advantage of any weakness in the Central Government to make themselves practically independent princes. The old nobility was, however, extinguished in the Hyksos wars, and from the time of the New Empire the nomes were purely administrative districts ruled by royal governors, who still bore the title of nomarchs. In the time of the Ptolemies the chief officer of the nome was the strategos, under whom the nomarch was a subordinate official charged with supervising the collection of taxes and other financial matters. In general there were some 42 nomes, 22 in Upper and 20 in Lower Egypt, but the number was not invariable. So far as is at present known, the number of the nomes never fell below 36, nor exceeded 47. Consult: Duemichen, *Geschichte des alten Aegyptens* (Berlin, 1878); Budge, *A History of Egypt* (New York, 1902); Brugsch, *Geographie des alten Aegyptens* (Leipzig, 1857); *Dictionnaire géographique de l'ancienne Egypte* (Leipzig, 1879-80); Egypt Exploration Fund, *An Atlas of Ancient Egypt* (2d ed., London, 1894).

NOME. A term used in the ancient Greek music to denote any melody determined by inviolable rules.

NOME, *nöm*. The largest city of Alaska, in the Northern District; situated at the mouth of the Snake River, 13 miles west of Cape Nome, on the north shore of Norton Sound, Bering Sea (Map: Alaska, G 3). It is the centre of the productive Cape Nome gold-mining district, which extends west along the coast for about 20 miles from Cape Nome. In the fall of 1898 the small streams in the vicinity were prospected with promising results, and in the following summer the creek diggings were being actively operated when the news of the rich beach deposits, first discovered in January, 1899, though their importance remained unrecognized until July, caused a rush to the beach, where about 2000 men were working by October. The output of the district for 1900 was more than \$5,000,000, and in 1901 it was estimated at \$7,000,000. During this period a 'mushroom' settlement of tents, first called Anvil City, had sprung up. This town was gradually replaced by a permanent city of frame structures after the arrival in June, 1899, of the first consignment of lumber. In the early days the matter of food and fuel supplies was a source of great anxiety; and the unsanitary conditions due to the level and undrained site of the town, its scanty water-supply, and the climatic changes resulted in considerable sickness. There now exists a fully organized city, compactly built over half of its length along the beach, with a municipal government, fire and police departments, sewerage, water, and electric-

light systems, telephone service, etc.; and with a number of substantial commercial buildings, banks, commercial organizations, a court house, and a post office, hospitals, clubs, etc. A railroad extends from the coast to the mining claims at the foot-hills of the mountains. Population, in 1900, 12,488.

NOME, CAPE. See CAPE NOME.

NOMENCLATURE, SCIENTIFIC. See CLASSIFICATION OF ANIMALS.

NOMINALISM (from *nominal*, from Lat. *nominalis*, relating to names, from *nomen*, name; connected with Gk. *ὄνομα*, *onoma*, Skt. *nāman*, OChurch Slav. *ime*, OIr. *ainm*, Goth. *namō*, OHG. *namo*, Ger. *Name*, AS. *nama*, Eng. *name*). The philosophical theory that only individual objects have real existence, and that so-called universals (see JUDGMENT) are nothing but names given in common to actually different and incommunicable objects. These names were considered as nothing but so much breath (*flatus vocis*), without indicating any real identity in the objects sharing in identical names. This view was an extreme development of the Aristotelian doctrine that all reality is individual, and that universals have existence only in individual objects; and it was called forth by the extreme Neo-Platonism of Erigena, who maintained that universals have an existence prior to particulars and individuals, and that the process of creation is only the progressive, logical differentiation of the universal. This Neo-Platonic view of the relation of the universal and the particular is called *realism*, and was advocated by Bernard of Chartres, Guillaume de Champeaux (q.v.), and Walter of Mortagne. Nominalism, on the contrary, was maintained by Roscelinus (q.v.). Abélard represented a modified nominalism in maintaining that the universal is not a real objective existence, nor, on the contrary, a mere word (*vox*), but the meaning of the word. This view, which is called *sermonism* (from *sermo*, which in scholastic Latin meant 'predicate'), is a type of conceptualism (q.v.) peculiar to Abélard, and is to be distinguished from other forms of conceptualistic doctrine in that it did not point expressly to the fact that meanings are mental facts. With Abélard meanings seemed to reside in words, not as words, but as predicates of propositions. The Arabian philosophers, and especially Avicenna (q.v.), succeeded in mediating between nominalism and realism by maintaining that universals are before individuals (realism) in the mind of God, in individuals (Aristotelianism) as their developed essence, and after individuals (nominalism) in human minds (conceptualism). This was the view adopted by Thomas Aquinas (q.v.) in his system and so incorporated in the received philosophy of the Roman Church. Nominalism received its last strong support in the teaching of William of Occam (q.v.) in the fourteenth century; but the influence of this revival was transitory, coming as it did upon the eve of the Renaissance and the general decline of interest in scholastic problems. See Löwe, *Der Kampf zwischen Nominalismus und Realismus im Mittelalter: sein Ursprung und sein Verlauf* (Prague, 1876); also the histories of philosophy by Ueberweg-Heinze, Windelband, Erdmann.

NOMINATION (Lat. *nominatio*, from *nominare*, to name, from *nomen*, name). In politics,

the formal selection and presentation of a candidate for an elective office. In the United States, before the development of political parties, candidates for office were frequently nominated at private conferences or caucuses of the leading citizens of the community. Sometimes no formal nominations were made, and candidates were self-announced. By 1800 parties were fairly well organized, and the necessity arose of devising some means of selecting the candidates for offices. In national elections this was supplied by the Congressional caucus, which assumed the right of choosing Presidential and Vice-Presidential candidates, and of determining the policy of the party. (See CAUCUS; CONVENTION.) This method lasted until 1824. With the commencement of the revolt against the Congressional caucus several other temporary methods of nomination sprang into existence. These were nomination by the State legislatures as a whole, nomination by party caucuses of the State legislatures, nomination by State conventions, and nomination by public meetings. All these proved to be ineffectual and were superseded by the method of national convention, which came permanently into existence between 1830 and 1840, the first such convention being that of the Anti-Masonic Party in 1832. This has continued to be the accepted method of nominating candidates for President and Vice-President. Generally the choice of the convention is determined by the votes of a majority of the delegates; but in the case of the Democratic Party a two-thirds vote is necessary for a choice. In the nomination of State and local officers the convention has also come to be the recognized method, although in case of some of the minor offices nominations are frequently made directly by the party voters in the so-called primary elections. The national nominating convention consists of a certain number of delegates from each State, while local conventions are made up of delegates representing the several local units of the electoral district, the principle of representation according to the total population prevailing in both cases. Exceptions to the general rule that candidates for public office are nominated by delegate convention are, first, the old English method of self-announcement, which exists in communities like some of the Southern States, where practically only one political party exists, and where the success of the party is not endangered by a multiplicity of candidates; second, the method of nomination by primary election, where the individual voters directly select the candidate without the intervention of a convention; and, third, the method of nomination by petition, according to which the candidate may be put forward by filing with the proper officer a paper signed by a certain specified number of qualified voters. In those parts of the country where the New England town meeting exists, local candidates are frequently put in nomination by that assembly. In the cities local elective officers are almost invariably nominated by primary caucus or delegate conventions. Consult Dallinger, *Nominations for Elective Office in the United States* (New York, 1897); Bryce, *American Commonwealth*, vol. ii., chap. lxix.

NOMINATIVE CASE. See DECLENSION.

NOMOCANON (Gk. *νομοκάνων*, *nomokanōn*, from *νόμος*, *nomos*, law + *κάνων*, *kanōn*, rule,

canon). In the Greek Church, the collection of ecclesiastical laws, both those proceeding from the Church (*canones*) and those from the State (*nomoi*). The first collection was made in the sixth century, but the most important in the fourteenth, the so-called *Syntagma*.

NO NAME. A novel by Wilkie Collins (1862). It is the story of a prosperous English family, but it turns out that the parents have not been married. That having been finally done, before a new will can be drawn up, the father is killed by accident, the mother dies, and the illegitimate daughters are left destitute, in spite of their father's wealth. The purpose is to show the evils resulting from the English law on such cases.

NON-COMBATANTS (in War). Officers and men charged with the administrative duties of the military or naval services, who do not fight except in self-defense.

NON-COMMISSIONED OFFICER. A soldier holding a rank intermediate between that of the enlisted man or private soldier and the commissioned officer. The following classification gives the various non-commissioned grades of the United States Army in the order of their precedence: (1) Sergeant-major, regimental, and sergeant-major, senior grade, artillery corps; (2) quartermaster-sergeant, regimental; (3) commissary-sergeant, regimental; (4) ordnance sergeant, post-commissary-sergeant, post-quartermaster-sergeant, electrician sergeant, hospital steward, first-class sergeant signal corps, chief musician, chief trumpeter, and principal musician; (5) squadron and battalion sergeant-major, and sergeant-major, junior grade, artillery corps; (6) first sergeant and drum-major; (7) sergeant and acting hospital steward; (8) corporal. In each grade, date of appointment determines the order of precedence. See CORPORAL; QUARTERMASTER; SERGEANT; STAFF.

The non-commissioned officer of to-day must possess the ability to assume executive command in any emergency demanding prompt action and tactical ability; consequently only the most intelligent of the enlisted men are selected for promotion. United States Army regulations permit a certain proportion of non-commissioned officers to obtain commissions annually, and in other ways make the rank very desirable. In the English army, except in rare instances, social conditions preclude the possibility of any non-commissioned officer of humble birth attaining the commissioned rank as a combatant officer; for although commissions are granted as quartermasters, riding masters, and occasionally as officers in certain divisions of the artillery and in the engineers, they are only given after a lifetime of service, and are to all intents and purposes honorary positions. During the Boer War of 1899-1902 the heavy casualties among officers made it necessary in many instances to admit qualified non-commissioned officers to the commissioned ranks, apart from any family or social consideration—and it is expected that this initiative will lead to an order of things similar to that of the United States Army. In Italy nearly one-third of the officers of each arm of the service are taken from the non-commissioned ranks. (See MILITARY EDUCATION.) The German army system, as also that of France,

makes special provision for the training of non-commissioned officers.

NON COMPOS MENTIS (Lat., not having power over the mind). A legal term for lunacy. See INSANITY.

NONCONFORMISTS (from *non-*, not + *conformist*, from Lat. *conformis*, similar, from *com-*, together + *forma*, form). A name given generally to those who do not conform to the religion of an established Church. The most frequent use of the word, however, is in relation to those who at any period in English history since the Reformation have refused to conform to the doctrines and practices of the Church of England; though even here, in ordinary usage, it designates only Protestant dissenters. The unification of the English Nonconformists, in spite of their varying beliefs, as one body over against the Established Church practically dates from the repressive measures enacted soon after the Restoration in the first flush of reactionary zeal. The Act of Uniformity, requiring assent from all clergymen to everything contained in the Prayer-Book, drove out nearly 2000 of them, or about one-fifth of the whole number of clergy; these were the first to be formally known as Nonconformists. In the place of Puritanism, now extinct, came political nonconformity, which has since had its seat principally in the middle or lower-middle classes of England, and whose incessant efforts have by this time succeeded in depriving the Church of England of most of its exclusive privileges. The Act of Uniformity was followed by the Corporation Act, which attacked the dissenters in one of their strongholds; the Conventicle Act, which prevented their gathering in any number; and the Five Mile Act, whose result was in many places to deprive them of religious teaching of their own sort.

The next epoch-making date is that of the Toleration Act of 1689, which, while it only relaxed and did not repeal the penal statutes, was at the time regarded as a great charter of religious liberty. Nonconformists acquired legal security for their chapels and funds, with something approaching a clerical status for their ministers. But its policy of grudging and partial indulgence perpetuated the division of the nation into two more or less hostile bodies of Churchmen and Dissenters. Niggardly as it was, it recognized dissent, and shook the belief that the State was bound to provide all its members with a religion and to force it, if necessary, upon their acceptance.

The history of the nineteenth century, or at least the last two-thirds of it, is that of a pertinacious struggle for further recognition on the part of the Nonconformists, crowned with considerable success—though the great object of political nonconformity, the disestablishment of the Church of England, seems further off than it was. In 1836 Dissenters were allowed to be married by their own ministers and rites; the commutation of tithes (q.v.) into a rent-charge rendered their collection less odious; registration of births, deaths, and marriages was transferred from the Church to the State; and a charter was given to the free University of London, which imposed no religious tests. Perhaps the most important of the later gains of nonconformity have been in the department of education—the great universities having been thrown

open to its young men in 1871, and a system of State schools rendering them independent of the Church for primary education. The Burials Act of 1880, allowing their ministers access to the churchyards for funerals, was another concession that had been loudly demanded by them. Generally of an aggressive liberal type in politics, and still smarting under a sense of social inferiority, they form a compact body of no small political power. See ESTABLISHMENTS, ECCLESIASTICAL; LIBERTY, RELIGIOUS.

NON-EFFECTIVE. This term in its military sense applies to all officers or men not available for effective service. Retired or half-pay officers, pensioners, deserters, sick or wounded, and those held prisoner by an enemy are reported as non-effectives.

NONES. See KALENDS.

NON-EUCLIDEAN GEOMETRY. See GEOMETRY.

NONFEASANCE (from *non-*, not + *feasance*, deed, from Fr. *faisant*, pres. part. of *faire*, from Lat. *facere*, to do, make). The omission to do an act which one is under a legal obligation to do. It is the view of some writers that nonfeasance never amounts to a tort (q.v.); that to avoid committing a tort one need only to forbear to act. But this is clearly erroneous; as, if an owner of a factory fails to comply with a law requiring him to equip it with fire-escapes, in case of fire he is liable in damages to the person burned. His nonfeasance is a tort.

The term is frequently used in connection with the liability of an agent or servant to third persons. The owner of property employs an agent to manage it and keep it in proper repair. The agent omits to make repairs. Clearly he has violated his contract with his principal, who may call him to account therefor; but the weight of judicial authority in this country holds there is no privity between the agent and a third person, and that in such a case there must be misfeasance or malfeasance by the agent to render him liable. On the other hand, it has been held by a number of courts that the agent is liable to the injured person. His liability should be determined by the rules applicable to negligence (q.v.), not by a dictum of two hundred years, although its author was the distinguished Lord Chief Justice Holt (q.v.), that "a servant or deputy cannot be charged for nonfeasance, but for a misfeasance an action will lie against him." Consult: Jaggard, *Hand-Book of the Law of Torts* (Saint Paul, 1895); Huffcut, *The Law of Agency* (Boston, 1901).

NONNIUS. See VERNIER.

NONNIUS MARCEL/LUS. A Latin grammarian, born at Thubursicum Numidarum, in Africa, at the beginning of the fourth century A.D. His work entitled *De Compensiosa Doctrina* consisted originally of twenty books, of which the sixteenth is now lost, and was intended as a book of reference on points of lexicography, grammar, and antiquities. Though it shows little critical sagacity, the work is valued for its citations from the lost authors, particularly of the archaic period. There are editions by Mercier (Paris, 1583; reprinted 1826), by Quicherat (Paris, 1871), and by L. Müller (Leipzig, 1888). Consult also Nettleship, *Essays in Latin Literature* (London, 1885).

NON-JUROR, THE. A comedy by Colley Cibber, produced in 1717. It was adapted from Molière's *Tartuffe*. *Tartuffe*, transformed into an English Catholic priest, tampers with the loyalty of an English gentleman. It gained for Cibber much favor from the Hanoverian party.

NONJURORS (from *non-*, not + *juror*, from Lat. *jurator*, swearer, from *jurare*, to swear, from *jus*, law, right). The name given to those clergy of the Church of England who refused to take the oath of allegiance to William and Mary, believing themselves still bound by their allegiance to James II. They had been avowed champions of the doctrine of passive obedience on the part of subjects toward kings; indeed, Lake, Bishop of Chichester, said on his deathbed that he looked on the doctrine as the distinguishing character of the Church of England, for which he would lay down his life. The House of Commons allowed the clergy six months longer than the laity to take the oath. Sancroft, Archbishop of Canterbury, with seven bishops and about 400 other clergy, refused it, and were deprived of their sees and benefices. The most distinguished of the Nonjurors was the saintly Bishop Ken; the scholars Hickes and Dodwell were also Nonjurors. They treated all who took the oath as schismatics, and themselves and their adherents as the only true members of the Church of England, and even went so far as to draw up a new liturgy of their own. Their organization, unsubstantial as it was, lingered for over a century, its last bishop dying in 1805. Two of the early missionaries in America, Welton and Talbot, were said to have received episcopal consecration from them, and there is evidence that the latter occasionally exercised episcopal functions in the United States half a century before Bishop Seabury's consecration. Consult Lathbury, *History of the Nonjurors* (London, 1845), a careful work, as far as it goes, supplemented rather than superseded by the most recent authority, Overton, *The Nonjurors* (ib., 1902).

NONNUS (Lat., from Gk. *Nonnus*). A Greek poet of Panopolis, in Egypt, who lived probably in the fifth century A.D. While a pagan he wrote a vast epic, preserved under the name of *Dionysiaca* (*Διονυσιακά*) in forty-eight books. Though somewhat bombastic in style, the work is not without poetic spirit, and is one of the chief sources of information on the growth and development of the Dionysiac cycle of myths. After adopting Christianity, he made a paraphrase of the Gospel of Saint John in Greek hexameters. The best editions of the *Dionysiaca* are those of Graefe (Leipzig, 1819-26) and Köchly (ib., 1858). The paraphrase has been edited by Passow (Leipzig, 1834). Consult: Köhler, *Ueber die Dionysiaka des Nonnus* (Halle, 1853); and Ludwig, *Beiträge zur Kritik des Nonnus* (Königsberg, 1873).

NONPAREIL. See TYPOGRAPHY.

NONSUIT. The termination of an action by entry of judgment against the plaintiff upon his failure to appear or prosecute the action, or because of his inability to sustain his case at the trial, in consequence of which the action is ended without a determination of the merits. Under the early system of common-law practice a nonsuit was entered only on motion of the defendant when the plaintiff was in default in prosecuting his action, and if the latter wished

to end the suit, he was obliged to resort to the procedure known as *nolle prosequi* or *retrahit*. However, in modern common-law procedure, a plaintiff is sometimes allowed to end his action by nonsuit, in the discretion of the court, and usually upon payment of costs. Under the various codes of procedure at the present time, the same result is effected by a discontinuance. Where the plaintiff fails to introduce sufficient evidence to make out a *prima facie* case, in many jurisdictions a nonsuit may be ordered by the court before the defendant has introduced any testimony whatever. But where the plaintiff does make out a *prima facie* case, even though the defendant's evidence appears to the court to disprove conclusively the truth of the testimony introduced by the plaintiff, the court cannot allow a nonsuit, against the objection of the plaintiff, as the latter is entitled to have the facts of his case determined by a jury.

A nonsuit differs from a "dismissal" of the complaint or declaration, only in that the latter is a broader term and may involve a determination of the merits of the action. A direction of verdict is also distinguishable from a nonsuit because it involves the merits of the controversy. It is, therefore, important whether an action is terminated by dismissal on the merits, verdict, or direction of verdict, in which cases the party against whom the court decides must appeal if he thinks the judgment erroneous; or whether a nonsuit is entered, as in the latter case the plaintiff can immediately commence a new action on the same state of facts. See ACTION; JUDGMENT; APPEAL; NOLLE PROSEQUI; VERDICT. Consult the authorities referred to under PRACTICE.

NOOTKA, nōōt'ka. A name sometimes applied to a group of closely related tribes of Wakashan stock (q.v.), occupying the west coast of Vancouver Island, southern British Columbia, and including also the Makaw (q.v.), who have conquered for themselves a territory upon the opposite coast of Washington. From their frequent repetition of the word *wakash*, 'good,' Vancouver in 1792 called them Wakash Indians, whence their stock-name *Wakashan* is derived. They are also frequently known as *Aht*, from the termination of the tribal names. The official Canadian report distinguishes eighteen tribes, but Boas counts twenty-two, including the Makaw. Those under Canadian jurisdiction have decreased from 3160 in 1888 to about 2600 at present, of whom 1600 are professedly Christians of various denominations, the others retaining their ancient forms. For general characteristics and customs, see WAKASHAN STOCK.

NOOTKA SOUND. An inlet on the west coast of Vancouver Island, British North America, in latitude 49° 35' N., longitude 126° 34' W. (Map: British Columbia, D 5). Its entrance is protected by an island of the same name, and the Sound can be entered on both sides of the island. It extends inland for ten miles in a north-northeast direction, and affords good anchorage. According to some writers, the Sound was discovered by the Spaniard Don Juan Perez, in 1774; according to others, by the English navigator Capt. James Cook, in 1778. In 1788 Capt. John Meares established an English settlement on the coast, which, however, in the following year was broken up by the Spaniards, who at the same time captured

several British vessels in the Sound. War for a time seemed imminent, but Spain finally agreed in 1790 to restore the property of British citizens and make due restitution.

NORBERT, SAINT. See PREMONSTRATENSIAN ORDER.

NORD, nōr. The most northerly department of France. It is conterminous with the former Province of Flandre (French Flanders), and stretches along the Belgian frontier, with a shore line on the North Sea (Map: France, J 1). Area, 2228 square miles. It is well watered, exceedingly fertile, and well cultivated, being one of the most densely populated departments of France. The chief agricultural products are wheat, oats, potatoes, and sugar beets. Stock-raising and fisheries are important, and the department is very rich in coal deposits. The Nord is also one of the foremost industrial departments, producing machinery, textiles, porcelain, glass, chemicals, and sugar. The chief of its many large cities are Lille, the capital, Dunkirk, Roubaix, and Valenciennes. Population, in 1891, 1,736,341; in 1901, 1,866,994.

NORDAU, nōr'dou, MAX SIMON (1849—). A German author, pathological critic of literature and of morals, and a prominent leader in the Zionist movement in Europe. He was born in Budapest of an educated Jewish family; studied medicine in the university of that city, getting his degree in 1872, and after six years of travel throughout Europe practiced in his native town for two years. His earlier writings, chiefly for newspapers and showing something of his later censorious manner, were reprinted under the titles, *Aus dem wahren Milliardenland* (1878); *Vom Kreml zur Alhambra* (1880); and *Paris unter der dritten Republik* (1881). Two years (1880-82) were spent in further medical study in Paris, where Nordau established himself in practice. In France and Germany his literary reputation began with *Konventionelle Lügen der Kulturmenschheit* (1884; French trans. 1886; Eng., 2d ed. 1895), a bold attack on the ethics of modern civilization in general, with particular treatment of the 'religious lie,' or false reverence for the Bible; of the 'governmental lie,' or the falsity of monarchy and aristocracy; of the 'economic lie,' or the untruth of our social system; of the 'social lie,' urging the falsity of conventional marriage laws, and not, as some of his critics have urged, a frenzied treatise against the white lies of society. In the same spirit was *Paradoxe* (1885; 7th ed. 1901; French trans. 1896; and in English, 1895), ironic rather than pessimistic in tone. Nordau's fame in England and America rests almost entirely (unfortunately) on the third of his satiric works, *Degeneration* (1893), from the German *Entartung*, a vigorous polemic against vice or abnormality, and a eulogium of decency in literature and art, at times approaching prudery. The work was dedicated to Cesare Lombroso, and, like the studies of that alienist, has for its theme the relation between genius and degeneracy. Nordau approaches the question from the artistic and moral side; examines the work of art produced, and if it be immoral and foul argues that the artist is, ergo, degenerate, and no genius. The manner of treatment is large and loose, and the chief value of the work is ethical. Nordau's other writings in-

clude the novels, *Die Krankheit des Jahrhunderts* (1889), *Gefühlskomödie* (1891), and *Drohnenschlacht* (1897); the plays, *Neue Journalisten* (1880, with Ferdinand Gross), *Krieg der Millionen* (1882), *Das Recht zu lieben* (1893); *Die Kugel* (1894), and *Dr. Kohn* (1898); and a volume of essays, *Zeitgenössische Franzosen* (1901).

NORDEN, nôr'den, EDUARD (1868—). A German classical philologist, born at Emden; professor in the University of Breslau. His most important publication is a brilliant and comprehensive history of ancient prose style from the sixth century B.C. to the time of the Renaissance, entitled *Die antike Kunstprosa* (2 vols., Leipzig, 1898).

NORDENBERG, nôr'den-bâr-y', BENGT (1822-1902). A Swedish genre painter, born at Kompinkulla, Province of Blekinge. For seven years employed as a house painter, he went in 1841 to Stockholm, and while still following his trade, frequented the Academy until 1851, when he proceeded to Düsseldorf. There he studied under Theodor Hildebrandt and in Paris (1857-58) under Couture. Then he visited Italy and finally settled at Düsseldorf. Much influenced by Tidemand, he chose his subjects almost exclusively from Swedish peasant life, which he depicted with a keen sense of observation and deep feeling. Prominent among such popular scenes are: "Communion in a Village Church" (1856, National Gallery, Christiania); "The Organist" (1861, Leipzig Museum); "Levying the Tithe in Schonen" (1862) and "Wedding Procession in Varend" (1873), both in Stockholm Museum.

NOR'DENFELT MACHINE GUN. See MACHINE GUNS.

NORDENSKJÖLD, nôr'den-shêld, NILS ADOLF ERIC, Baron (1832-1901). A famous geographer and explorer. He was born at Helsingfors, Finland. He entered the university of his native town in 1849, where he devoted himself especially to chemistry and mineralogy. In 1853 he accompanied his father to the Urals and studied particularly the iron and copper mines at Tagilsk. Returning home, he published his first papers, dealing with the minerals and mollusca of Finland, and received an appointment as curator of the mathematico-physical faculty. He was suddenly dismissed, however, because he offered a toast at a banquet to which the Governor gave an obnoxious political significance. Visiting Berlin, he engaged in researches in mineral analysis at Rose's laboratory, and in 1857 returned to Finland, obtained the Alexander traveling stipend from his university, together with his degree as master and doctor, and prepared for a geological expedition to Siberia and Kamchatka. Another unlucky toast gave offense to the Russian Governor-General, and he drove the offender from the country, following him up with a dispatch depriving him of the right of ever holding office in the university. This disqualification lasted until a new Governor-General was appointed in 1862. Nordenskjöld settled in Stockholm in the winter of 1857-58, and Sweden became his adopted country. During 1858 he made his first voyage to Arctic seas as companion to the Swedish geologist Torell, and made valuable discoveries of the remains of Tertiary plants. After his return he was appointed professor and

director of the Royal-Museum, Stockholm. In 1861 he made a second expedition to Spitzbergen with Torell, and surveyed the northern part of the archipelago. Upon invitation of the Royal Academy of Sciences of Sweden, Nordenskjöld led an expedition to Spitzbergen in 1864, completing a preliminary survey for the arc of the meridian, mapping the southern part of Spitzbergen, and collecting new data as to fauna and flora. His next expedition was in 1868, when in the *Sofia* he penetrated to latitude 81° 42' N. A visit to Greenland had important scientific results in that he was enabled to formulate a theory as to the nature of the ice-sheet that once covered the greater part of Europe by his examinations of similar formations upon the Greenland ice-cap. The expedition of 1872 accomplished the discovery of what he supposed to be cosmic dust on polar ice and the survey of part of Northwest Land. Crossing the Kara Sea in 1875, he penetrated to the Yenisei and returned home overland, believing that a northeast passage could be made from Europe to the eastern shore of Asia. The opinion was put to the test in 1878-79. He left Tromsø on July 21, 1878, in the *Vega*, and continued his journey eastward till the end of September, when he became ice-bound in latitude 67° 7' N. and longitude 173° 23' W., not far from Bering Strait. Here he remained imprisoned until July 18, 1879, when the expedition was released. He then passed through Bering Strait and sailed to Japan. For this achievement the King of Sweden and Norway conferred upon Nordenskjöld the rank of a baron in the Swedish peerage, and he was appointed commander of the Order of the North Star. In 1883 he made his last expedition to Greenland. Nordenskjöld was a liberal in politics and sat in 1870-72 in the Lower House of the Swedish Diet. He discovered uranium in many varieties of coal, and showed that fresh water could be found anywhere in Sweden at a depth of 100 feet through the Archæan rocks. Besides scientific reports and monographs, his principal works are: *The Voyage of the Vega Around Asia* (1881); *The Second Swedish Expedition to Greenland* (1885); *Facsimile Atlas to the Early History of Cartography* (1889); and *Periplus* (1897). Consult the autobiographical sketch in *Bejër's Swedish Biographical Lexicon*, a translation of parts of which may be found in *The Arctic Voyages of Adolf Erik Nordenskjöld*, edited by Alexander Leslie (London, 1879); also articles and bibliography in *Ymer*, vol. xxii. (Stockholm, 1902).

NORDERNEY, nôr'der-nl. The most important of the East Frisian Islands, lying off the northwest coast of Germany, and belonging to the Prussian Province of Hanover (Map: Prussia, B 2). It is eight miles long, about a mile wide, and covered with dunes 50 to 75 feet high. The island is the most popular German sea-bathing resort, visited annually by over 14,000 persons. The village at the western end is protected by a large sea-wall. It has a handsome *Konversationshaus* with a museum, and a national hospital for children. A large lighthouse stands in the centre of the island. The permanent population is about 4000.

NORDHAUSEN, nôr't-hou'zen. A city in the Province of Saxony, Prussia, on the Zorge, 38 miles north-northwest of Erfurt (Map: Prussia, D 3). The Church of Saint Blasius with paintings by Lucas Cranach, the Roman Catholic late-

Gothic Cathedral, and the museum of antiquities, are worthy of note. The town is the centre of a large general trade, especially in grain and cattle. It has extensive distilleries and breweries, and considerable manufactures of tobacco, chemicals, leather, cloth, sugar, and machinery. Population, in 1890, 26,847; in 1900, 28,500. Nordhausen is mentioned in the tenth century, and was made a free Imperial city in 1253.

NORDHOFF, nörd'hôf, CHARLES (1830-1901). An American journalist, descriptive and miscellaneous writer, born in Erwitte, Westphalia. He came to America in 1835, was educated in Cincinnati, and was for nine years at sea, in the navy and merchant service; from 1853 to 1857 in various newspaper offices; was then employed editorially by the Harpers (1861), and for the next ten years on the staff of the *New York Evening Post*. From 1871 to 1873 Nordhoff traveled in California and visited Hawaii. He then became Washington correspondent of the *New York Herald*. The more noteworthy of his books are: *Man-of-War Life*, largely autobiographical (1855); *The Merchant Vessel* (1855); *Whaling and Fishing* (1856), both the result of personal experience, as was also *Nine Years a Sailor* (1857); then for ten years politics and sociology were his themes in *Secession Is Rebellion* (1860); *The Freedmen of South Carolina* (1863); *America for the Working Men* (1865). To sociology he contributed: *Politics for Young Americans* (1875), perhaps the best known and most useful of his books; *The Communitistic Societies of the United States* (1875). Later volumes are *God and the Future Life* (1881) and *Peninsular California* (1888). Nordhoff died in California in July, 1901.

NORDICA, LILLIAN (1859-). An American soprano, born at Farmington, Maine. She was pupil of the New England Conservatory and of J. O'Neill, making her debut in 1876. Then followed two years of successful concert work, on the conclusion of which she accompanied Gilmore's band to Europe, and later took up the study of opera with San Giovanni. She was an earnest student, and possessed of considerable stage aptitude, which, together with her magnificent voice and pleasing presence, won her an immediate success. After touring Germany and Russia, she appeared in 1881 in Paris, where her success was absolute. Her marriage with Frederick A. Gower in 1882 turned out to be unfortunate, and three years later she sued for a separation, the proceedings in which were brought to a close by the disappearance of Gower, supposedly in a balloon accident. In 1887 she appeared in London, and in 1895 made her first appearance in opera in her native land, at the Metropolitan Opera House, New York. Two years later she married Döme, an Hungarian singer. She achieved her greatest successes in *Aïda*, *Les Huguenots*, and the soprano parts in the Wagnerian operas, and came to be regarded as one of the greatest prima donnas of her day, being especially noted for her coloratura work.

NÖRDLINGEN, nörd'ling-en. A town in the western part of Bavaria, Germany, on the Eger, 39 miles northwest of Augsburg (Map: Germany, D 4). It is an ancient town with walls and towers. The Gothic Saint George's Church, and the late-Gothic Rathaus, with a collection of old German pictures and fine mural paintings, are

worthy of mention. The town has a *Realschule* and a fine library. Among the manufactures of Nördlingen are furniture, linen, woolen, and leather goods, carpets, and agricultural implements. Population, in 1890, 8004; in 1900, 8299. Nördlingen is mentioned for the first time about 900, and became an Imperial city under the Emperor Frederick II. The town is best known for the two battles of which it was the scene during the Thirty Years' War. In the first, fought on August 27 (new style, September 16), 1634, the Protestant army of Bernhard of Weimar and the Swedes under General Horn were overwhelmed by a superior force of Imperial troops under Ferdinand, the King of the Romans. This was the first defeat of the Swedes on German soil, and its effect was the delivery of South Germany from the foreigner. The second battle, fought on August 3 (13), 1645, between the French and the Imperial troops, resulted in the defeat of the latter and the death of their commander, General Mercy.

NORDMANN, nört'mán, JOHANNES (1820-87). An Austrian author, whose family name was Rumpelmaier. He was born at Landersdorf, and studied at Vienna, whither he returned in 1848, after several years in Dresden and Leipzig, and where as a member of the Academic Legion he played a prominent part in the Revolution. From 1859 to 1869 he edited the *Wanderer*, and subsequently wrote for the *Neue Freie Presse* and other papers. *Gedichte* (1847), a volume of lyrics, contains the best of his poetical works. A posthumous volume of poems appeared in 1889. He also wrote the epic *Eine Römerfahrt* (1875-77); various novels and tales, *Zwei Frauen* (1850), *Fruhlingnächte in Salamanca* (1857; 3d ed. 1880), *Ein Wiener Bürger* (1860; 2d ed. 1882), and *Der zerbrochene Spiegel* (1870); and books of travel.

NOREEN, nò-rän', ADOLF GOTTHARD (1854-). A Swedish philologist. He was born at Oestra Emtervik, Sweden. After graduating from the University of Upsala in 1877, he became a privat-docent there and in 1887 professor of the Scandinavian languages. Among his principal publications are: *Aeldre Västgötalagen* (1876); *Altisländische und altnorwegische Grammatik* (2d ed. 1892); *Abriss der urgermanischen Lautlehre* (Strassburg, 1894); *Altischiedische Grammatik mit Einschluss des altgutnischen* (1898). Noreen contributed the article on the Scandinavian language to Paul's *Grundriss der Germanischen Philologie*, and is the author of a number of articles published in the *Arkiv för Nordisk Filologi*, of which he is one of the editors. He holds a very high place among European philologists.

NORFOLK, nôr'fak. A maritime county of England, bounded north and northeast by the North Sea, and south by the county of Suffolk (Map: England, G 4). Area, 2037 square miles, mostly level ground. The soil, consisting chiefly of light sands and loams, is not naturally of a productive character, but has been made so by systematic treatment, and Norfolk is chiefly an agricultural, stock and poultry raising county. The principal rivers are the Ouse, Yare, and Bure. Capital, Norwich. Population, in 1891, 454,500; in 1901, 460,000. Consult: Mason, *History of Norfolk* (London, 1882-85); Rye, *History of the County of Norfolk* (London, 1885).

NORFOLK. The second largest city of Virginia, and a port of entry, in Norfolk County, 88 miles in a direct line, and 116 by water, southeast of Richmond; on the Elizabeth River, an arm of Chesapeake Bay, opposite Portsmouth and Berkeley, the three cities practically forming one municipality, having a population, within a radius of three miles, of more than 115,000 (Map: Virginia, H 5). Norfolk is the terminus of many steamship lines, including transatlantic, coastwise, and interior lines, the Albemarle and Chesapeake and the Dismal Swamp canals affording additional means of communication with inland towns. The railroad facilities comprise the Atlantic Coast Line, the Seaboard Air Line, the Chesapeake and Ohio, the Norfolk and Western, the Norfolk and Southern, the New York, Philadelphia and Norfolk, and the Southern. Norfolk has an area of about $3\frac{1}{4}$ square miles, and is irregularly laid out on level ground. The more prominent buildings include the custom-house, the city hall, Saint Vincent's Hospital, the Norfolk Protestant Hospital, the post-office, and the Citizens' Bank. Saint Paul's Church is of historic interest, having been built in 1737. The city maintains a public library (10,500 volumes), and has several private secondary schools, among which is the Norfolk Mission College (United Presbyterian), an institution for colored students. There is a public park of 95 acres. The Norfolk Navy Yard is at Portsmouth (q.v.).

Norfolk is one of the most important Southern ports, its excellent transportation facilities contributing largely to its commercial prominence. The harbor is commodious, accessible for the largest ships, has a channel 30 feet deep, and is well protected, the defenses including Fort Monroe (q.v.). Norfolk and Portsmouth together constitute a Federal customs district, the foreign trade of which in 1901 comprised exports valued at \$10,308,000 and imports aggregating \$594,000. The commerce of the port is principally in lumber, coal, grain, cotton, peanuts, oysters, vegetables, and fruit. One of the largest coaling stations in the world is here—Lambert's Point coal piers, which handle annually some 2,500,000 tons. Norfolk is developing rapidly also as an industrial centre, a number of large plants having been established since 1900, when its manufactures, according to the census, represented capital to the amount of \$6,425,000, and had a production valued at \$9,397,000, a notable gain in output over that of 1890 (\$5,100,000). The most important industrial establishments are fertilizer works, lumber mills, hosiery and knitting mills, cotton and silk mills, oil mills, carriage and wagon shops, foundries and machine shops, a steel shutter and blind manufactory, ship and boat building yards, creosoting works, agricultural implement works, tobacco and cigar factories, a large pickling establishment, etc. Under the charter of 1884, as subsequently amended, the government is vested in a mayor, elected every two years, and a council consisting of two bodies, the members of the select council being chosen by all the councilmen from among their own number. The council controls appointments of all administrative officers, excepting those elected by popular vote—school trustees, treasurer, attorney, street inspector, commissioner of revenue, collector of taxes, health officer, and minor officials. Norfolk spends

annually in maintenance and operation about \$845,000, the principal items being: for interest on debt, \$250,000; for streets, \$80,000; for water, \$65,000; for the police department, \$60,000; for schools, \$60,000; for the fire department, \$45,000. There are municipal water-works, built in 1872, and acquired by the city in the following year; the system cost \$1,235,000 and has about 59 miles of mains. Population, in 1860, 14,620; in 1880, 21,966; in 1890, 34,871; in 1900, 46,624.

Organized as a town in 1682, Norfolk was incorporated as a borough in 1736, and was chartered as a city in 1845. On January 1, 1776, it was bombarded and set on fire by the English under Lord Dunmore, and nine-tenths of the buildings were destroyed. In 1855 the city suffered severely from the ravages of yellow fever. In April, 1861, General Taliaferro, at the head of a body of Virginia troops, entered the city, and soon afterwards the navy yard was fired by order of the commandant, but comparatively little damage was done. Until May, 1862, when the Federal forces took possession, the city was the chief naval station of the Confederacy. Consult: Forrest, *Historical and Descriptive Sketches of Norfolk and Vicinity* (Philadelphia, 1853); Burton, *The History of Norfolk, Virginia* (Norfolk, 1877); Lamb, *Our Twin Cities of the Nineteenth Century* (ib., 1887-88).

NORFOLK, DUKES OF. See HOWARD.

NORFOLK ISLAND. An isolated island in the Pacific Ocean, 500 miles northwest of New Zealand, and 1200 miles northeast of Sydney; latitude $29^{\circ} 3' S.$, longitude $167^{\circ} 58' E.$ (Map: Australasia, J 5). Its area is 16 square miles. The coasts are high and steep, and the interior is mountainous, rising in Mount Pitt to a height of 1040 feet. In its forests the most conspicuous tree is the magnificent Norfolk Island pine (*Araucaria excelsa*). The soil is fertile and the climate is healthful. The inhabitants in 1901 numbered 870, most of whom are the descendants of the mutineers of the *Bounty*, who in 1856 were transferred hither by the British Government from Pitcairn Island (q.v.). Others are pupils in the Melanesian mission school established here. The island is governed by a resident magistrate and council under the administration of New South Wales. It was discovered by Cook in 1774, and was used by New South Wales as a penal settlement down to 1851.

NORFOLK ISLAND PINE. See ARAUCARIA.

NORFOLK SPANIEL. See SPANIEL.

NORICUM. A province of the Roman Empire, corresponding to Styria, Carinthia, parts of Upper and Lower Austria and Bavaria, and Salzburg. It was bounded on the north by the Danube, on the east and south by Pannonia; also south by Illyricum and Cisalpine Gaul; on the west by Rætia. The region is mountainous, the Noric Alps stretching through the centre of the province; the chief rivers were the Genus (modern Inn), Dravus (Drave), and Murus (Mur). The chief town was Noreia, mentioned by Cæsar in his *Commentaries*. The province was subdued by the generals of Augustus (c.13 B.C.). The Romans obtained iron and salt from the region, and, it is said, gold.

NORMA. An opera by Bellini (q.v.), produced at La Scala, Milan (1832). The libretto

by Romain was based on Saumet's tragedy *Norma*, which appeared in 1831. *Norma*, a high priestess of the Druids, secretly married Pollio, the Roman general. He, faithless to her, urges the virgin Adalgiza to fly with him. She confesses to *Norma*, who in fury calls the Druids, and Pollio is condemned. *Norma*, confessing her broken vows, dies with him.

NOR'MAL. A town in McLean County, Ill., 61 miles northeast of Springfield; on the Illinois Central and the Chicago and Alton railroads (Map: Illinois, C 3). It is the seat of the Illinois State Normal University, and of the State Soldiers' Orphans' Home. Nursery stock, fruit, and vegetables are extensively cultivated in this vicinity; and Normal is also an important horse market. There are municipal water-works. Population, in 1890, 3459; in 1900, 3795.

NORMAL (Lat. *normalis*, according to rule, from *norma*, rule, carpenter's square). In mathematics, a straight line perpendicular to a tangent at the point of its contact with the given curved line or surface. The evolute (q.v.) of a curve may be considered as the envelope (q.v.) of the normals to the given curve. This relation is evident since the centres of curvature of which the evolute is the locus are the intersections of normals at adjacent points of the curve; e.g. the semicubical parabola, an evolute of the common parabola, is an envelope of the normals to this curve. See PARABOLA.

The *subnormal* corresponding to any curve is the segment of the axis intercepted by the normal and the ordinate of the point of contact.

NORMAL COLLEGE. An institution for the training of teachers, in New York City, founded in 1869 and having its inception in the growing demand for professionally trained teachers in the public schools of New York. Previous to its foundation the secondary education of women in New York was supplied by private schools and the supplementary classes of the public grammar schools. The inadequacy of this method was, however, soon felt, and as early as 1847 the State Legislature contemplated an institution similar to the City College. (See NEW YORK, COLLEGE OF THE CITY OF.) In 1856 a Daily Normal School was actually established, but it ceased to exist after a precarious career of about three years. The Saturday Normal School was then organized for the training of teachers. While these makeshifts were being resorted to in New York, the State at large was rapidly increasing its number of normal schools, and otherwise multiplying the facilities for the training of teachers. This educational awakening throughout the State had the effect of hastening the establishment of a normal institution in New York City. In 1869 the Board of Education was empowered to establish a female institution similar to the City College, and the same year the Normal and High School was established. The name was changed in the following year to Normal College. The pupils of the various supplementary classes were admitted to advanced standing and a three years' course was organized. The task of arranging the work of the new institution fell to Dr. Thomas Hunter, the president since its inception. Under his vigorous administration the college grew rapidly. A building erected on the block bounded by Lexington and Park Avenues and Sixty-eighth and Sixty-ninth streets, at a cost of over \$350,-

000, was opened in 1873. A model primary school was opened for practice teaching at an additional cost of \$80,000, and the first free public kindergarten in the United States was established at the Normal College in 1871. The Board of Education and the president of the college have since its organization constituted an ex officio board of trustees. The attendance, which in 1870 numbered 969, with a graduating class of 97, increased by 1902 to 2844. In the same year the staff of instructors, including those in the training department, numbered 101. The total number of graduates since the foundation of the college was, in 1902, over 9000. There has been a constant tendency to raise the requirements for graduation; the course was extended to four years in 1879, to five, for students taking a degree, in 1888, and in 1902 a professional course of six and a collegiate course of seven years were organized, the institution thus being raised to the standard required by the University of the State of New York for degree-conferring institutions. The college includes five fully equipped laboratories and the Alumnae library. High school graduates are admitted to advanced standing.

NORMAL SCHOOL. In general, any institution for the professional training of teachers. In a special sense, the term is used to designate a school for the training of elementary school teachers, carried on usually by the State, sometimes by private enterprise, which receives students who have had more or less high school training, and gives them academic and professional courses. Normal schools in some form are now found throughout the civilized world, usually as integral parts of the systems of public education in the several countries or States. The earliest successful normal school appears to have been that established by La Salle in 1685 at Rheims, France. Not until early in the nineteenth century, however, were public normal schools established in France. In Germany the first attempt to provide professional training for teachers is attributed to August Hermann Francke, who in 1704 founded the normal school at Halle, which still bears his name. During the reign of Frederick the Great, and especially during the period after the French Revolution, many normal schools (or teachers' seminaries, as they are called) were founded, especially in Prussia. There are to-day in Prussia alone no fewer than 116 normal schools. In Great Britain there is a well-developed system of public normal schools (called also teachers' training colleges), the growth chiefly of the last fifty years. The British system has been successfully extended to Canada, Australia, and South Africa. In America the first normal schools were founded in Massachusetts in 1839 and 1840 at Lexington, Barre, and Bridgewater. They were the result, in particular, of the combined efforts toward securing higher qualifications among teachers of the following men: Charles Brooks, who visited Prussian normal schools in 1834, and disseminated the ideas he had gained during the following two years; of Henry Barnard, the distinguished pioneer in educational journalism and educational progress; of Edmund Dwight, who offered the Legislature \$10,000 on condition that it should appropriate an equal amount to promote the preparation of teachers for the com-

mon schools; and especially of Horace Mann, who as secretary of the State Board of Education did more than any other man to develop the normal school idea and to make it effective. The course in these early normal schools included (1) the science and art of teaching the common school branches; together with (2) the subject matter of these branches, and, if possible, of such higher studies also as algebra, geometry, general history, natural philosophy, and astronomy; and (3) practice teaching in a model school. In the thirty years following the establishment of these schools, no fewer than fifteen leading normal schools of the highest type were established in as many different States; and many more of inferior quality. In 1898-99 there were in the United States 166 public and 165 private normal schools, with a total enrollment of 68,380 students.

In standards and courses of study the normal schools of the United States vary widely. The minimum entrance requirements are indicated by the subjects in which examinations are required for admission, viz. arithmetic, geography, grammar, composition, orthography, American history, civil government, physiology and hygiene, and penmanship. Students presenting these qualifications may be graduated on completion of a two-year course, including one year devoted to the theory and practice of teaching. The more advanced courses include high school subjects, methods in elementary subjects, psychology, the science of education, history of education, child study, and practice teaching. Many normal schools offer special courses for the training of kindergarten teachers.

The name Normal College has been given to certain institutions, like the Albany State Normal College, and the Michigan State Normal College, which require a full high-school course for admission, and which, in addition to more extended professional courses than are usually offered by normal schools, undertake the preparation of teachers for secondary schools. Such institutions are empowered to grant pedagogical degrees.

The establishment of university chairs and departments of education, a movement of the greatest significance for education, has been the growth of the past fifty years. Its beginnings were weak and tentative. In America the honor of the earliest attempts is due to President Francis Wayland at Brown University (in 1850), to Horace Mann, at Antioch College (in 1853), and to President Barnard, at Columbia College (in 1858). The first chair of education to be established on a solid basis in an American college or university was that at the University of Michigan under President Angell in 1879, since which time such departments have been established in large numbers throughout the country.

The rapid growth of large cities has created a demand for trained teachers, which all the agencies thus far mentioned have proved entirely inadequate to supply. This need has been met in part by the establishment of city training schools. The Brooklyn Training School, organized by Superintendent William H. Maxwell, is a type of such schools. It receives on examination the graduates of public high schools, and prepares them by a course of one year to be teachers in elementary schools. It instructs in the history of education, psychology, methods of teaching ele-

mentary subjects, and practical training in a model school.

For the benefit of teachers in the service, particularly those who have had little or no professional training, teachers' institutes have been organized, and have been a feature of American education for the past sixty years. The teachers' institute is a short-time school, whose aim is to give stimulus and guidance to teachers in personal knowledge and skill, and in personal culture. Its curriculum usually includes methods of teaching and school management, the subject matter of some branch or branches of literature, science, or art, together with general lectures for culture or recreation. The method of instruction is usually by lectures; but sometimes lessons are assigned and recitations held—the best institutes having modified the formal lecture system. The instruction is given either by a regular institute corps, as in the State of New York, or by a special corps organized for each institute, as in Pennsylvania. See NATIONAL EDUCATION, SYSTEMS OF; NORMAL COLLEGE; PEABODY COLLEGE FOR TEACHERS; SUMMER SCHOOL; TEACHERS COLLEGE.

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NORMAN. A city and the county-seat of Cleveland County, Okla., 50 miles south of Guthrie; on the Atchison, Topeka and Santa Fe Railroad (Map: Oklahoma, F 3). It is the seat of the University of Oklahoma, which was opened in 1892, and of the Territorial Insane Asylum. There are manufactures of cottonseed oil, flour, etc., and some trade with the fertile agricultural section adjacent. The water-works are owned by the municipality. Population, in 1890, 787; in 1900, 2225.

NORMAN, HENRY (1858—). An English traveler and author, born in Leicester, September 19, 1858. He graduated from Harvard and studied at Leipzig University. For some years he was on the *Pall Mall Gazette*, and later he became assistant editor of the *Daily Chronicle*, from which he withdrew in 1899. His voyages include the United States and Canada, Japan, China, Siberia, Korea, India, Siam, the Malay Peninsula, and Egypt. We may mention these works: *An Account of the Harvard Greek Play* (1881); *The Real Japan* (1892); *The Peoples and Politics of the Far East* (1895); *The Near East* (1899); *All the Russias* (1902); and *Delhi: An Account of the Great Mutiny in India* (1902). The work of this writer is characterized by keen insight, fairness, and brilliant sobriety of tone.

NORMAN ARCHITECTURE. A style originated and chiefly used by the Normans, and a subdivision of Romanesque (q.v.) architecture, under which its principal monuments are described. Soon after their conquest of the

north of France, during which they had indulged in wholesale burning of churches and monasteries, the Normans began to rebuild religious structures on a larger scale, as a consequence of their conversion. They accordingly expanded the dimensions, while to a great extent at first retaining the style of the buildings they found in France. They seem also to have borrowed some of their ideas from the Rhine, and from Lombardy, especially the use of vaulting. They carried the architecture of their province and of France with them to England with the Conquest, and even to South Italy, where they established a great kingdom in the eleventh century. The leading characteristics of their style were great size, simplicity, and massiveness. They adopted the old Basilical plan of central and side aisles and semicircular apse, though the square apse was sometimes used in England toward the close of the style. They seized on the tower as a distinguishing feature, and developed it as their style progressed, placing one usually on each side of the façade. The ornaments are simple and of great variety; but the most common and distinctive are the zigzag, billet, chevron, nail-head, etc. The windows and doors are simple, with semicircular arched heads—the former without tracery. The tympanum of the door-arch is occasionally filled with sculpture. The nave arches are carried sometimes on heavy single pillars in English examples, but more frequently, especially as the style advanced, on piers with shafts. Owing to the great size of the buildings, the architects were unable at first to vault the main aisle, which, accordingly, had usually a wooden roof, the side aisles only being vaulted. In France, however, vaulting of the nave became common after 1100, though not in England.

The masonry was at first rude, the joints being large, and the stones hewn with the axe; but in the twelfth century the technique improved with the use of the chisel. The style prevailed from about the beginning of the eleventh century until the rise of Gothic in the thirteenth. There are many examples in Normandy, the churches at Caen being well-known buildings of the date of William the Conqueror. The chapel in the white tower of the Tower of London is the earliest example of pure Norman work in England. The development of vaulting in the French section of the Norman school furnished the models for the development of the Gothic method of ribbed vaulting, while the English section remained stationary and maintained itself longer than in France, until early in the thirteenth century. The Normans, while good builders, did little in sculpture, painting, or the minor arts.

BIBLIOGRAPHY. The most important publication is Ruprich-Robert, *L'Architecture Normande* (Paris, 1884-90), which illustrates the principal buildings both in Normandy and in England. An even fuller illustration is given in Dehio and Bezold, *Kirchliche Baukunst des Abendlandes* (Stuttgart, 1892).

NORMANBY, CONSTANTINE HENRY PHIPPS, Marquis of (1797-1863). An English statesman and author. He was the eldest son of the first Earl Mulgrave. He was educated at Harrow and Cambridge, and became member of Parliament for Scarborough in 1818. Although of a Tory family, he acted with the Liberals; his first speech was in favor of the political claims

of the Roman Catholics, and his second advocated Lord John Russell's proposals for Parliamentary reform. He succeeded to the title in 1831, and soon after was made Governor of Jamaica, where he successfully executed the act for the emancipation of the slaves, and suppressed without loss of life a mutiny of the soldiers. Returning to England, he succeeded the Earl of Carlisle as Lord Privy Seal in 1834. He was Lord Lieutenant of Ireland (1835-39), and displayed an impartiality which won the approbation of O'Connell. He was made a marquis at the coronation of Victoria, and was Colonial Secretary for a short time in 1839, but was soon transferred to the home department, where he remained till 1841. From 1846 to 1852 he was Ambassador at Paris, and from 1854 to 1858 at Florence. He published *A Year of Revolution* (1857), containing his personal observations at Paris, and a number of novels, including: *Matilda* (1825), *Yes and No* (1828), and *The Contrast* (1832).

NORMANDY (Fr. *Normandie*). A former province of France, bordering on the English Channel. Its capital was Rouen. It is comprised in the modern departments of Seine-Inférieure, Eure, Orne, Calvados, and La Manche. In the northeastern part of Normandy (formerly Upper Normandy) are the towns of Rouen, Dieppe, Havre, Harfleur, Honfleur, Lisieux, Evreux, Yvetot; in the southern and western parts (Lower Normandy) are Caen, the chief town, Falaise, Saint-Lô, Bayeux, Coutances, Avranches, Granville, Alençon, and Cherbourg.

In the time of the Romans the region was included in *Gallia Lugdunensis Secunda*. Under the Frankish monarchs it formed a part of Neustria, and came to be known as Normandy after Charles the Simple, in 911 (912?), had given it to Hrolf or Rollo, the leader of a band of Norse rovers (see **NORMANS**), as a fief of the French Crown. From Hrolf (baptized under the name of Robert) and Gisela, the daughter of Charles the Simple, sprang the dukes of Normandy, of whom Richard I. (grandson of Hrolf) vigorously maintained his authority against his liege lords, Louis IV. and Lothaire. William II., son of Robert II., *le Diable*, became Duke of Normandy in 1035, and in 1066 established a Norman dynasty on the throne of England (see **WILLIAM I.**), thereby politically uniting Normandy with the latter country. In 1077 his eldest son, Robert, wrested Normandy from him, but it was again united to England under Henry I. in 1106. With this monarch the direct male line became extinct. Henry II., the son of Henry I.'s daughter, Matilda, after the death of Stephen of Blois, obtained in 1154 the government of England and Normandy; but in the reign of his son, John, Normandy was conquered by Philip Augustus of France (1202-04). It remained a portion of the French monarchy for over two centuries, save when conquered by Edward III. in 1346; but after the battle of Agincourt (1415) it was reconquered by the English, who held it till 1449, when it was finally wrested from them by Charles VII. The Channel Islands, which were once a part of Normandy, have remained in possession of England. Consult: Dumoulin, *Histoire générale de Normandie* (Rouen, 1631); Goube, *Histoire du duché de Normandie* (Rouen and Paris, 1815); Barthélemy, *Histoire de la Normandie ancienne et moderne* (Tours, 1857).

NORMAN FRENCH. A French dialect which originated in Normandy after the Scandinavian invaders, under Rollo, had settled there about 911. (See NORMANDY and NORMANS.) At a very early date these Scandinavians adopted the French language, together with French religion and culture. The Normans in adopting French as a medium of communication and for purposes of literary expression retained many Scandinavian words, which are still, though in a greatly changed form, characteristic of this French dialect. It is not always possible, however, to distinguish these elements, because the Norman French has been influenced, though undoubtedly to a much less extent, by another Germanic tongue, the Saxon. The largest class of Scandinavian derivatives in Norman French is that of proper names of persons and places. Among the first of these, occurring in early works, may be mentioned *Boudre*, from *Baldr*; *Herault*, from *Haraldr*; *Turquetil*, from *Thor-ketill*; *Sigvard*, from *Sigvarth*. In place names suggestions of a Danish origin are numerous, as in *Danneval*, *La Dennerie*, *Danemarche*, *Dancourt*. Many Northern suffixes occur in Norman place names, as *dalle* in *Brecquedalle*, *bec* in *Caudebec*, *Houlbec*, etc., *torp*, familiar in English words of Northern origin, in *Torgistorp*, and *stein*, in *Crestein* and *Gouestain*. Among other words of possible Scandinavian origin the following may be noted: *bruman*, a newly married man; *vin huet*, white wine; *raguer*, to shave or rake; *tang*, seaweed, Old Icelandic *thang*. Several nautical terms in use in Norman French seem to be of Norse origin, as *brant*, the bow of a ship, Old Norse *brandr*, *escuif*, a ship; *hune*, top of a mast, Old Icelandic *hunn*. A few of these words have passed into standard French, but most of them are used only dialectically. Norman French is also distinguished by its sounds, prominent among which is the pronunciation of initial *h*, which in the other French dialects is silent. During the early period Norman French played an important part in French literature, some of the most important monuments being written in this dialect.

Of greater interest to English readers than the peculiarities of Norman French at home is its development in England after the Conquest. In order to distinguish between the French used on the Continent and that used in England, the latter is often called Anglo-Norman or Anglo-French, of which terms the second is now the more generally used. One of the most obvious of these influences in the case of Anglo-French was the introduction of English words, especially those that expressed specifically English ideas, for which no French word existed. The pronunciation, too, was influenced by the English, especially in connection with the accent. The influence of French had begun before the Conquest, as a result of the strong French sympathies of Edward the Confessor, and for several centuries after the Conquest French continued to be the Court language. A considerable French literature was produced in England, both in poetry and prose, and many works of a non-literary character, such as law codes, wills, etc., have been preserved. Many French words were borrowed, forming the first period of the French element.

The best popular account of the Anglo-French is found in Skeat, *Principles of English Ety-*

mology, second series (Oxford, 1891). The best technical treatment is by D. Behrens, in Paul's *Grundriss der germanischen Philologie* (2d ed. 1897). There is no complete dictionary of Anglo-French, though a number of texts have been edited. Useful lists of English words found in Anglo-French have been published by Skeat (1882-89). The question of the influence of Scandinavian culture on the Normans has been discussed from opposite sides by Le Héricher, *Les Scandinaves en Normandie* (Paris, 1877), and A. Fabricius, *Danske Minder i Nordmandiet* (Copenhagen, 1897).

NORMAN LAW. When, about 911, Charles the Simple ceded to the Scandinavian pirate Hrolf, or Rollo, that portion of Neustria which was thenceforth known as the Duchy of Normandy, the institutions and customs of the country were Frankish. These institutions and customs the conquerors apparently accepted, for there is little trace in the later Norman law of Scandinavian influences. Some at least of the Frankish imperial institutions were more fully preserved under the Norman dukes than in other parts of France. Our knowledge, however, of Norman law in the tenth and eleventh centuries is very imperfect; it is based largely on inferences from earlier Frankish and later Anglo-Norman sources.

For the period from the Norman conquest of England in 1066 to the French conquest of Normandy in 1202-04 we have considerable material; we have twelfth century documents (printed by Bigelow as an appendix to his *History of Procedure in England*, 1880) and more or less complete Exchequer Rolls of various dates from 1180 to 1203 (published by Stapleton, with valuable observations, 1840, 1844). That the organization of the exchequer was originally Norman and not English is shown by its existence in the Norman Kingdom of Sicily in the first half of the twelfth century. As later in England, exchequer was a judicial as well as an administrative authority, and from the time of Henry I. it included trained lawyers. Like the Frankish emperors, the Norman dukes sent out *missi*, or itinerant justices, who held court in various parts of the duchy. In the ducal court and in the circuit courts procedure was initiated by ducal writ (*breve*), and proof by wager of battle was supplanted by an inquest of the vicinage. This was a further development of the Frankish *inquisitio*; and the Norman 'jury of proof,' as Brunner calls it, was transferred to England and became the jury of judgment. That in other respects the influence of Norman law upon English law was very great is universally admitted; but there is as yet no agreement as to the extent to which it superseded the older Saxon law.

When Philip Augustus conquered Normandy he promised that the duchy should preserve its privileges. Shortly before, about 1200, a private compilation had been made, known as the *Statuta et Consuetudines Normanniæ*. To this was added, about 1218, a *Tractatus de Brevis et Recognitionibus*. Later in the same century appeared compilations of judgments rendered in the exchequer and of judgments rendered in assize. The most complete statement of Norman law, however, is the *Grand Coutumier de Normandie*, described in the oldest Latin texts as the *Summa de Legibus Normanniæ* or *Jura et Consuetudines Normanniæ*. See GRAND COUTUMIER OF NORMANDY.

Gradually, by judicial interpretation, the law of Normandy was assimilated to that of Paris and of Northern France generally. Not only were the courts filled with French judges, but cases were carried to the Parliament in Paris. The notes or glosses which accompany the fifteenth century copies of the *Grand Coutumier* misinterpret some passages and declare that others are no longer in force. About the middle of the sixteenth century Guillaume Terrien wrote a commentary on the laws of Normandy, which was printed in 1574. This work and the original *Grand Coutumier* still constitute the basis of the law of the English Channel Islands.

In 1577 Henry III. ordered that a new *coutume* be drawn up for Normandy. The royal commissioners stated in their report that the old *coutume* was largely unintelligible and for the most part no longer in use; and in their revision they omitted some of the most important institutions, which give to the Norman law its historical importance, including the incompletely developed jury. The new *coutume* remained in force until the Code Napoléon gave France a common law.

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NORMANN, nôr'mân, EILERT ADELSTEN (1848—). A Norwegian landscape painter, born at Bodø. He studied (1869-73) under Eugen Dückert at the Academy in Düsseldorf, whence he afterwards made annual trips to his native country. The Norwegian fjords and their majestic surroundings furnished the themes for most of his works, executed with truly poetic conception and luminous in color. In 1887 he removed to Berlin, where his style gradually changed to a more realistic treatment. His best known views include: "Harbor of Bodø" (Düsseldorf Gallery), "Midnight in Lofoten Islands" (Cologne Museum), "Romsdals Fjord" (Stockholm Museum), "Summer Night in Lofoten Islands" (National Gallery, Berlin), "Narø Fjord" (Dresden Gallery and Museo Civico, Turin), "Sogne Fjord" (Rudolphinum, Prague, and National Museum, Budapest).

NORMANS (OF. *Norman*, *Normand*, from Dan. *Normand*, Icel. *Norþmaðr*, Northman, from Icel., AS. *norþ*, OHG. *nord*, Ger. *Nord*, north, probably connected with Umbrian *nerthro*, to the left, Gk. *στερεος*, *nerteros*, lower + *maþr*, Goth. *manna*, AS., OHG. *man*, Ger. *Mann*, man). A name generally restricted in its application to those sea rovers who established themselves in the part of France called, after them, Normandy; but sometimes embracing also the early inhabitants of Norway. During the Middle Ages the name Northmen, or Norsemen, was often used in a broader sense, to denote the entire population of Scandinavia. The Germans and French called the piratical hordes who ravaged their shores Danes or Eastmen. They were also distinguished

by the latter as *Mark* (or *March*) men (from *Denmark*), as *Ash*-men (i.e. men of the *ashen*-ships), and as the *Heathen*. The primary cause of the plundering expeditions southward and westward across the seas, undertaken by the Norse Vikings, 'Sea-Kings,' was doubtless the over-population and consequent scarcity of food in their native homes; besides, the relish for a life of warlike adventure, conjoined with the hope of rich booty, strongly attracted them. Finally, discontent with the ever-increasing power of the greater chiefs or kings induced many of the nobles with their followers to seek new homes.

The first Danish Norsemen made their appearance on the eastern and southern coasts of England about 787. In 795 they settled in some of the towns on the coast of Ireland. After 832 their invasions of England were repeated almost every year. In 851 they wintered for the first time in the island, and after 866 obtained firm footing there. The Anglo-Saxon Ethelred I. fought valiantly against them. His brother, Alfred the Great (q.v.), after a long and doubtful struggle, partially reduced them to subjection; nevertheless, he was compelled to leave them in possession of Northumbria and East Anglia, and had not only to defend himself against a new and fierce invasion led by the famous rover Hastings (q.v.), but to contend against the revolts of his Dano-Norman subjects, which continued to trouble his immediate successors. A period of external peace ensued; but in 991 the invasions of the Danes and Norwegians began anew. The Saxon King, Ethelred II., at first sought to buy them off by paying a sort of tribute money, called *Danegeld* (q.v.); but the massacre of the Danes living in England, by command of that monarch, November 13, 1002, was avenged by four expeditions under the Danish King, Sweyn, who frightfully wasted the country, and finally conquered it in 1013, dying the following year. His son, Knut, or Canute (q.v.), after carrying on a struggle for the supreme power with Ethelred and his successor Edmund Ironside (q.v.), at length, on the death of the latter, became sole monarch of England, which now remained under Danish or Norse rulers till 1042. The government of the country then reverted into the Saxon hands of Edward the Confessor (q.v.), who was succeeded in 1066 by Harold II. (q.v.), son of the powerful Godwin, Earl of Wessex (q.v.); but in October of the same year Harold lost his life and crown at the battle of Hastings, and William the Conqueror, a descendant of a Norwegian chief who had settled in Normandy, once more established a Norse dynasty on the throne of England.

It was also Danish Norsemen, in particular, who ravaged the western coasts of the European mainland, from the Elbe to the Garonne. As early as 810 the Danish King, Gottfried, had overrun Friesland; but the power of Charles the Great was too much for these undisciplined barbarians, and they were overawed and subdued for a time. Soon after his death, however, they recommenced (c.820) their piratical expeditions, and, favored by the weakness and dissensions of the Carolingian rulers, became, during the ninth century, the terror and scourge of Northwestern Germany and France. They plundered Hamburg several times, ravaged the coasts of the Frisians (whose country then extended as far as the Scheldt), and in 843 firmly planted themselves at the mouth of the Loire. Ere long

they swarmed up the great rivers into the interior of the country, which they devastated far and wide. In 842 they were at Rouen. In 845 they ascended the Seine and plundered Paris—an exploit which was frequently repeated. In 885 not less than 40,000 of these Vikings, in 700 vessels, are said to have ascended the river from Rouen, under the leadership of one Siegfried, and besieged the capital for ten months. It was only saved at the expense of Burgundy, which was abandoned to their ravages. In 881 Louis III., King of the West Franks, inflicted a severe defeat on the invaders at Vineu, near Abbeville, in Picardy; but neither that nor the repulse which they sustained from the brave German monarch Arnulf near Louvain in 891 could hinder them from making fresh irruptions. In 892 they appeared before Bonn, and tradition says that bands of Danish rovers penetrated even into Switzerland, and established themselves in the Canton of Schwyz and the Vale of Hasli. From their settlements in Aquitania they proceeded at an early period to Spain, plundered the coasts of Galicia in 844, and subsequently landed in Andalusia, but were defeated near Seville by the Arab prince Abd-ur-Rahman. In 859-860 they forced their way into the Mediterranean, plundered the shores of Spain, Africa, and the Balearic Isles, and penetrated up the Rhone as far as Valence; then, turning their piratical prowls in the direction of Italy, entered the Tyrrhenian Sea, burned Pisa and Lucca, and actually touched distant Greece before their passion for destruction was satiated.

Doubtless Norwegian rovers also took part in these so-called Danish expeditions. We know that as early as the beginning of the ninth century they made voyages to the north of Ireland, Scotland, the Hebrides, the Orkney and Shetland Isles; and the increasing power of Harald Haarfagr (q.v.), in the ninth and tenth centuries, exciting great discontent among the smaller chiefs, great emigrations took place, and these islands became the new homes of these Norwegian Vikings. About the same period colonies were settled in the Farøe Isles and Iceland, from which some Vikings proceeded westward across the North Atlantic to Greenland about 983, and thence about 20 years later southward to a region which they called *Vinland*, believed by some to be the coast of Canada or of New England, thus probably anticipating the discovery of America by Columbus by nearly 500 years. From Norway also issued the last and most important expedition against the coast of France. It was led by Hrolf or Rollo (q.v.). Hrolf forced Charles the Simple to grant him possession of all the land in the valley of the Seine, from the Epte and Eure to the sea (911 or 912). The invaders firmly planted themselves in the country, which henceforth went by the name of Normandy (q.v.). They and their descendants are, strictly speaking, the Normans of history. They rapidly adopted the more civilized form of life that prevailed in the Frankish kingdom—its religion, language, and manners. At a later period, the twelfth century, they even developed a great school of narrative poetry, whose cultivators, the *Trouveurs*, or *Trouvères*, rivaled in celebrity the lyrical troubadours of Southern France. But though the Normans had acquired comparatively settled habits in France, the old passion for adventure was still strong in their blood; and in the course of the eleventh century many nobles with their

followers betook themselves to Southern Italy, where the strifes of the native princes, Greek and Arab, opened up a fine prospect for ambitious designs. In 1059 Robert Guiscard (q.v.), one of the ten sons of the Norman Count Tancred de Hauteville, all of whom had gone thither, was recognized by Pope Nicholas II. as Duke of Apulia and Calabria. His brother and liegeman, Roger, conquered Sicily. Roger II. of Sicily united the two dominions in 1127 and in 1130 assumed the title of King of Sicily; but in the person of his grandson, William II., the Norman dynasty became extinct, and the kingdom passed into the hands of the Hohenstauffen family. These Normans of Italy played also a considerable rôle in the Crusades, especially in the first, of which Bohemond I. (q.v.) and Tancred (q.v.) were among the principal leaders. See CRUSADE.

The Swedish Norsemen directed their expeditions chiefly against the eastern coasts of the Baltic—Courland, Esthonia, and Finland—where they made their appearance in the ninth century, at the very time when their Danish and Norwegian brethren were roving over the North Sea, the English Channel, and the Bay of Biscay, and were establishing themselves on the shores of England and France. According to the narrative of the Russian annalist Nestor, they appear to have penetrated into the interior as far as Novgorod, whence they were quickly banished by the native Slavic and Finnish inhabitants, but were as quickly solicited to return and assume the reins of government. Rurik (q.v.) founded one kingdom at Novgorod (862), which stretched northward as far as the White Sea. His successor, Oleg, united with that a second, established by other Swedish adventurers at Kiev. (See RUSSIA.) For a long period these Norsemen, who, it appears, became completely identified with their Slavic-speaking subjects in the tenth century, were dangerous enemies of the Byzantine Empire, whose coasts they reached by way of the Black Sea, and whose capital, Constantinople, they frequently menaced, as, for instance, when Igor (q.v.) is said to have appeared before the city with upward of 1000 ships or boats, about the middle of the tenth century. Earlier in the same century these warriors had found their way into the Caspian Sea, and actually penetrated as far as Persia. Partly from them and partly from native Scandinavians came those soldiers who from the ninth to the twelfth century formed the bodyguard of the Byzantine emperors, the celebrated Varangians (q.v.). Consult: Depping, *Histoire des expéditions maritimes des Normands* (2d ed., Paris, 1843); Freeman, *History of the Norman Conquest* (Oxford, 1867-76); Delarc, *Les Normands en Italie* (Paris, 1883); Keary, *Vikings in Western Christendom* (London, 1891); Du Chaillu, *Viking Age* (New York, 1890); Oman, *History of the Art of War* (London, 1898).

NORMANTON, nôr'man-ton. A town in the West Riding of Yorkshire, England, near the Calder, eight miles southeast of Leeds (Map: England, E 3). It is an important railway junction, and has coal-mining industries and iron works. Population, in 1891, 10,200; in 1901, 12,350.

NORNS (Icel. *Nornir*, Fates). The Fates of the Scandinavian mythology. They were three young women, by name Urd, Verdandi, and

Skuld—i.e. past, present, and future. They sit by the Urdarwell under the world-tree Yggdrasil, and there determine the fate both of gods and men. Every day they draw water from the spring, and with it and the clay that lies around the wells sprinkle the ash-tree Yggdrasil, that its branches may not rot and wither away. Besides these three great norns, there are also many inferior ones, both good and bad; for, says the prose Edda, when a man is born there is a norn to determine his fate; and the same authority tells us that the unequal destinies of men in the world are attributable to the different dispositions of the norns. These lesser norns corresponded to the *genii* of classic mythology. Women who possessed the power of prediction or magic also bore this name.

NORONA, nō-rō'nyā, GASPARE MARIA DE NAVA ALVAREZ, Conde de (1760-1815). A Spanish poet and soldier, born at Castellón de la Plana. He served with distinction at the siege of Gibraltar and afterwards was made lieutenant-general. He had meanwhile been Ambassador to Russia. At the time of the French invasion he was Governor of Cadiz. His works include: *Madama Gonzalez*, a tragedy; *El hombre marcial* and *El cortejo enredador*, comedies; *Poesías* (1799); and *Ommiada* (1816), an epic poem of 15,000 verses, pronounced very dull reading. A selection of his works is found in *Biblioteca de autores españoles*, vol. lxiii. (Madrid, 1871).

NORRIDGEWOCK (properly *Nānrantswak*, where the river falls again). A tribe of Algonquian stock (q.v.), the leading member of the Abnaki (q.v.) confederacy. Their principal village, which bore the tribal name, was on the left bank of the Kennebec River, just below the rapids at Indian Old Point, near the present Norridgewock, Maine. Their territory embraced the whole Kennebec River region nearly to the coast, whence they were frequently called Kennebec Indians. The French established a mission at Norridgewock in 1688, and in 1695 the Jesuit Rasse took up his residence there, where he remained for the rest of his life, and succeeded in attaching the tribe so warmly to the French cause that they came to be regarded as the most dangerous enemies of the English colonists. In 1724 an expedition was sent against the settlement, which resulted in the destruction of the village and the dispersion of the tribe, Rasse himself being shot. A part of the fugitive Norridgewock afterwards returned and rebuilt their village, but on a second attack by the English in 1749 they retired to Canada, most of them joining the other New England refugees at Saint Francis.

NORRIS, EDWIN (1795-1872). An English Orientalist, born in Taunton, Somerset. He was one of the first to decipher the Assyrian cuneiform inscriptions, was intimately associated with Rawlinson at various times, and published three parts of an *Assyrian Dictionary* (1868-72). His other works include studies of African dialects, an *Ethnographical Library*, of which, under his editorship, there appeared two volumes, and *The Ancient Cornish Drama* (1859), with an essay on Cornish grammar.

NORRIS, FRANK (1870-1902). An American novelist, born in Chicago, Ill. He studied art in Paris from 1887 to 1889, and pursued literary courses at the University of California and at

Harvard. *Yberville*, a story of Spanish life in old California, appeared in 1891. He was correspondent in South Africa for the *San Francisco Chronicle* at the time of the Jameson Raid, in 1896 and 1897 edited the *San Francisco Wave*, and in 1898 was a war correspondent in Cuba. *McTeague* (1899), a realistic story, was his first novel to attract attention. *Moran of the Lady Letty* (1900) is a story of adventure off the California coast. *The Octopus*, the first novel of a trilogy embodying an 'epic of the wheat,' was published in 1901. It concerns the growing of the wheat and arraigns the oppressive methods of railroad monopoly as existing in California. *The Pit* (1903) deals with the battles over the exchange of the wheat. The last part, *The Wolf*, as planned, was to depict the struggle for the wheat in a famine-stricken community in Europe. At the time of his death he held a position as literary adviser in a publishing house in New York City.

NORRIS, HENRY (?-1536). An English courtier, son of Sir Edward Norris of Norreys. As a young man he became a favorite with Henry VIII., and was an opponent of Wolsey, to whose fall he contributed. Norris's attempts to advance Anne Boleyn were entirely successful, but his intimacy with her gave his enemies at court a means of attack. He was accused of an intrigue with her, quite unjustly it would seem, and was executed in 1536. His son became Baron Norris of Rycote.

NORRIS, WILLIAM EDWARD (1847-). An English novelist, born in London. After going through Eton he went to the Continent to study languages, with the intention of entering the diplomatic service, but, changing his plans, he studied law, and was admitted to the bar in 1874, though he has never practiced. His short stories, contributed to the *Cornhill Magazine*, attracted the especial notice of the editor, Leslie Stephen, by whom he was encouraged to attempt the longer novel. *Heaps of Money* (1877) was followed by *Mademoiselle de Mersac* (a serial in *Cornhill* for 1879), and *Matrimony* (1880), a novel showing fine discrimination in character-drawing. Among his other novels are: *No New Thing* (1882); *Thirlby Hall* (1883); *Adrian Vidal* (1884); *A Bachelor's Blunder* (1885); *My Friend Jim* (1886); *Major and Minor* (1887); *The Rogue* (1888); *Miss Shafto* (1889); *Mrs. Fenton* (1889); *Marcia* (1890); *Mr. Chaine's Sons* (1891); *His Grace* (1892); *A Deplorable Affair* (1893); *The Dancer in Yellow* (1896); *Clarissa Furiosa* (1897); *The Widower* (1898); *Giles Ingilby* (1899); *An Octave* (1900); *Lord Leonard the Luckless* (1903).

NORRISTOWN. A borough and the county-seat of Montgomery County, Pa., 18 miles west by north of Philadelphia; on the Schuylkill River, the Schuylkill Canal, and the Pennsylvania and the Philadelphia and Reading railroads (Map: Pennsylvania, F 3). It is beautifully situated among hills and on the Schuylkill and two tributaries, and is popular as a place of residence. Among the institutions here are the county prison, the Norristown Hospital for the Insane (State), Charity Hospital, the Agnes Stinson Home for Aged Ladies, Friends' Home, Saint Joseph's Protectory (Roman Catholic) for girls, McCann Library (public), and Montgomery County Historical Society. Other prominent

buildings and places of interest are the county court house, municipal building, high school, Masonic Temple, Montgomery Cemetery, with a tomb of Gen. W. S. Hancock and a shaft to Gen. John F. Hartranft, the Schuylkill Bridge (1829), and Valley Forge, but six miles distant. Norristown is in a rich agricultural and mining region, and has extensive manufactures of glass, wire, screws, iron, hosiery, knitting machines, shirts, etc. The government is administered by a burgess, elected every three years, and a unicameral council, which controls elections of subordinate municipal departments. The borough owns and operates its electric light plant. Founded in 1785 and named in honor of Isaac Norris, who had formerly owned a large part of the land in this vicinity, Norristown was incorporated as a borough in 1812, its population then being about 500. It was enlarged in 1853. It is claimed that the earliest settlement here was in 1688 by Friends from Wales. Population, in 1890, 19,791; in 1900, 22,265.

NORRKÖPING, nôr'chê-pîng. A seaport on the east coast of Sweden, situated at the head of the Bråvik, 75 miles southwest of Stockholm (Map: Sweden, G 7). It is regularly laid out with streets crossing at right angles, and has several beautiful parks, squares, and promenades. There are many fine modern buildings, among the best of which are the almost palatial public schools, the new Church of Saint Matthew, the city hall, and the labor lyceum. The Motala, which flows through the town, is extensively utilized for water power, and Norrköping is one of the foremost manufacturing towns of Sweden. In 1900 there were 175 factories, whose products for the year were valued at \$9,650,000. The most important manufactures are woolen and cotton textiles, paper, tapestries, and sugar. Norrköping is also one of the most important commercial ports in the country. Its harbor admits the largest vessels. The shipping in 1899 amounted to nearly 375,000 tons. The chief exports are manufactured goods, grain, wood, and dairy products. Population, in 1890, 32,826; in 1900, 41,008.

NORRLAND, nôr'lant. The northernmost and largest, but least populous, of the three historical divisions of Sweden. It extends south as far as Gefle, and has an area of 80,785 square miles, with a population in 1901 of 860,254.

NORSEMEN, or **NORTHMEN**. See **NORMANS**.

NORSE MYTHOLOGY. See **ÆSIR**; **SCANDINAVIAN MYTHOLOGY**.

NORTH, CHRISTOPHER. The pseudonym of the part author of the *Noctes Ambrosianæ*, John Wilson (q.v.).

NORTH, FRANCIS, Baron Guilford (1637-85). A celebrated English jurist. He was born November 2, 1637, the third son of the fourth Lord North. Prejudiced against Presbyterians by the sternness of his early teachers, North was confirmed in this feeling by Dr. Stevens, a sturdy Royalist, head of the school at Bury Saint Edmund, where he finished his preparation for college. Matriculated at Saint John's College, Cambridge, he withdrew in two years to become a student of law in the Middle Temple. He was admitted to its practice in 1661, and as he had always been a student of great application, he

soon gained a high rank at the bar. Indeed, his rise in favor at the Court was so rapid that he has been accused of using unworthy means to gain his end. He became Solicitor-General in 1671, Attorney-General in 1673, and Lord Chief Justice of the Common Pleas in 1675. In 1682 he was made Lord Keeper of the Great Seal. With other members of the Court party he was hostile to Titus Oates, and as judge ruled in such a manner against Stephen College that it aided in securing a death sentence. This act constitutes the most serious blot on his fame as a judge, for in most cases his decisions were marked by their ability and justice. He was a Royalist, true to Charles II. at all times. In 1683 he entered the House of Lords as Baron Guilford, but took little part in its proceedings. He was a man of vast knowledge and wide culture, an excellent musician, a patron of artists, and a friend of natural sciences, yet withal too complaisant to the corruptions of his day. As a lawyer his ability and learning were undoubted, and his decisions did much to increase the jurisdiction of the Court of Common Pleas. Consult Roger North, *The Lives of the Norths* (London, 1890).

NORTH, FREDERICK, Lord, Earl of Guilford (1732-92). An English statesman. He was a son of Baron Guilford. After a course at Eton and Trinity College, Oxford, and a period of Continental travel, North was at the age of twenty-two sent to the House of Commons as member from Banbury, a borough controlled by his father. From 1759 until the fall of the Rockingham Ministry in 1765 he held the position of a junior lord of the treasury. In December, 1766, after a short tenure of the office of paymaster, he was admitted as a member of the Privy Council. His ability won for him, in March, 1767, an offer of the chancellorship of the exchequer, which he at first declined, but upon the death of Townshend in September finally accepted. With this post went the leadership of the House of Commons, for which he was well qualified by his eloquence, good humor, wit, and readiness of resource. His attitude on the Townshend tea tax, however, was one of the immediate causes of the American war. It was North's own boast that as a member of the Commons he had "voted against all popular and in favor of all unpopular measures." In 1770 he succeeded the Duke of Grafton as Prime Minister. He was called by Horace Walpole the ostensible Minister; for the real Minister was King George III. It has since been proved that North as early as 1776 believed that the unyielding policy he was pursuing with regard to the American colonies would end in ruin to the King and to the country; yet in the face of the powerful opposition of Fox and Burke, he allowed his own convictions to be overborne by the obstinacy of King George's ultra-Tory purpose. In 1778 he was forced to a renunciation of the right to tax the colonies; but the concession came too late, and in 1782, finding it impossible to carry on the war any longer, he resigned. With North's retirement came to an end George III.'s scheme of governing the country by his own will, and of ruling the House of Commons. Soon, however, Fox entered into a coalition with North, against whom he had for so many years inveighed. North and Fox took office under the

Duke of Portland in 1783, but the coalition lasted only a few months. He succeeded his father as Earl of Guilford in 1790. During the last five years of his life North was totally blind. He bore his afflictions with great cheerfulness, dying August 5, 1792. North was an amiable man, possessed of considerable wit and talent, but lacking those powers necessary to carry a country well through a crisis like that which England experienced during his administration. Consult Donne, *Correspondence of George III. with Lord North* (London, 1867).

NORTH, Sir THOMAS (1535?-1602?). An Elizabethan translator, the son of Edward, first Baron North, and younger brother of Roger North (1530-1600), the courtier and soldier. He was probably educated at Peterhouse, Cambridge, and certainly studied at Lincoln's Inn (1557). In 1588 he was captain of three hundred men at Ely; was styled a man of courage; and was knighted in 1591. In 1601 he received a pension of £40 for his 'good and faithful service.' North, a master of clear and robust English, performed still greater service to literature. Under the title *The Diall of Princes* (1557), he Englished the Spaniard Guevara's *Libro Aurco*. North's version was exceedingly popular. From the Italian of Antonio Francesco Doni he published the *Morall Philosophie of Doni* (1570; reprint by J. Jacobs, London, 1891), a collection of Eastern fables. Better known now is his version of Plutarch's *Lives* (1579; 2d edition 1595; enlarged 1603), made from the French of Amyot. It was the source of Shakespeare's Roman tragedies. Consult the reprint of the first edition of North's Plutarch, ed. by Wyndham (Tudor Library, London, 1895).

NORTH, WILLIAM (1752-1836). An American soldier, born at Fort Frederick, Maine. He entered the Revolutionary army in 1775, and in 1778 was a captain at the battle of Monmouth. The next year he was transferred to the staff of Baron Steuben and remained with him until the surrender of Cornwallis. He left the army with the brevet rank of brigadier-general, and went to live with Steuben, whose favorite he had become. A zealous Federalist, he took an active interest in politics, and was a member of the United States Senate in 1798-99. During the trouble with France in 1798 he was appointed adjutant-general of the army with the rank of brigadier-general. He wrote a valuable memoir of Baron Steuben.

NORTH ADAMS. A city, including several villages within its corporate limits, in Berkshire County, Mass., 21 miles north of Pittsfield; on the Hoosac River, and on the Boston and Albany and the Boston and Maine railroads (Map: Massachusetts, A 2). An attractive feature of the city is its beautiful location, amid mountain scenery, at the foot of Greylock, the highest mountain in the State. It is near the western end of the famous Hoosac Tunnel, and the natural bridge which spans Hudson Brook at a height of 50 feet is in North Adams. The more prominent institutions are a State normal school, North Adams Library, and North Adams Hospital. The principal industries include the manufacture of cotton, woolen, and print goods, boots and shoes, machinery, etc. North Adams was one of the first places in the United States east of the Pacific slope where Chinamen were em-

ploied. The government is administered, under the charter of 1895, by a mayor, annually elected, and a unicameral council, elected on a general ticket. The majority of subordinate municipal officials are appointed, either absolutely or with the consent of the council, by the executive, but with these exceptions: city clerk and auditor of accounts, elected by the council, and assessors, trustees of public library, and school committee, chosen by popular vote. The water-works are owned and operated by the municipality. Population, in 1890, 16,074; in 1900, 24,200. Settled about 1765, North Adams was separated from Adams and incorporated as a town in 1878. In 1895 it became a city. The site of Fort Massachusetts, which was captured by the French and Indians under Vaudreuil in 1746, is in the western part of the city. Consult Spear, *History of North Adams* (North Adams, 1885).

NORTHALLERTON. A market-town in the North Riding of Yorkshire, England, 30 miles northwest of York (Map: England, E 2). It has a large number of public schools and other institutions, manufactures of linen and leather, brick-making, and malting. It is famous as the place where the battle of the 'Standard,' so called from a high standard erected on a car by the English, was fought, August 22, 1138, between the English under the earls of Albemarle and Ferrers and the Scotch under King David. The latter were defeated. Population, in 1891, 3802; in 1901, 4009. For the history, consult Ingledew (London, 1858) and Saywell (*Northallerton*, 1886).

NORTH AMERICA. See AMERICA.

NORTHAMPTON. The capital of Northamptonshire, England, a market-town, Parliamentary and municipal borough, on rising ground on the Nen, 67 miles northwest of London (Map: England, E 4). The principal edifices are the shire hall, the handsome town-hall, the corn exchange, the numerous churches, several of which are unusually interesting, as Saint Peter's, a restored specimen of enriched Norman, and Saint Sepulchre's, one of the four round churches in the Kingdom, and dating from the twelfth century. Northampton has numerous endowed charitable and educational establishments. It is a horse-racing centre, and two meetings annually are held on a fine course in the suburbs. The town owns the water supply, markets, a sewage farm; maintains a free library, museum, cemetery, fire brigade, police force; and provides technical instruction. Northampton is the centre of the English shoe-making industry, and has currying works, iron foundries, maltings, breweries, flour and paper mills, and brick and tile works. Of early English origin, in the *Saxon Chronicle* it is called Mamp-tune. It was long in the possession of the Danes, who burned it in 1010. It was walled and strongly fortified by Simon de Saint Liz in 1075. During the Civil War it was held for Parliament. The meadows below the town witnessed the defeat of Henry VI. by the Yorkists in 1460. Population, in 1891, 75,075; in 1901, 87,021. Consult: *Liber Custumarum: the Ancient Customs of the Town of Northampton* (Northampton, 1895); Adkins, *Northampton in English History* (London, 1898).

NORTHAMPTON. A city, including several villages, and the county-seat of Hampshire Coun-

ty, Mass., 17 miles north of Springfield; on the Connecticut River, and on the Boston and Maine and the New York, New Haven and Hartford railroads (Map: Massachusetts, B 3). The city, which occupies elevated ground and is noted for its beautiful scenery, has become widely popular as a summer resort. It has, among noteworthy institutions, Smith College (q.v.), the Clarke Institute for Deaf Mutes, richly endowed by John Clarke, Northampton Insane Hospital (State), Smith Charities, Cooley Dickinson Hospital, Home for Aged and Invalid Women, the Burnham Classical School, Public, Forbes, and Lilly libraries, Memorial Hall, and Academy of Music. Among the conspicuous edifices are the court house and high school building. In the immediate vicinity of Northampton are Mount Tom and Mount Holyoke, both ascended by mountain railways and commanding magnificent views. The principal industries are the manufactures of silk, cutlery, brushes, lumber products, furniture, hosiery, wood pulp, emery wheels, boxes, foundry products, baskets, sewing machines, pocketbooks, etc. The government is administered, under the charter of 1883, by a mayor, annually elected, and a bicameral council, which controls appointments of the subordinate departments, excepting those of schools and the Forbes Library, chosen by popular vote. The water-works are owned and operated by the municipality. Population, in 1890, 14,990; in 1900, 18,643. Northampton was first settled in 1654 by a small company from Springfield, and was named (in 1655) after Northampton, England. In 1676, during King Philip's War, it was attacked by Indians. Jonathan Edwards was minister here from 1729 until dismissed in 1750. Northampton was chartered as a city in 1883. Consult Trumbull, *History of Northampton* (Northampton, 1898).

NORTHAMPTON, ASSIZE OF. A royal decree issued in January, 1176, by Henry II. of England. Like the Assize of Clarendon (q.v.), it is in the form of instructions to the itinerant justices. The penalties are severer than they were in the earlier document, and there are special orders in regard to difficulties due to the rebellion of 1173 against Henry II. (q.v.), which had centred about Henry's eldest son and namesake. Consult: Stubbs, *Constitutional History of England*, vol. i. (6th ed., Oxford, 1897); id., *Select Charters* (8th ed., Oxford, 1895), for the Latin text; Adams and Stephens, *Select Documents of English Constitutional History* (New York, 1901), for an English translation of the document.

NORTHAMPTONSHIRE, or NORTH'ANTS. A southern midland county of England, bounded on the north by Lincoln, Rutland, and Leicester, on the east by Bedford, Huntingdon, and Cambridge, on the south by Oxford and Buckingham, and on the west by Warwick and Oxford (Map: England, F 4). Area, 998 square miles. The surface generally is undulating and well wooded; the northeast belongs to the Bedford Level (q.v.). The chief rivers are the Nen, Welland, and Avon. Stock-raising and the cultivation of pasture land are the chief branches of agriculture, but Northamptonshire is principally an iron-producing and manufacturing county. Northampton (the capital), Peterborough, Wellingborough, Daventry, and Kettering are the principal towns. Population, in 1891, 302,183; in 1901, 338,064. Con-

sult Baker, *History and Antiquities of the County of Northamptonshire* (London, 1841).

NORTH ANDOVER. A town in Essex County, Mass., 28 miles north of Boston and two miles southeast of Lawrence; on the Boston and Maine Railroad (Map: Massachusetts, E 2). It is important both as a residential place and as a manufacturing centre. There are several large woolen mills and manufactories of woolen mill machinery. North Andover was set off from Andover and incorporated as a town in 1855, the original form of government, by town meeting, still prevailing. The town owns and operates the water-works. Population, in 1890, 3742; in 1900, 4243.

NORTHANGER (nôth-an'jër) ABBEY. A novel by Jane Austen (1818). It is a picture of commonplace English life in the latter part of the eighteenth century at Bath and at the Abbey, the countryplace of friends of the heroine, Catherine Morland. It was written early in her career (though not published till after her death) with a view of showing that the every-day life of ordinary people could be made as interesting as the absurd romances, like the *Mysteries of Udolpho*, which were then popular.

NORTH ATTLEBORO. A town, including several villages, in Bristol County, Mass., 32 miles south-southwest of Boston; on the New York, New Haven and Hartford Railroad (Map: Massachusetts, E 4). It has the Richards Memorial Library (public), with 6000 volumes. There are extensive manufactories of jewelry, also establishments producing jewelers' supplies, cotton yarn, silverware, rope, braid, boxes, buttons, etc. North Attleboro was incorporated in 1887; its government is administered by town meetings. The water-works and electric light plant are owned by the municipality. Population, in 1890, 6727; in 1900, 7253.

NORTH BAY. A town in Nipissing district, Ontario, Canada; on Lake Nipissing, and the Canadian Pacific and Grank Trunk railroads (Map: Ontario, D 1). Small steamers ply on the lake, and the place is much visited by tourists and fishing parties. There is a United States consular agent. Population, in 1901, 2530.

NORTH BERWICK, bër'wîk. A seaport town, in Haddingtonshire, Scotland, at the entrance to the Firth of Forth, 19 miles east-northeast of Edinburgh (Map: Scotland, F 3). Formerly a fishing-village, North Berwick has now become a watering-place, noted for its fine sandy beach, and its five-mile course golf links. Near by are Bass Rock, North Berwick Law, and the ruins of Tantallon Castle, graphically described in Scott's *Marmion*. Tantallon Castle is an irregular pile, two miles east of the town, on a high rock, surrounded by the sea on three sides, with a ditch on the land side, where there was formerly a drawbridge. North Berwick Law is a conical hill of an elevation of 612 feet, on the south, close to the town. Population, in 1891, 1500; in 1901, 2784.

NORTH BRABANT. A province of the Netherlands, adjoining Belgium and occupying the northern part of Brabant (q.v.) (Map: Netherlands, D 3). Area, 1980 square miles. It has a low surface and belongs to the basin of the Meuse. Agriculture and the raising of domestic animals are the chief occupations, but the manufacturing

industries are also well developed. The chief manufactures are cotton and woolen fabrics, linen, hats, leather, etc. Population, in 1889, 509,628; in 1890, 553,845.

NORTH BRADDOCK. A borough in Allegheny County, Pa., ten miles from Pittsburg, on the Pennsylvania Railroad (Map: Pennsylvania, B 3). It is mainly a residential and manufacturing place, and has a large plant, making chiefly steel rails, of the United States Steel Corporation. Organized from a part of Braddock Township, North Braddock was incorporated in 1897; its government is administered by a burgeois, elected every three years, and a council. Population, in 1900, 6535.

NORTH BRIDGE. A town, including several villages, in Worcester County, Mass., 13 miles southeast of Worcester; on the Blackstone and Mumford rivers, and on the New York, New Haven and Hartford Railroad (Map: Massachusetts, D 3). The town has a public library, and its industrial interests are represented by extensive manufactures of cotton mill machinery, cotton and woolen goods, etc. Settled in 1662, Northbridge was set off from Mendon and incorporated as a separate town in 1772. The government is administered by town meetings. The water-works are owned and operated by the Whitin Machine Works, one of the town's great manufacturing plants. Population, in 1890, 4603; in 1900, 7036.

NORTH BROOK, LORD. See **BARING, THOMAS GEORGE.**

NORTH CAPE. A promontory projecting into the Arctic Ocean from the island of Magero (q.v.), off the north coast of Norway, in latitude $71^{\circ} 11'$ north (Map: Norway, L 1). It is generally considered as the northernmost point of Europe, though a little to the west of it a low point of land, the Knivskjoerodde, extends a few minutes farther north. The northernmost point of the European mainland is Cape Nordkyn, 44 miles east of North Cape, in latitude $71^{\circ} 7'$. North Cape is a precipitous rocky headland, rising 968 feet above the sea. Its summit is crowned by a granite monument; in summer it is visited by numerous tourists.

NORTH CAROLINA (popularly called the 'Old North State,' also the 'Turpentine State'). A South Atlantic State of the United States. It lies between $33^{\circ} 50'$ and $36^{\circ} 33'$ north latitude, and between $75^{\circ} 27'$ and $84^{\circ} 20'$ west longitude. It is bounded on the north by Virginia, on the east and southeast by the Atlantic Ocean, on the south by South Carolina and Georgia, and on the west by Tennessee. Its extreme length from east to west is $503\frac{1}{4}$ miles, and its extreme breadth $187\frac{1}{2}$ miles, the average breadth being about 100 miles. Its area is 52,250 square miles, including the large coast lagoons, the land surface covering 48,580 square miles, or 31,091,200 acres. Its gross area is, according to the latest official figures, exactly equal to that of Alabama, and is exceeded by 23 of the other States. In land area North Carolina ranks 25th.

TOPOGRAPHY. The State may be divided into three distinct topographical belts, the Appalachian mountain region in the west, the Piedmont plain in the middle, and the coastal plain in the east, the dividing lines between these running obliquely across the State from southwest to

northeast. The mountain belt, taken as a whole, consists of a high plateau covering about 6000 square miles and lying at an average elevation of 2000 to 5000 feet. It is bounded on the east by the Blue Ridge, which rises in a steep and rugged escarpment from the Piedmont plain to a height of nearly 4000 feet above sea level in the north, becoming lower southward. On the west the plateau is bounded by the Great Smoky Mountains, whose crest separates North Carolina from Tennessee. Between these ridges the plateau itself is much dissected by river valleys running in all directions, and broken up into cross ranges and irregular mountain groups. These are generally rounded, forest-covered heights, but there are several pointed peaks, and some precipitous slopes and rocky cliffs. More than twenty-five peaks are over 6000 feet high. Their summits are generally bare. The highest is Mount Mitchell, in the group known as the Black Mountains, the culminating point of the Appalachian system and the highest peak in the eastern half of the continent. It rises from the centre of the plateau in North Carolina to a height of 6711 feet above the sea.

The portion of the State east of the mountain belt is about equally divided between the Piedmont and the coastal plains. The former reaches its widest development in this State, of whose area it includes nearly one-half. It slopes gradually from an elevation of 1000 feet at the foot of the Blue Ridge to less than 500 feet where it merges into the coastal plain. Its surface is undulating, rugged, and hilly near the mountains, but gradually levels toward the east. It is partly forested, but consists largely of cultivated land, being the most populous and best developed region of the State. The coastal plain occupies the eastern belt stretching from 100 to 150 miles from the coast. It is level and sandy, consisting in parts of pine barrens, and everywhere is less than 500 feet in elevation. It merges through low swamps into the shallow coast lagoons, of which Pamlico and Albemarle sounds are the largest. They are bounded on the ocean front by narrow sand beaches.

HYDROGRAPHY. The greater part of the State belongs to the Atlantic slope, but the western mountain region beyond the Blue Ridge belongs to the Mississippi basin, being drained by the headstreams of the Tennessee River, chief among which are the Little Tennessee and the French Broad River. The eastern slope of the Blue Ridge in this State is the watershed for nearly all the Atlantic rivers of both North and South Carolina, all of them having a general southeast course. In the northern half of the State the Roanoke, the Tar, and the Neuse enter Albemarle and Pamlico sounds through deep and wide estuaries. The southern portion is drained by the Cape Fear River, and the western part of the Piedmont plain by the Yadkin or Great Pedee and the Catawba, both of which flow into South Carolina. The large rivers of the coastal plain, especially their magnificent estuaries, offer facilities for communication, and on the Piedmont plain they furnish a vast amount of water-power.

CLIMATE. North Carolina lies in the warmer part of the temperate zone. The climate becomes almost sub-tropical in the southeastern corner. The mean temperature near the coast is 61° , and in the mountains 56° , the mean summer tempera-

AREA AND POPULATION OF NORTH CAROLINA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Alamance.....	C 1	Graham.....	494	18,271	25,665
Alexander.....	A 2	Taylorsville.....	297	9,430	10,000
Alleghany.....	A 1	Sparta.....	223	6,523	7,759
Anson.....	B 3	Wadesboro.....	551	20,027	21,870
Ashe.....	A 1	Jefferson.....	599	15,028	19,581
Beaufort.....	F 2	Washington.....	819	21,072	26,404
Bertie.....	E 1	Windsor.....	712	19,176	20,526
Bladen.....	D 3	Elizabethtown.....	1,013	16,763	17,677
Brunswick.....	D 3	Southport.....	812	10,900	12,657
Buncombe.....	B 4	Asheville.....	624	35,266	44,288
Burke.....	C 4	Morganton.....	534	14,939	17,699
Cabarrus.....	B 2	Concord.....	387	19,142	22,456
Caldwell.....	C 1	Lenoir.....	507	12,296	15,694
Camden.....	F 1	Camden.....	218	5,667	5,474
Carteret.....	F 3	Beaufort.....	538	10,825	11,811
Caswell.....	C 1	Yanceyville.....	396	16,028	15,028
Catawba.....	A 2	Newton.....	408	18,689	22,133
Chatham.....	C 2	Pittsboro.....	785	25,413	23,912
Cherokee.....	A 4	Murphy.....	451	9,976	11,860
Chowan.....	F 1	Edenton.....	161	9,167	10,258
Clay.....	A 4	Hayesville.....	185	4,197	4,532
Cleveland.....	A 2	Shelby.....	485	20,394	25,078
Columbus.....	D 3	Whiteville.....	287	17,856	21,274
Craven.....	E 2	Newbern.....	685	20,533	24,160
Cumberland.....	C 2	Fayetteville.....	1,008	27,321	29,249
Currituck.....	F 1	Currituck.....	273	6,747	6,529
Dare.....	G 2	Manteo.....	405	3,768	4,757
Davidson.....	B 2	Lexington.....	563	21,702	23,403
Davie.....	B 2	Mocksville.....	264	11,621	12,115
Duplin.....	E 3	Kenansville.....	830	18,600	22,405
Durham.....	D 1	Durham.....	284	18,041	26,233
Edgecombe.....	E 2	Tarboro.....	515	24,113	26,491
Forsyth.....	B 1	Winston-Salem.....	369	28,434	35,251
Franklin.....	D 1	Louisburg.....	471	21,090	25,116
Gaston.....	A 2	Dallas.....	359	17,764	27,303
Gates.....	F 1	Gatesville.....	356	10,252	10,413
Graham.....	A 4	Robbinsville.....	302	3,313	4,343
Granville.....	D 1	Oxford.....	504	24,484	23,263
Greene.....	E 2	Snowhill.....	258	10,639	12,038
Guilford.....	C 1	Greensboro.....	674	28,052	39,074
Halifax.....	E 1	Halifax.....	681	28,908	30,793
Harnett.....	D 2	Lillington.....	596	13,700	15,988
Haywood.....	A 4	Waynesville.....	541	13,346	16,222
Henderson.....	B 4	Hendersonville.....	362	12,589	14,104
Hertford.....	E 1	Winton.....	339	13,851	14,294
Hyde.....	F 2	Swanquarter.....	596	8,903	9,278
Iredell.....	B 2	Statesville.....	592	25,462	29,094
Jackson.....	A 4	Webster.....	494	9,512	11,853
Johnston.....	D 2	Smithfield.....	688	27,239	32,250
Jones.....	E 3	Trenton.....	403	7,403	8,226





**AREA AND POPULATION OF NORTH CAROLINA
BY COUNTIES. (Continued.)**

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Lenoir	E 2	Kinston.....	486	14,870	18,630
Lincoln	A 2	Lincolnton.....	296	12,586	15,408
McDowell.....	B 4	Marion.....	437	10,939	12,567
Macon	A 4	Franklin.....	531	10,102	12,104
Madison	B 4	Marshall.....	431	17,805	20,644
Martin	E 2	Williamston.....	438	15,221	15,383
Mecklenburg.....	B 2	Charlotte.....	590	42,673	55,268
Mitchell.....	B 3	Bakersville.....	362	12,807	15,221
Montgomery.....	C 2	Troy.....	489	11,239	14,197
Moore.....	C 2	Carthage.....	798	20,479	23,622
Nash.....	D 2	Nashville.....	584	20,707	25,478
New Hanover.....	E 3	Wilmington.....	190	24,026	25,785
Northampton.....	E 1	Jackson.....	523	21,242	21,150
Onslow.....	E 3	Jacksonville.....	645	10,303	11,940
Orange.....	C 1	Hillsboro.....	386	14,948	14,680
Pamlico.....	F 2	Bayboro.....	358	7,146	8,045
Pasquotank.....	F 1	Elizabeth City.....	231	10,748	13,660
Pender.....	D 3	Burgaw.....	883	12,514	13,381
Perquimans.....	F 1	Hertford.....	251	9,293	10,091
Person.....	C 1	Roxboro.....	396	15,151	16,085
Pitt.....	E 2	Greenville.....	644	25,519	30,880
Polk.....	B 4	Columbus.....	258	5,902	7,004
Randolph.....	C 2	Ashboro.....	795	25,195	28,232
Richmond.....	C 3	Rockingham.....	466	23,948	28,408
Robeson.....	C 3	Lumberton.....	1,043	31,483	40,371
Rockingham.....	C 1	Wentworth.....	573	25,363	33,163
Rowan.....	B 2	Salisbury.....	483	24,123	31,066
Rutherford.....	B 4	Rutherfordton.....	547	18,770	25,101
Sampson.....	D 2	Clinton.....	921	25,096	26,360
Scotland.....	C 3	.....	.....	.....	.....
Stanly.....	B 2	Albemarle.....	413	12,136	15,220
Stokes.....	B 1	Danbury.....	472	17,199	19,866
Surry.....	B 1	Dobson.....	531	19,281	25,515
Swain.....	A 4	Bryson City.....	560	6,577	8,401
Transylvania.....	B 4	Brevard.....	371	5,881	6,620
Tyrell.....	F 2	Columbia.....	397	4,225	4,960
Union.....	B 3	Monroe.....	561	21,259	27,156
Vance.....	D C	Henderson.....	276	17,561	16,084
Wake.....	D 2	Raleigh.....	841	49,307	54,626
Warren.....	D 1	Warrenton.....	412	19,390	19,151
Washington.....	F 2	Plymouth.....	334	10,300	10,608
Watauga.....	A 1	Boone.....	390	10,611	13,417
Wayne.....	D 2	Goldensboro.....	597	26,100	31,356
Wilkes.....	A 1	Wilkesboro.....	718	22,675	26,872
Wilson.....	F 2	Wilson.....	392	18,644	23,506
Yadkin.....	B 1	Yadkinville.....	334	12,790	14,083
Yancey.....	B 4	Burnsville.....	302	9,490	11,464

* Established since the last census was taken..

tures for the two regions are 77° and 72°, and the winter temperatures 45° and 40°. The normal maximum is about 100°, and the minimum for the central part of the State 10°, though such cold is rare. In the mountains the winters are more severe, but the Blue Ridge protects the rest of the State from the cold northwest waves. The rainfall is abundant and very evenly distributed, both in regard to seasons and localities, though the central region receives somewhat less rain than the coast and mountain regions, and the summer somewhat more than the other seasons. The annual average for the State is 53.3 inches. The average snowfall is about five inches, but snow rarely remains on the ground more than one or two days. The prevailing winds are from the northeast and southwest. The State lies outside the path of the cyclonic storms, and tornadoes are extremely rare; but the sub-tropical storms from the southwest sometimes endanger navigation along the coast.

FLORA. North Carolina, being the meeting ground of the temperate and sub-tropical floras, and having all varieties of climate from sub-tropical to sub-arctic, is unrivaled by any State east of the Mississippi in the variety of its plant life, and is probably surpassed by no region of similar area elsewhere. In the swamps along the coast the prevailing tree is the bald cypress, with the white cedar and live oak. Here also are numerous bulrushes and several species of carnivorous plants (*Sarracenia* and *Drosera*). In the sandy parts of the coastal plain the long-leaf pine (*Pinus Australis*) is predominant, together with the loblolly-pine (*Pinus taeda*) and scrub oak. Composite and leguminous plants are here abundant, as well as blueberries, sumacs, alders, a profusion of wild grapes and other vines, and, in the south, palmettos. In the Piedmont plain the indigenous species have been largely supplanted by those introduced by settlers. Oaks, hickories, and elms are predominant in the forests of this plain. In the mountains the forest of the common northern trees covers a remarkable and typical northern undergrowth of gorgeous shrubbery, magnolias, rhododendrons, and similar species.

For Fauna, see that section under UNITED STATES.

GEOLOGY AND MINERALOGY. The main geological surface formations are coincident with the topographical belts described above; in fact, the latter are a result of the former, and the coastal plain is a geological rather than a topographical division. It consists of Cretaceous and Tertiary sands, gravels, clays, and marls covering the underlying bed-rock of granites and limestones. The remainder of the State, the Piedmont plain and the mountains, has as its principal feature an immense belt of granites and gneisses running across the State from southwest to northeast, and flanked on the east by a narrower belt of crystalline schists and other slates. Between the latter and the coastal plain deposits is a still narrower belt of more recent formation—the Triassic red sandstone. The Great Smoky Mountains in the extreme west and the southern portion of the Blue Ridge consist of rocks of the Ocoee formation. The red sandstone formation contains coal deposits, and also yields the most valuable building stones. The crystalline rocks, which are much folded,

tilted, and broken, are penetrated in many places by quartz veins, some of which are auriferous. Other veins are impregnated with copper ores, and valuable iron deposits are also found both in the granite and slate belts, while ores of silver, lead, and zinc are also found, sometimes associated with gold.

MINING. Gold-mining began early in the nineteenth century, yet the industry shows little signs of extensive development, and the annual output remains small. The State is noteworthy for its production of corundum and mica, there being few other regions in the country where these are found. In 1900 the corundum mined for the year was valued at \$102,715, and represented all that was mined in the United States during that year. Both corundum and mica are found in the counties west of the Blue Ridge. In 1900 the ores mined included the red and brown hematite and the magnetite varieties of iron ore, their respective output being 55,844 tons, 259,863 tons, and 20,479 tons. Coal-mining has been carried on in Chatham County since 1889, but the output is small. Granite quarried in 1900 was valued at \$257,962—much in excess of any other year between 1890 and 1900. The production of talc and soapstone is rapidly increasing, the value in 1900 being \$75,308. Some sandstone and phosphate rock are also obtained. In 1900 the value of brick and tile was estimated at \$797,112. A little pottery is also produced.

FISHERIES. Fishing is the most important industry in the eastern part of the State. North Carolina is naturally adapted for this pursuit by its sounds and other coastal bodies of water, fresh and salt. The annual catch is more than twice that of South Carolina, Georgia, and Florida (Atlantic Coast side) combined. In 1897, the last year in which fishery statistics were compiled, there were 12,045 men engaged in the industry. The value of the product reported was \$1,316,017. Shad and oysters are by far the most prominent, the value of the former being \$362,811. Of the many other varieties the more important are squeteague, alewife, mullet, striped bass, clams, and bluefish. The seine fisheries of the Albemarle Sound section are the most important in the State. Vessel fishing is not yet extensive.

AGRICULTURE. Agriculture is the leading industry. Yet the largest part of the swampy coast land is unreclaimed, and there is also much waste land in the mountainous area of the west. In 1900, 73.2 per cent. of the land surface was included in farms—the largest per cent. recorded since 1860. While the per cent. of improved land is still small, being in 1900 only 36.6 of the farm land, there was a large gain from 1850 to 1900, the corresponding figures for 1850 being 26.0. The most remarkable agricultural development of that half century was the change from large to small farms, the average size having decreased steadily from 368.6 acres in 1850 to 101.3 acres in 1900. This decrease is a part of the general process which the overthrow of slavery precipitated. Negroes who were formerly slaves on large plantations became renters or owners of small holdings. Also the holding of the white farmer was reduced more nearly to an area which it was possible to cultivate by his own efforts. In 1900, 24.4 per cent. of the farms were operated by colored farmers, the average size of the farms being 53.6 acres, or less than half

that of the farms operated by white farmers. The per cent. of rented farms is high, having been 41.4 per cent. of the total number of farms in 1900. Renting is much more common among the negroes than among the whites, the percentage of renters among each being respectively 68.0 and 33.4. In the western counties, where nearly all the farmers are white, the share system of renting prevails. Among the colored farmers of the cotton-growing counties the cash and share tenants are about equal. The negro farmers usually mortgage their crops.

As may be inferred from the paragraphs under *Topography*, there is a great diversity of agricultural products, three agricultural sections being recognized. These are the eastern or coastal plain region, containing much sandy and barren soil; the middle or Piedmont section, more undulating, and with a soil more fertile and better adapted to diversified farming; the western or mountainous section, characterized by a fertile loam and best suited to grazing and the raising of temperate zone crops. The crop which stands out prominently as to acreage is corn, the acreage for 1900 exceeding 47 per cent. of the total crop area, and the receipts equaling 25.2 per cent. of the total crop receipts. Since the Civil War the corn acreage has steadily increased. Wheat, the next most prominent cereal, has only one-fourth as large an acreage. The acreage devoted to oats and rye each decreased one-half from 1890 to 1900. The yield per acre of all these crops is very low. The acreage of hay and forage crops is comparatively small. The two crops which yield the largest receipts from sales are cotton and tobacco. The acreage of each fluctuates greatly. An increase in one usually is accompanied by a decrease in the other, the respective acreages being determined by the rise or fall in the price of one or the other crop. The State ranks about eighth as a cotton State, and cotton does not hold the dominant position it maintains in the commonwealths farther south. However, there was a very decided increase in production from 1850 to 1900, the crop for 1900—459,707 bales—being over three times that of 1850. The utilization of the seed has greatly increased the value of the cotton yield.

Likewise there has been a large increase in the attention given to tobacco-raising. From 1890 to 1900 the acreage was more than doubled, and North Carolina took rank next to Kentucky. The State holds third rank in the production of peanuts and second in the production of sweet potatoes. The former are grown most extensively in the northeastern counties. They are, however, put on the market bearing the Virginia label, being sold to Virginia factories. The area of production increased enormously during 1890-1900. Garden farming has become a prominent industrial feature. The climate enables gardeners to produce for the early Northern market, and cheap transportation is furnished by ocean navigation. The southeastern or Wilmington section has made the greatest progress in this line. Watermelons, cabbages and other vegetables, and strawberries and other small fruits are there grown in abundance. Orchard fruits are most common in the western part of the State, the apple being the principal variety. Peaches are raised, but not in such great quantities as in other Southern States. Rice is raised

along the tide-water rivers, where the construction of dikes makes possible a system of flooding and draining. In Hyde County, however, irrigation is accomplished by pumping. The last census reported 22,279 acres devoted to rice. Peas and sorghum are among the other crops grown.

The following table of acreages explains itself:

CROPS	1900	1890
Corn.....	2,720,206	2,360,627
Wheat.....	746,984	666,800
Oats.....	270,876	541,881
Rye.....	28,074	56,496
Hay.....	229,998	190,754
Cotton.....	1,007,020	1,147,136
Tobacco.....	203,023	97,077
Peanuts.....	96,856	17,767
Sweet potatoes.....	68,730	71,752

STOCK-RAISING. Stock-raising is of secondary importance. Swine is about the only variety of farm animal raised on a scale which permits any considerable outside shipments. There were five times as many mules and asses in 1900 as in 1850. During that period the number of sheep decreased almost two-thirds, the decrease being the most marked in the last decade. The number of horses has increased considerably since 1870, particularly since 1890. Dairying is becoming more important. The following table needs no further comment:

	1900	1890
Dairy cows.....	233,178	223,416
Other cattle.....	391,340	407,487
Horses.....	159,153	131,461
Mules and asses.....	136,436	100,011
Sheep.....	208,412	402,247
Swine.....	1,300,460	1,261,006

MANUFACTURES. Prior to 1880 the manufactures were little more than such necessary neighborhood industries as are common to rural communities. In the two decades following 1880 the value of products increased 100.9 and 135.1 per cent. respectively, and the corresponding increase in the number of wage-earners engaged was 85.7 and 109.9 per cent. In 1900 the total number of wage-earners was 70,570, or 3.7 per cent. of the total population. The absence of legislation bearing upon child labor is reflected in the unusually large total of persons employed who are under sixteen years of age. They number one-tenth of the total employed. Most mill-owners, however, have agreed to discontinue the employment of children under twelve years of age.

From the table appended it will be seen not only that each of the ten leading industries made gains from 1890 to 1900, but in a number of them the value of the product increased three-fold or more. The manufacture of cotton goods has realized the largest growth. Several favorable conditions have united to bring about this result. The fact that the cotton fields are near the factories results in the saving of the cost of transportation; the cheapness of living results in lower wages; there is a plentiful supply of wood for fuel; and there is, as already mentioned, plenty of water power. The streams of the State, it is estimated, would furnish 3,500,000 horse power, only a little more than one-fifth of which is now utilized. From 1890 to 1900 the value of the manufactured cotton product in-

creased 196.7 per cent., amounting in 1900 to 29.9 per cent. of the total value of the products of the State. The cotton manufactures employed 42.9 per cent. of the wage-earners, the rank of North Carolina during that period rising from tenth to third in the value of this product, Massachusetts and South Carolina alone exceeding it. North Carolina was exceeded by Massachusetts alone in the number of wage-earners in this branch of industry. The spindles now running annually consume an amount of cotton almost equal to the crop grown in the State. The industry is carried on for the most part by small mills scattered over the Commonwealth. The value of cottonseed oil and cake increased over 400 per cent. in the decade 1890-1900.

A number of other important industries are included in the group dependent upon agricultural products, the manufactures of tobacco being of greatest importance. This is one of the earliest established industries in the State. North Carolina has a wide reputation for certain brands of smoking tobacco and cigarettes. The value of the product increased 184.7 per cent. from 1890 to 1900. The manufacture of flour and grist-mill products is another large and flourishing industry. The tanning and currying of leather developed from comparative insignificance into an industry of some prominence during 1890-1900. The following table of the leading industries explains itself:

uct increased from less than \$1,000,000 in 1850 to \$5,898,742 in 1890, and \$14,862,593 in 1900. The dependent industries—the manufactures of planing-mill products, etc.—made large gains in the decade 1890-1900, as is shown in the above table. The turpentine and resin product was valued at over \$1,000,000 in 1900.

TRANSPORTATION AND COMMERCE. The Raleigh and Gaston Railroad Company was the first to begin construction, in 1836. This and the Wilmington and Weldon Railroad were completed in 1840. The most active decade in railroad construction was 1880-90, when the mileage increased from 1846 to 3128 miles. In 1900 there were 3732 miles in operation. The major part of the mileage belongs to the three principal systems, namely: The Seaboard Air Line (614 miles), the Atlantic Coast Line (949 miles), and the Southern (1226 miles). A number of the rivers are navigable through the coast plain region, and together with the coast waters are of considerable importance in the local commerce. There are two customs districts—Wilmington and Pamlico. The former ranks eighth among the Atlantic districts in the value of its foreign trade, the greater part of which consists of exports.

BANKS. There were no banks in North Carolina until 1804, when two were chartered. The State subscribed for shares in both. The State Bank of North Carolina was organized in 1810

INDUSTRIES	Year	Number of establishments	Average number wage-earners	Value of products, including custom work and repairing
Total for selected industries for State.....	1900	4,071	55,642	\$77,351,292
	1890	2,068	24,045	28,707,151
Increase, 1890 to 1900.....		2,003	31,597	\$48,644,131
Per cent. of increase.....		96.9	131.4	169.4
Per cent. of total of all industries in State.....	1900	56.3	78.8	81.5
	1890	56.4	71.5	71.1
Cotton goods.....	1900	177	50,273	\$28,372,798
	1890	91	8,515	9,563,443
Cottonseed oil and cake.....	1900	21	564	2,676,871
	1890	11	318	529,746
Tobacco—chewing, smoking, and snuff.....	1900	80	6,403	13,620,816
	1890	90	6,002	4,783,481
Flouring and grist-mill products.....	1900	1,773	1,019	8,867,462
	1890	1,039	1,124	5,279,068
Leather—tanned, curried, and finished.....	1900	75	366	1,502,378
	1890	55	107	190,887
Fertilizers.....	1900	18	427	1,497,025
	1890	12	343	904,135
Cars and general shop construction and repairs by steam railroad companies.....	1900	12	1,141	1,511,376
	1890	9	434	393,576
Lumber and timber products.....	1900	1,770	11,751	14,862,593
	1890	713	6,466	5,898,742
Lumber, planing-mill products, including sash, doors, and blinds.....	1900	101	1,939	2,892,058
	1890	42	584	915,070
Furniture, factory product.....	1900	44	1,752	1,547,305
	1890	6	152	159,000

FORESTS AND FOREST PRODUCTS. The total wooded area in 1900 was 35,300 square miles, or 73 per cent. of the State's area. Over a portion of this the best timber, particularly the oak and poplar, has been removed. Extensive areas of yellow pine have been cut, and the bulk of the lumber product consists of this variety. The cypress forests have contributed but little to the lumber supply. In 1901 an examination in the mountain regions was made, and the report estimated the stand of timber at 10,650,000,000 feet, of which 41.41 per cent. was oak, 17.20 chestnut, and 5.30 hemlock. The value of the lumber prod-

uct in Raleigh, with branches in six towns. In this bank also the State was heavily interested, as its notes were the main currency in the Commonwealth. There were 31 banks in 1861, but the

	National banks	State banks	Private banks	Savings banks
Number.....	38	81	21	14
Capital.....	\$3,280,000	\$2,858,000	\$205,000	.....
Surplus.....	1,073,000	551,000	95,000	\$28,000
Cash, etc.....	951,000	1,029,000	77,000	85,000
Deposits.....	8,978,000	9,403,000	925,000	2,451,000
Loans.....	11,457,000	10,020,000	902,000	2,399,000

viciissitudes of the next four years destroyed their financial standing. In 1866 an act was passed enabling them to close their business. A revival of banking came only during 1890-1900.

The condition of the banks in 1902 is shown on the preceding page.

GOVERNMENT. The present Constitution was adopted in 1868. An amendment requires a three-fifths vote of each House, and approval by a majority of the popular vote. A proposal to call a constitutional convention must receive a two-thirds vote of each House and a majority of the popular vote.

Voters must have resided in the State two years, in the county six months, in an election district four months. Persons who were not entitled to vote in any State prior to 1867, or are not descendants of persons entitled to vote prior to that time, must be able to read and write any section of the Constitution in the English language. Privileged illiterates must register before December 1, 1908. Suffrage is further conditioned upon the payment of poll tax.

LEGISLATURE. The Legislature consists of 50 Senators, representing districts of undivided contiguous counties, and 120 Representatives, at least one for every country. All members are elected for two years and receive \$4 a day and mileage. They meet biennially on the Wednesday after the first Monday in January, and the session is limited to sixty days. State elections are held biennially on the Tuesday after the first Monday in November. The power of impeachment rests with the House, the trial of impeachment with the Senate.

EXECUTIVE. The Governor, Lieutenant-Governor, Secretary of State, Auditor, Treasurer, Superintendent of Public Instruction, and Attorney-General are elected for four years. The Governor has the usual power to convene extra sessions of the Legislature and grant pardons. The Secretary of State, Auditor, Treasurer, and Superintendent of Public Instruction constitute a Council of State to advise with the Governor.

JUDICIARY. The Supreme Court consists of a Chief Justice and four associates. The State is divided into judicial districts, a judge being chosen in each district. A Superior Court must be held in each county at least twice each year. The Legislature provides special courts for cities and towns. Each county elects a clerk of the Superior Court every four years. A solicitor serving four years is elected in each judicial district.

LOCAL. Each county elects a sheriff, coroner, treasurer, register of deeds, surveyor, and five commissioners, who hold office for two years. The commissioners have charge of the penal and charitable institutions, schools, roads, bridges, and finances. Each township elects biennially a clerk and two justices of the peace, who constitute a board of trustees. They act under the supervision of the county commissioners. The townships also elect for a similar period a constable and a school committee of three persons. These provisions, however, may be changed by statute.

MISCELLANEOUS. Atheists are disqualified for office, and also all persons who have been convicted of treason, perjury, or other infamous crimes, and not legally restored to the rights of citizenship. The property of a married woman is her own, and not liable for the debts of her

husband. Personal property is exempt for debt to the value of \$500. There are also provisions for liberal homestead exemptions. A local-option liquor law was passed in 1887. The legal rate of interest is 6 per cent.; 8 is allowed by contract. The State has ten members in the Lower House of the National Congress. The capital of the State is Raleigh.

FINANCES. North Carolina had no debt until the advent of the epoch of railroad building. In 1848-58 several issues of bonds were authorized in aid of railroad, plank road, and canal companies, and as security the State received stock in these companies. At the beginning of the Civil War the debt of the State amounted to \$18,167,000. The financial troubles of the war greatly aggravated this condition, but the enormous loans for war purposes were repudiated by order of President Johnson in 1865. Great injury to the finances of North Carolina was done during the five years of the 'carpetbag' régime that followed. Large issues of bonds for purposes of railroad construction followed one another in rapid construction. The Constitution of 1868 forbids the issue of any bonds unless a special tax for payment of interest be levied. But this did not stop the growth of the debt, for in the following two years more than \$16,000,000 of the 'special tax bonds' were issued. Another cause for issuing bonds was the refunding of old obligations and their unpaid coupons. Altogether, in 1865-70, \$24,375,800 of bonds were issued, and the total debt exceeded \$42,000,000. As against this the State held \$22,000,000 of railroad stocks, out of which only \$3,000,000 paid dividend. The rest were worthless, as the money obtained from sale of the State bonds was squandered. The burden of the interest on these bonds lay very heavily upon the State, and there was constant defaulting.

This condition of affairs caused great popular dissatisfaction and a tendency toward repudiation. Payment of interest on the 'special tax' loans was stopped in 1870, the special tax laws were repealed, and all the efforts of the bondholders to enforce payment through courts remained futile. In 1879 a compromise was reached with regard to the rest of the State debt. Under this compromise the old bonds were refunded at the rate of 15 per cent. to 40 per cent., according to issues. The conversion proceeded from 1880 to 1900, and the debt remained almost the same. The compromise has improved the finances considerably. The budget of the State is small, but instead of the large deficits there is a small surplus. On November 30, 1902, the State debt was \$6,527,770. The total receipts for the year were \$1,924,134; expenditures, \$1,866,640; the balance in the treasury, \$111,280. The main sources of income are a general property tax (about 40 per cent.), North Carolina Railroad dividends (10 per cent.), railroad and corporation taxes, earnings of the State prison, etc. Of the disbursements almost \$300,000 a year goes for payment of interest.

MILITIA. The State had 326,202 men of militia age in 1900. The militia numbered 1860 in 1901.

POPULATION. The following figures show the growth of the population: 1790, 393,751; 1820, 638,829; 1850, 869,039; 1860, 992,622; 1870, 1,071,361; 1880, 1,399,750; 1890, 1,617,947; 1900,

1,893,810. From third rank in 1790 the State fell to tenth in 1850, and fifteenth in 1900. The per cent. of gain for 1890-1900 was 17.1, as compared with 20.7 for the United States. The State's heavy contribution to the westward tide of immigration reached its climax in the decade 1830-40, which accounts for the stationary position of the population for that decade. North Carolina has the smallest foreign-born population—4492—of any State. In 1900 there were 624,469 negroes, the State holding sixth rank in negro population. The increase in this element from 1890 to 1900 was 101,451. The negroes are much less numerous in the western or mountainous counties. As is true of most of the Southern Commonwealths, the urban population constitutes but a small percentage of the total. In 1900 17 places had over 4000 inhabitants each, and together contained 8 per cent. of the total population.

CITIES. The population of the four largest towns in 1900 was: Wilmington, 20,976; Charlotte, 18,091; Asheville, 14,694; and Raleigh, 13,643.

RELIGION. The leading religious denominations are the Baptist and the Methodist, comprising respectively about one-half and two-fifths of all church members. The Presbyterians, Lutherans, Disciples of Christ, Episcopalians, Congregationalists, and Roman Catholics are largely represented.

EDUCATION. Education in the State of North Carolina received a considerable impetus from the immigration of the Scotch-Irish during the second half of the eighteenth century. Classical schools were maintained by many of the Presbyterian missionaries, and as these were mostly graduates of Princeton University, that institution had a considerable influence on higher education in the State. Moravians and Germans also played a conspicuous part in this development. The first State Constitution contained a clause providing for public education, but nothing was done toward carrying it out before 1825, when the dividends from stocks held by the State in several banks and navigation companies, and the revenue derived from liquor licenses, etc., as well as the vacant and unappropriated swamp lands of the State, were appropriated for a common school fund. This fund was subsequently augmented by \$1,133,757—the State's share of the surplus revenue distributed among the States by the act of Congress of 1836. The public school system was established in 1840, and the first State superintendent of public instruction was appointed in 1852. By 1860 North Carolina was in education the most advanced of the slaveholding States.

Only a comparatively small part of the school-age population is provided with schools. North Carolina has neither a compulsory attendance law nor uniform requirements for teachers, the professional standing of whom, especially in the colored schools, is in many cases very low. According to the census of 1900, the illiterate population of North Carolina amounted to 28.7 per cent. of the total population of ten years of age and over, being 19.5 per cent. for the native whites and 47.6 per cent. for the colored. The illiteracy of the native whites shows a decrease of 3.6 per cent. for the decade of 1890-1900, as compared with the decrease of 12.5 per cent. for the colored during the same period.

In 1900 North Carolina had a school population (6 to 21) of 439,431 white and 220,198 colored. The enrollment for the same year was 270,447 white and 130,005 colored; and about one-half each of the colored and white enrollment was in average attendance.

The length of the school term in 1900 was 73 days for the white and 65 days for the colored, or an average of 70.5 days, the lowest of any State. Of the 7387 teachers employed in 1900, the men constituted 49.4 per cent. The average monthly salaries of white teachers in 1900 were \$26.18 for male teachers and \$23.41 for female; the average salaries of the colored male and female teachers were \$21.14 and \$19.82, respectively, as compared with \$24.69 and \$20.36, respectively, in 1884. The total revenue for the public schools for 1900 amounted to \$1,031,327, and the expenditure to \$950,317, or about \$4.60 per pupil in average attendance. The school revenue is derived principally from a general property tax, a general poll tax, liquor licenses, fines, forfeitures, and penalties.

Secondary education is provided chiefly by the private high schools and academies. There are seven normal schools for the colored youth, and a State normal and industrial college for white women. The chief institutions for higher education are the University of North Carolina, at Chapel Hill; the College of Agriculture and Mechanic Arts, and Davidson College (Presb.), at Davidson; Trinity College (M. E.), at Durham; Wake Forest College (Bapt.), at Wake Forest; Elon College (Christian), at Elon College; Guilford College (Friends), at Guilford; and Saint Mary's College (R. C.), at Belmont. Higher education for the colored race is provided by the Agricultural and Mechanical College (State), at Greensboro; Shaw University (Bapt.), at Raleigh; Biddle University (Presb.), at Charlotte; and Livingstone College (A. M. E. Zion), at Salisbury.

CHARITABLE AND PENAL INSTITUTIONS. There is an unsalaried Board of Public Charities which has supervision of the State charitable and penal institutions, and of the county and municipal jails, workhouses, and 'homes.' County 'homes' are inspected by county boards of visitors. The State maintains an insane asylum for the whites at Raleigh and one at Morganton; also an asylum at Goldsboro for colored insane—the first in the world for this class. There are a State institute for the blind at Raleigh, a school for the deaf at Morganton, and another for the colored deaf, dumb, and blind at Raleigh. A Confederate soldiers' home is located at Raleigh, and an orphan asylum for whites and for blacks at Oxford. The State penitentiary is located at Raleigh. Only those sentenced for the highest crimes are confined in the penitentiary proper. About nine-tenths of the convicts are employed on State farms. The convicts are controlled by State officers and not under the lease system.

HISTORY. On July 4, 1584, Philip Amadas and Arthur Barlow, sent by Sir Walter Raleigh under a charter granted by Queen Elizabeth to make explorations in America, dropped anchor off the present coast of North Carolina. On their return they gave the most flattering accounts of the country. The next year a colony of men was sent out under Ralph Lane to make a permanent settlement. They made no attempt to provide a food supply, and in 1586 abandoned the settle-

ment which they had founded on Roanoke Island. The next year John White was sent with men, women, and children. He went back to England for supplies, but on his return the colony had utterly vanished; tradition relates that they were absorbed by an Indian tribe in the neighborhood. In 1629 Charles I. granted to Sir Robert Heath, under the name of Carolina, the territory between 31° and 36° N., but the proprietor failed to make use of his grant, and in 1663 Charles II. conferred on eight 'Lords Proprietors' the territory between 31° and 36° extending to the Pacific Ocean. The limits were enlarged in 1665 to 29° to 36° 30'. The proprietors were given palatine powers, divided the territory into two parts, North and South Carolina, and began to send out settlers. Already there were scattered settlements along the streams and sounds in the eastern part. For the government of the colony, an elaborate scheme, the 'Fundamental Constitution' was drawn up by the philosopher John Locke. This provided for three orders of nobility and four houses of Parliament. It was never put fully into operation, and was abandoned entirely in 1693. The population was hardy and rude and paid little attention to any sort of government, occasionally driving away an obnoxious Governor by force. Up to 1710, when Edward Hyde was appointed Governor of North Carolina, there was but one Governor for Carolina with deputies for the divisions. A strong hand was, however, needed. In 1711 the Tuscarora Indians had fallen upon the scattered farms and massacred several hundred people, and the power of the Indians was broken only by aid from Virginia and South Carolina. (See MOORE, JAMES.) Pirates also were ravaging the coast.

Carolina did not prove a success from a financial standpoint, and in 1728 seven of the proprietors sold to the Crown their shares for £2500 each. Lord Carteret (afterwards Lord Granville) retained his, and in 1744 it was laid off in severalty for him. Affairs were more settled after the Crown assumed control, and the western portion of North Carolina began to receive settlers, largely Scotch-Irish from Pennsylvania, and Germans from the Palatinate. After the battle of Culloden (1746) a number of Scotch settled on the Upper Cape Fear River. Many of the royal Governors came into conflict with the inhabitants, and during the administration of William Tryon the Regulators (q.v.) threatened to overturn the Government in 1771.

The First Provincial Congress met in defiance of Governor Josiah Martin (q.v.) in 1774, and sent delegates to the Continental Congress. (See MECKLENBURG DECLARATION OF INDEPENDENCE.) The colony was the first to authorize her delegates in Congress to vote for independence, on April 12, 1776, and a State constitution was adopted, on December 18, 1776. North Carolina troops took part in many of the important battles of the war, and in 1780-81 the State was invaded by the British. The State sent delegates to the national constitutional convention in 1787, but refused to ratify the instrument, in 1788, and presented twenty-six amendments. The State did not vote in the first Presidential election, but after the adoption of the first ten amendments to the Constitution, ratified that instrument, on November 19, 1789. The western lands, now the State of Tennessee, were offered to Congress in 1784. The inhabitants, indignant at

being transferred without their consent, revolted and set up the State of Franklin. Governor Caswell was able to cause the dissolution of this abortive State, and the lands were again ceded in 1790. The next year the capital was located at Raleigh. In 1795 the State University was opened for students. The question of a market for their products was a serious one to the residents of the middle and eastern counties. After 1820 much money was spent in the fruitless attempt to make the shallow rivers navigable, and to connect them by canals. The measures were opposed by the eastern counties, which had abundant water transportation. The question of constitutional revision was one of great interest for a long time. The Constitution of 1776 gave equal representation to every county, and this gave an unfair advantage to the smaller counties of the east. After much effort the Convention of 1835 was called and drafted a constitution giving representation in the Senate according to property and in the House according to population. But during this period thousands of people had gone to Ohio, Indiana, and Illinois.

The State opposed secession as a matter of expediency, and in February, 1861, refused to call a convention, but with President Lincoln's demand for troops to coerce the seceding States sentiment changed. An ordinance of secession was unanimously passed, May 20th, and the State lost the first soldier of the war at Big Bethel. North Carolina furnished more than 120,000 soldiers to the Confederate cause, nearly twice her proportion, lost more soldiers than any other Southern State, and during the last year of the war practically fed Lee's army. At the close of the war W. W. Holden, formerly a rabid secessionist, was appointed Provisional Governor. A convention was called which repealed the ordinance of secession, abolished slavery, and ordered an election for State officers. Jonathan Worth was elected Governor, but in the following year the new Constitution was rejected. With the beginning of reconstruction in 1867 the civil authority was superseded by the military. Another convention was called in 1868, and a constitution allowing negro suffrage was adopted. Under this W. W. Holden was elected Governor. In this year the Ku-Klux-Klan (q.v.) appeared, and Alamance and Granville counties were placed under martial law. The Conservative Democrats secured the Legislature in 1870, and Governor Holden was impeached. The present Constitution was adopted in 1876, and in 1900 a clause intended to restrict negro suffrage was added. The State has been Democratic in national elections since the beginning of parties, with the exception of the years 1840-48, when it voted for the Whig candidates, and 1868-72, when its vote was cast for Grant. The Governors of the colony and State have been as follows:

UNDER THE LORDS PROPRIETORS

William Drummond.....	1663-67
Samuel Stephens.....	1667-70
Peter Carteret.....	1670
Samuel Stephens.....	1670-74
John Jenkins (acting).....	1675
John Harvey (acting).....	1675-76
Thomas Eastchurch.....	1676-77
Thomas Miller (acting).....	1677-78
John Harvey (acting).....	1678
John Jenkins.....	1678-81
Henry Wilkinson.....	1681-83
Seth Southwell (or Sothel).....	1683-89

Philip Ludwell.....	1689-91
Alexander Lillington.....	1691-94
Thomas Harvey.....	1694-99
Henderson Walker.....	1699-1704
Robert Daniel.....	1704-05
Thomas Cary.....	1705-06
William Glover (acting).....	1706-07
Thomas Cary (acting).....	1707-08
William Glover } contestants.....	1708-10
Thomas Cary }	
Edward Hyde.....	1710-12
Thomas Pollock (acting).....	1713-14
Charles Eden.....	1714-22
Thomas Pollock (acting).....	1722
William Reed (acting).....	1722-24
George Burrington.....	1724-25
Edward Mosely (acting).....	1725
Sir Richard Everard.....	1725-29

ROYAL

George Burrington.....	1729-34
Nathaniel Rice (acting).....	1734
Gabriel Johnston.....	1734-52
Nathaniel Rice (acting).....	1752
Matthew Rowan (acting).....	1752-54
Arthur Dobbs.....	1754-65
William Tryon.....	1765-71
James Hazell (acting).....	1771
Josiah Martin.....	1771-75

GOVERNORS OF THE STATE

Richard Caswell.....	1777-79
Abner Nash.....	1779-81
Thomas Burke.....	1781-82
Alexander Martin.....	1782-84
Richard Caswell.....	1784-87
Samuel Johnston.....	1787-89
Alexander Martin.....	1789-92
Richard Dobbs Spaight.....	1792-95
Samuel Ashe.....	1795-98
Wm. Richardson Davie.....	1798-99
Benjamin Williams.....	1799-1802
James Turner.....	1802-05
Nathaniel Alexander.....	1805-07
Benjamin Williams.....	1807-08
David Stone.....	1808-10
Benjamin Smith.....	1810-11
William Hawkins.....	1811-14
William Miller.....	1814-17
John Branch.....	1817-20
James Franklin.....	1820-21
Gabriel Holmes.....	1821-24
Hutchings G. Burton.....	1824-27
James Iredell.....	1827-28
John Owen.....	1828-30
Montford Stokes.....	1830-32
David L. Swain.....	1832-35
Richard Dobbs Spaight, Jr.	1835-37
Edward B. Dudley.....	1837-41
John M. Morehead.....	1841-45
William A. Graham.....	1845-49
Charles Manly.....	1849-51
David S. Reid.....	1851-54
Warren Winslow (acting).....	1854-55
Thomas Bragg.....	1855-59
John W. Ellis.....	1859-61
H. T. Clark (acting).....	1861-62
Zebulon B. Vance.....	1862-65
W. W. Holden (provisional).....	1865
Jonathan Worth.....	1865-67
Gen. Daniel E. Sickles (Military).....	1867
Gen. E. R. S. Canby.....	1867-68
W. W. Holden.....	1868-70
Tod R. Caldwell.....	1870-74
Curtis H. Brogden.....	1874-77
Zebulon B. Vance.....	1877-78
Thomas J. Jarvis.....	1878-85
Alfred M. Scoles.....	1885-89
Daniel G. Fowle.....	1889-91
Thomas M. Holt.....	1891-93
Elias Carr.....	1893-97
Daniel L. Russell.....	1897-1901
Charles B. Aycock.....	1901—

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nings of North Carolina (Baltimore, 1884); Saunders, *The Colonial Records of North Carolina* (10 vols., Raleigh, 1892); Weeks, "Bibliography of Historical Literature of North Carolina," in the *Library of Harvard University Bibliographical Contributions*, No. 48 (Cambridge, 1895); Clark, *State Records of North Carolina* (1895-1902).

NORTH CAROLINA, UNIVERSITY OF. A State institution at Chapel Hill, N. C., chartered in 1789, and opened in 1795. It comprises a college and schools of law, medicine, and pharmacy, together with a summer school for teachers. It confers the bachelor's degree in arts, science, philosophy, and law, the degree of graduate in pharmacy, the master's degree in arts and science, and the doctor's degree in philosophy and medicine. Free instruction is offered to graduates of colleges and universities, to candidates for the ministry, to teachers and young men who are preparing to teach, and to those who are laboring under bodily infirmities. A loan fund, established by Rev. C. F. Deems of New York, and enlarged by Mr. W. H. Vanderbilt, furnishes temporary assistance to indigent students. Women are admitted to the higher courses. In 1903 the university had an attendance of 698, a faculty of 66, and a library of 41,000 volumes. The campus covers 48 acres, and with the buildings, fifteen in number, is valued at \$500,000.

NORTH CONWAY. A village of New Hampshire. See CONWAY.

NORTHCOTE, nōth'kōt, JAMES (1746-1831). An English historical and portrait painter and author, born at Plymouth. The son of a poor watchmaker, who insisted upon apprenticing James to his trade, he was hampered in his early artistic aspirations, but in 1771 managed to make his way to London, where Sir Joshua Reynolds admitted him into his studio as an assistant, and soon after invited him to live in his house. Northcote studied also at the Royal Academy, exhibited there some good portraits, and, after remaining with Reynolds five years, returned home and thence went to Italy in 1777. For two years in Rome he studied the great masters, especially Titian, then visited Florence, where he was requested to paint his own portrait for the Uffizi Gallery, and was elected a member of the Academy. Back in London in 1780, he became a regular exhibitor, first of portraits, and from 1783 on of subject pictures. The success of one of these led to his being employed by Boydell, the publisher, to paint nine pictures for the famous Shakespeare Gallery, the most celebrated of which are "The Murder of the Princes in the Tower," "The Burial of the Princes," "Prince Arthur and Hubert," and "Entry of Bolingbroke and Richard II. into London." Their popularity brought him the commission for a large painting of the "Death of Wat Tyler in 1381" (1786), now in the Guildhall, London. Of his other numerous historical subjects, the only one in a public collection is the "Presentation of British Officers to Pope Pius VI.," in the South Kensington Museum. He also obtained considerable success with pictures of animals, but his fame is due chiefly to his portraits. The National Gallery contains those of Dr. Jenner, of Viscount Exmouth, and one of himself (1827). His literary ability is proved by his *Memoirs of Sir Joshua*

Reynolds (1813), to which a supplement was added in 1815, and by *One Hundred Fables* (1828), illustrated with numerous wood cuts after his own designs. In 1830 he published a *Life of Titian*, and after his death appeared a second series of fables under the title *The Artists' Book of Fables*. Consult: Cunningham, *Lives of the Most Eminent British Painters*, edited by Heaton (London, 1879).

NORTHCOTE, Sir STAFFORD HENRY, first Earl of Iddesleigh (1818-1887). An English statesman and financier, born in London. He was educated at Eton and Oxford, graduating at Balliol College in 1839 with high honors. His first position in political life was that of private secretary to Gladstone, when the latter was president of the Board of Trade. In 1847 he was called to the bar and was made legal secretary to the Board of Trade. In 1851 he succeeded to the family title and estates as eighth baronet of his line. He was member of Parliament for Dudley and Stamford 1855-66, and was then returned for North Devon, which place he continued to represent in the interest of the Conservative Party. He was president of the Board of Trade in 1866-67, and in 1867 was made Secretary of State for India. From 1869 to 1874 he was chairman of the Hudson's Bay Company, and promoted the transfer of Prince Rupert's Land to the Canadian Government. He visited Canada and the United States in 1870 to study conditions, and was a member of the joint high commission which signed the Treaty of Washington on May 8, 1871. On the formation of Disraeli's Cabinet in 1874, Sir Stafford Northcote was made Chancellor of the Exchequer, and when his leader was elevated to the peerage under the title of Lord Beaconsfield, Northcote became leader of the Commons. In the first Salisbury Administration (1885-86) he was First Lord of the Treasury. He was created Earl of Iddesleigh and Viscount Saint Cyres in 1885. When Salisbury became Premier for the second time (1886) the Earl of Iddesleigh was made Foreign Secretary. He died suddenly on January 12, 1887, in the presence of Lord Salisbury, the Premier, in the official residence, London. Northcote published a number of political and financial pamphlets, such as *Twenty Years of Financial Policy* (London, 1862). His character was distinguished by unselfishness, pure-mindedness, and sincere patriotism. Consult his collected *Lectures and Essays* (London, 1887); *Lang, Life, Letters, and Diaries of Stafford Northcote, First Earl of Iddesleigh* (London, 1890).

NORTH DAKOTA. A north central State of the United States, lying between latitudes 45° 55' and 49° N., and between longitudes 96° 25' and 104° 3' W. It is bounded on the north by the Canadian provinces of Assiniboia and Manitoba, on the east by Minnesota, on the south by South Dakota, and on the west by Montana. Its boundaries are straight lines, except the eastern border, which is formed by the Red River of the North. Its shape is that of a rectangle, with an extreme length east and west of 360 miles, and a breadth of 210 miles. The area is 70,795 square miles, of which 70,195 cover the land surface. North Dakota ranks fourteenth in size among the States.

TOPOGRAPHY. The eastern part of the State is the perfectly level bed of the ancient Lake

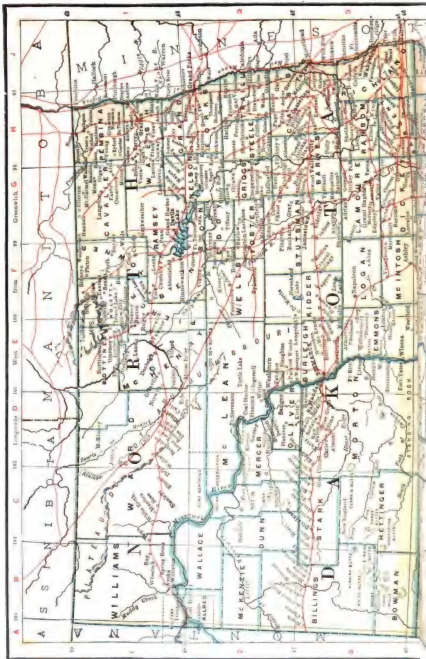
Agassiz, now traversed by the Red River and its tributaries. It lies about 1000 feet above sea-level, and merges westward into the rolling prairies of the central region. In the north the land rises to a height of over 2000 feet in the small forest-covered plateau known as the Turtle Mountains. This range extends about 20 miles south of the Manitoba boundary. Southwestward the prairies rise toward the grassy Plateau du Coteau du Missouri, which has an elevation of 2000 feet near the centre of the State, and rises gradually to 3000 feet in the extreme southwestern corner. There are no great altitudes above the general level. In the central region there are rounded, grassy, and boulder-crowned hills of glacial drift; and in the southwest isolated conical buttes capped with sandstone become more and more frequent until the rough and rocky 'bad lands' of the southwestern corner are reached.

The principal rivers lie from 100 to 300 feet below the surrounding plains, and are lined with bluffs. The western half of the State is traversed in a winding southeast course by the Missouri River, which enters on the western boundary and leaves the State near the middle of the southern boundary. Its chief tributaries from the State are from the right and drain the southwestern plateau. They are the Little Missouri, Knife, Heart, and Cannon Ball rivers. The Yellowstone also joins the Missouri in North Dakota immediately east of the Montana boundary line. The northern portion is drained by the Souris or Mouse River, which flows southeast from Canada and re-enters that country in the opposite direction after making a long narrow loop toward the centre of the State. From this central section the James River flows southward into South Dakota, where it joins the Missouri. The remaining eastern portion is drained by the Red River of the North, chief of whose numerous tributaries is the Sheyenne. Scattered over the central and eastern plains are numerous lakes, the largest of which is Devil's Lake, an irregular body of water 32 miles long and 1 to 5 miles wide, with wooded shores.

CLIMATE, SOIL, AND VEGETATION. North Dakota has a typical continental climate characterized by enormous extremes of temperature, which, however, the dry atmosphere renders bearable, healthful, and invigorating. The mean temperature for January is 3°, and for July 70°. The extremes have a range of nearly 155° for the year, a maximum having been recorded as high as 114°, while a minimum of 40° below zero is not rare. The average annual rainfall of 17.29 inches would scarcely suffice for the needs of agriculture were it not for the fact that fully three-fourths of the precipitation falls during the growing season (April to September). In the western half of the State, however, the rainfall is insufficient for successful agriculture. The deep alluvial deposits of the Red River Valley are of inexhaustible fertility, and are conspicuously favorable to wheat-growing. The glacial drift of the prairies forms, in addition, an excellent subsoil, but toward the west it grows poorer and more scanty, especially in the southwest. Forest growth is found only along the river banks, and on the Turtle Mountains in the north, and in some sections of the Red River Valley. The remainder of the State is a treeless prairie covered with numerous species of

AREA AND POPULATION OF NORTH DAKOTA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Barnes.....	G 3	Valley City.....	1,506	7,045	13,150
Benson.....	F 1	Minnewaukon.....	1,380	2,460	8,320
Billings.....	B 3	Medora.....	6,150	170	975
Bottineau.....	E 1	Bottineau.....	1,137	2,803	7,532
Bowman.....	.....	.....	.....	6	.....
Buford.....	.....	.....	.....	803	.....
Burleigh.....	E 3	Bismarck.....	1,680	4,247	6,081
Cass.....	H 2	Fargo.....	1,752	19,613	28,635
Cavalier.....	G 1	Langdon.....	1,512	6,471	12,580
Church.....	.....	.....	.....	74	.....
Dickey.....	G 3	Ellendale.....	1,146	5,573	6,061
Dunn.....	.....	.....	.....	150	.....
Eddy.....	F 2	New Rockford.....	648	1,377	3,330
Eminence.....	E 3	Williamsport.....	1,550	1,971	4,349
Flannery.....	.....	.....	.....	72	.....
Foster.....	F 2	Carrington.....	641	1,210	3,770
Garfield.....	.....	.....	.....	33	.....
Grand Forks.....	H 1	Grand Forks.....	1,432	18,357	24,459
Griggs.....	G 2	Cooperstown.....	730	2,817	4,741
Hettinger.....	.....	.....	.....	81	.....
Kidder.....	F 3	Steele.....	1,398	1,211	1,751
Lamoure.....	G 3	Lamoure.....	1,148	3,187	6,048
Logan.....	F 3	Napoleon.....	980	597	1,025
McHenry.....	E 1	Towner.....	1,468	1,384	5,253
McIntosh.....	F 3	Ashley.....	1,000	3,248	4,818
McKenzie.....	.....	.....	.....	8	.....
McLean.....	D 2	Washburn.....	3,348	700	4,791
Mercer.....	C 2	Mannhaven.....	1,030	428	1,778
Morton.....	D 3	Mandan.....	4,740	4,728	8,069
Mountraille.....	.....	.....	.....	122	.....
Nelson.....	G 2	Lakota.....	990	4,293	7,316
Oliver.....	D 2	Sanger.....	727	464	900
Pembina.....	H 1	Pembina.....	1,134	14,334	17,889
Pierce.....	F 1	Rugby.....	1,008	906	4,765
Ramsey.....	F 1	Devils Lake.....	1,200	4,418	9,198
Ransom.....	H 3	Lisbon.....	864	5,393	6,919
Renville.....	.....	.....	.....	99	.....
Richland.....	H 3	Wahpeton.....	1,445	10,751	17,387
Rolette.....	F 1	Rolla.....	943	2,427	7,995
Sargent.....	H 3	Forman.....	864	5,076	6,039
Sheridan.....	.....	.....	.....	5	.....
Stark.....	C 3	Dickinson.....	6,002	2,304	7,621
Steele.....	H 2	Sherbrooke.....	720	3,777	5,888
Stevens.....	.....	.....	.....	11	.....
Stutsman.....	F 2	Jamestown.....	2,296	5,266	9,143
Towner.....	F 1	Cando.....	1,048	1,450	6,491
Trall.....	H 2	Hillsboro.....	872	10,217	13,107
Wallace.....	.....	Grafton.....	.....	24	.....
Walsh.....	G 1	.....	1,308	16,587	20,248
Ward.....	C 1	Minot.....	6,690	1,681	7,961
Wells.....	F 2	Fessenden.....	1,206	1,212	8,310
Williams.....	B 1	Williston.....	3,512	109	1,530
Standing Rock Indian reservation.....	D 3	2,208
Unorganized territory.....	511





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AREA AND POPULATION OF SOUTH DAKOTA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
*Armstrong.....	D 5	Plankinton.....	1,460	.....	.....
Aurora.....	G 8	Huron.....	724	5,045	4,011
Beadle.....	G 5	Tyndall.....	1,270	9,586	8,081
Bonhomme.....	H 7	.....	569	9,067	10,379
*Boreman.....	D 4	.....	1,231	.....	.....
Brookings.....	J 5	Brookings.....	817	10,132	12,541
Brown.....	G 4	Aberdeen.....	1,745	16,855	15,286
Brule.....	F 6	Chamberlain.....	808	6,737	5,401
Buffalo.....	F 5	Gannaville.....	483	903	1,790
Butte.....	B 5	Bellefourche.....	7,834	1,037	2,907
Campbell.....	E 4	Mound City.....	765	3,510	4,527
Charles Mix.....	G 6	Wheeler.....	1,123	4,178	8,408
Choteau.....	.....	Now belongs to Butte Co.	.....	8	.....
Clark.....	H 5	Clark.....	973	6,728	6,942
Clay.....	H 7	Vermillion.....	408	7,509	9,316
Codington.....	H 4	Watertown.....	780	7,037	8,770
Custer.....	D 6	Custer.....	1,612	4,891	2,728
Davison.....	G 6	Mitchell.....	486	5,449	7,463
Day.....	H 4	Webster.....	1,077	9,168	12,254
Deuel.....	J 5	Clearlake.....	621	4,574	6,056
*Dewey.....	D 4	.....	2,219	.....	.....
Douglas.....	G 6	Armour.....	445	4,600	5,012
Edmonds.....	F 4	Ipawich.....	1,176	4,399	4,916
Ewing.....	.....	Now belongs to Butte Co.	.....	10	.....
Fall River.....	B 6	Hot Springs.....	1,757	4,478	3,541
Faulk.....	F 4	Faulkton.....	1,010	4,062	3,547
Grant.....	J 4	Millbank.....	694	6,814	9,103
Gregory.....	F 6	Fairfax.....	1,004	295	2,211
Hamlin.....	H 5	Castlewood.....	543	4,625	5,945
Hand.....	F 5	Miller.....	1,418	6,546	4,525
Hanson.....	H 6	Alexandria.....	486	4,267	4,947
Hughes.....	E 5	Pierre.....	765	5,044	3,684
Hutchinson.....	H 6	Olivet.....	817	19,499	11,897
Hyde.....	F 5	Highmore.....	875	1,890	1,492
*Jackson.....	D 6	.....	.....	30	.....
Jerauld.....	G 5	Westington Springs.....	548	3,005	2,798
Kingsbury.....	H 5	Deasmet.....	834	8,502	9,866
Lake.....	H 5	Mudlson.....	549	7,508	9,137
Lawrence.....	B 5	Deadwood.....	814	11,673	17,897
Lincoln.....	J 6	Canton.....	579	9,143	12,161
*Lugenbeel.....	D 6	.....	1,066	.....	.....
Lyman.....	F 6	Oncoma.....	3,456	293	2,632
McCook.....	H 6	Salem.....	575	6,448	8,682
McPherson.....	F 4	Leola.....	1,146	5,940	6,827
Marshall.....	H 4	Britton.....	880	4,544	5,942
Meade.....	B 5	Sturgis.....	3,003	4,640	4,907
*Meyer.....	E 6	.....	1,407	.....	.....
Miner.....	H 6	Howard.....	569	5,165	5,864
Minnelaha.....	J 6	Sioux Falls.....	802	21,879	23,026
Moody.....	J 6	Flandreau.....	517	5,941	8,326
Pennington.....	B 5	Rapid City.....	2,506	6,540	5,610
Potter.....	E 4	Gettysburg.....	900	2,910	2,988
*Pratt.....	.....	.....	.....	23	.....
Presho.....	.....	.....	.....	181	.....
*Pratt.....	.....	.....	.....	34	.....
Roberts.....	J 4	Sisseton Agency.....	1,102	1,997	12,216
Sanborn.....	G 5	Woonsocket.....	576	4,610	4,464
Schnasse.....	D 4	.....	1,563	.....	.....
*Shannon.....	C 6	.....	1,066	.....	.....
Spink.....	C 5	Redfield.....	1,518	10,581	9,487
Stanley.....	E 5	Fort Pierre.....	4,882	1,028	1,349
*Sterling.....	D 5	.....	.....	96	.....
Sully.....	E 5	Onida.....	1,052	2,412	1,715
Todd.....	.....	.....	.....	188	.....
*Tripp.....	E 6	.....	1,480	.....	.....
Turner.....	H 6	Parker.....	621	10,256	13,175
Union.....	J 7	Elkpoint.....	447	9,130	11,163
Walworth.....	E 4	Bangor.....	745	2,153	3,839
*Washburn.....	.....	.....	1,228	.....	.....
*Washington.....	C 6	.....	1,540	40	.....
Yankton.....	H 7	Yankton.....	515	10,444	12,649
Ziebach.....	C 5	.....	.....	510	.....
Cheyenne River Indian reservation.....	D 4	.....	.....	.....	2,357
Pine Ridge Indian reservation.....	C 6	.....	.....	.....	6,827
Rosebud Indian reservation.....	E 6	.....	.....	.....	5,301
Standing Rock Indian reservation.....	D 3	.....	.....	.....	1,658

*Counties as yet not fully organized; parts of Indian reservations.

grasses and other forage plants. The principal trees are cottonwood along the rivers, and oak, elm, birch, ash, and poplar in the Turtle Mountains.

GEOLOGY AND MINERAL RESOURCES. The rock formations of the State include the Archæan, Cambrian, Silurian, Cretaceous, and Tertiary systems. The Dakota sandstone of the Cretaceous system is an important member, being the chief water-bearing stratum on which the artesian wells of North Dakota depend. Most of the rocks, however, are covered by a deposit of glacial drift, composed of sand, gravel, and clay. In the Red River Valley there is a thick layer of alluvium deposited by Lake Agassiz, whose ancient shore-lines have been traced all around the valley. The central and western portions of the State are underlaid with extensive beds of lignite, which is being more and more utilized. The production in 1901 amounted to 166,601 tons, valued at \$214,151. Clay is the only other mineral utilized to any extent, though some building-stone is available, and lime, salt, and a little iron are found.

AGRICULTURE. Although stock-raising made considerable progress in the decade 1870-80, the putting of the land under plow was almost wholly the work of the succeeding decades. The number of acres included in farms doubled from 1890 to 1900, and amounted in the latter year to 34.6 per cent. of the total area. Of the farm area, 62.1 per cent. was improved. During the same decade the average size of farms increased from 277.4 acres to 342.9 acres—a larger average than is found in any other State. In 1900, 1346 farms contained over 1000 acres each. Excepting that of the 'bad lands,' in the southwest, the soil is not only unusually fertile, but also easily tilled. Its composition is fortunately such as to favor the retention of moisture. Nevertheless, there are occasionally severe droughts.

Everywhere wheat is the dominant crop. In 1899 it constituted 56 per cent. of the total crop area. In the same year the per capita acreage of wheat, 13.9 acres, was larger than in any other State. The Red River Valley, which extends entirely across the eastern end of North Dakota, is perhaps the most famous wheat-producing region in the world. In the six counties bordering the Red River almost half of the total area is devoted to wheat. Oats is the next most important cereal. The cultivation of flax increased during the decade 1890-1900 from a few thousand acres to an acreage exceeding that of any other State. Barley is most extensively produced in the northeastern counties and corn in the southeastern. Potatoes yield abundantly and are an important crop. But very little fruit is raised.

The following table gives the acreage of the leading crops for the census years indicated:

CROPS	1900	1890
Wheat.....	4,451,251	2,709,421
Oats.....	780,517	402,855
Flax.....	773,999	43,724
Barley.....	287,092	109,400
Corn.....	42,373	11,954
Rye.....	27,995	1,568
Hay.....	1,410,534	558,720
Potatoes.....	21,936	18,262

STOCK-RAISING. The prairie lands afford excellent pasturage, and large areas of wild salt and prairie grasses are annually cut for winter feed. With the exception of mules, all kinds

of domestic animals showed large gains from 1890 to 1900. Cattle and horses are the most important varieties.

The following table, taken from the census, shows the relative prominence of the principal varieties of farm animals:

	1900	1890
Dairy cows.....	128,603	88,299
Neat cattle.....	531,931	193,585
Horses.....	359,948	130,931
Mules and asses.....	6,976	8,709
Sheep.....	451,437	136,413
Swine.....	191,798	92,213

MANUFACTURES. But little manufacturing is carried on besides the so-called neighborhood industries. In 1900 the wage-earners numbered 2398, and the total value of the product was \$9,183,114, of which \$4,134,023 represented the flour and grist-mill output.

TRANSPORTATION. In 1870 the combined mileage of the railways in what is now North and South Dakota was only 65 miles. In 1890 North Dakota alone had 2116 miles, which figure had increased in 1900 to 2810. The eastern part of the State is well supplied with railroad facilities. The Great Northern crosses the northern part, and the Northern Pacific the southern part. In addition, the Saint Paul, Minneapolis and Sault Ste. Marie enters the State at the southwest corner and extends in a northwest direction entirely across the Commonwealth. These three lines with their branches constitute the greater part of the total mileage. All three have connections with the Canadian system of railroads, the two former by way of the Red River Valley. There is a railroad commission empowered to alter tariffs, to make rules and regulations, and to hear and decide complaints subject to the revision of the courts. The Red River is navigable part of the year, but is not extensively used.

BANKING. Until the organization of the State there was very little banking within its confines. In 1873 the first private bank commenced operations. The first incorporated bank opened in 1878 as a national bank. At the time of admission to Statehood there were 30 national and 8 State banks. One of the first measures of the Legislature in 1890 was to pass a stringent banking law prohibiting private banking; creating the office of Superintendent of Banks; and providing for reports and examinations. Under the security of this law many State banks were organized, and the number of national banks diminished somewhat. In 1892-93 the reputation of the North Dakota banks was seriously injured by the long list of failures of the so-called 'Mears Banks,' organized by E. Mears according to the Territorial law, and therefore not amenable to the new regulations. The last of these banks went into liquidation in 1896, and the reputation of the banks of the State was restored. The condition of the banks in 1902 is shown in the following table:

	National banks	State banks
Number.....	49	163
Capital.....	\$2,076,000	\$1,782,000
Surplus.....	329,000	223,000
Cash, etc.....	794,000	917,000
Deposits.....	9,772,000	9,326,000
Loans.....	9,218,000	5,840,000

GOVERNMENT. The State Constitution was adopted in October, 1889. A proposed amendment must receive the approval of a majority of the members elected to two successive legislative assemblies, and of a majority of the qualified electors at a popular election. Voters must be either citizens, or civilized Indians who have severed their tribal relations two years before election. Voters must also have resided in the State one year, in the county six months, and in the precinct ninety days. The Legislature may prescribe penalties for failing, neglecting, or refusing to vote at any general election. The capital of the State is Bismarck.

LEGISLATIVE. The Senate must consist of not less than 30 or more than 50 members; the House of Representatives of not less than 60 nor more than 140 members. The Senators are elected from districts of contiguous undivided counties for a term of 4 years. The Representatives are elected at large from the Senatorial districts for a term of 2 years. Both receive \$5 per day and mileage. Sessions are biennial, beginning on the first Tuesday after the first Monday in January, and are limited to 60 days.

EXECUTIVE. The Governor, Lieutenant-Governor, Secretary of State, Auditor, Treasurer, Superintendent of Public Instruction, Commissioner of Insurance, three Commissioners of Railroads, an Attorney-General, and a Commissioner of Agriculture and Labor are elected every two years. The Governor can veto all bills or any item of any appropriation bill, but his veto is overridden by a two-thirds vote of both Houses. An unreturned bill becomes a law after three days. The Governor may call extra sessions, and, in conjunction with a board of pardons, may exercise the pardoning power.

JUDICIARY. There is a Supreme Court of three judges elected by the State at large for the period of 6 years. There are 6 district courts, a judge being elected in each district for 4 years. The Legislature can increase the number. A clerk of the district court is elected in each county for 4 years. County court judges are elected for 2 years. The Legislature provides by law for the election of justices of the peace and police magistrates.

LOCAL GOVERNMENT. General laws provide for organizing new counties and changing county lines. There must be, however, at least 24 Congressional townships and 1000 inhabitants in each county. Changes in boundaries must be approved by popular vote of the counties affected. Township organization is also provided for by a general law. Every two years the counties elect a register of deeds, auditor, treasurer, sheriff, and attorney. Other county, township, and district officers may be provided for by law.

OTHER LEGAL PROVISIONS. Trusts or combinations controlling the price or cost of exchange of articles are unlawful. The importation, manufacture, sale, or gift of intoxicating liquors is prohibited. The legal rate of interest is 7 per cent., though 12 may be allowed by contract. Judgments outlaw in 10 years, notes in 6 years.

FINANCES. The small public debt was created mainly in 1884-89, before admission to Statehood, for purposes of construction of public buildings. It bore 6 per cent., but was refunded after 1890 in 4 per cent. bonds. At the time of admission the debt was \$689,000, and the Con-

stitution prohibits any increase of this debt by more than \$200,000. The income of the State is derived from a general property tax limited by the Constitution to 4 mills, from a tax on corporations and railroads, and from sale of public lands. All the proceeds from the last source must go into the permanent school fund.

On June 30, 1902, the State had a balance on hand in the treasury of \$562,582.81. The total receipts from June 30, 1900, to June 30, 1902, were \$3,126,435.08, and the expenditures for the same period amounted to \$2,740,278.27. The bonded indebtedness on June 30, 1902, was \$722,300.

MILITIA. The number of men of militia age in 1900 was 80,191. The militia in 1901 numbered 718.

POPULATION. The population of North Dakota by decades is as follows: 1870, 2405; 1880, 36,909; 1890, 182,719; 1900, 319,146. North Dakota at the first two censuses was a part of the Territory of Dakota. The increase in the last decade amounted to 74.7 per cent. The counties along the Red River are the most densely populated. But few people are located in the western half of the State. There is a larger per cent. of foreign-born than is found in any State. In 1900 this element of the population numbered 113,091, and there was a still larger number of native whites of foreign parents, these two elements almost equaling four-fifths of the total population. The Canadians and Swedes are the chief foreign nationalities represented. Only two towns had more than 4000 inhabitants in 1900: Fargo, 9589; and Grand Forks, 7652. The State sends two members to the National House of Representatives.

RELIGION. The principal Protestant denomination is the Lutheran. It represents about one-third of all the church members. The Roman Catholics form over one-seventh of the total population. The other denominations, in order of importance, are Methodist, Presbyterian, Baptist, and the Congregational.

EDUCATION. The Constitution provides for a free public school system under the supervision of a board of commissioners consisting of the Governor, the State Superintendent of Public Instruction, and the president of the State University. The system of high schools is under the control of local boards of education, city superintendents, and State high school boards; and there are a State normal school and institutions for higher education. The proportion of illiteracy in 1900 was 5.6 per cent., being the highest (with the exception of Missouri) in the North Central division of States. This proportion ranges from 0.9 per cent. for the native white population, to 6.7 per cent. for the foreign white, and to 59.2 per cent. for the colored. The 2641 common schools (245 graded) had in 1900 an enrollment of 77,686, and an average daily attendance of 43,560. The length of the school term in 1900 was 155.7 days, as against 113 days in 1890. The average monthly salaries of male and female teachers in 1900 were \$41.72 and \$36.80 respectively.

The total income for school purposes in 1900 was \$1,456,496, the revenue being derived principally from local taxes, from the permanent school fund, and from the sale and rental of school lands. The expenditure per pupil, based on average attendance, was \$35.03—the highest ex-

penditure found among the North Central States and a figure exceeded in but few States. Under the enabling act admitting the State of North Dakota to the Union, the 16th and 36th sections of every township were granted for the maintenance of the common schools. The State thus acquired about 2,300,000 acres. In 1900 North Dakota had 27 public high schools with a total attendance of 1130. Normal education is provided by two public schools (at Mayville and Valley City) and one private normal school. The institutions for higher education are the University of North Dakota, at University; Fargo College (Cong.), at Fargo; Red River Valley University (M. E.), at Wahpeton; and the Agricultural College, at Fargo.

CHARITABLE AND PENAL INSTITUTIONS. The State maintains a school for the deaf at Devil's Lake, an asylum for the insane and a school for the feeble-minded, both at Jamestown, and a soldiers' home at Lisbon. The State penitentiary is located at Bismarck.

HISTORY. The whole territory of Dakota was a part of the Louisiana Purchase, and was for a long time unorganized. Lewis and Clark in their expedition of 1804-06 spent the first winter near Mandan. British subjects had posts for the fur trade within the territory, and Lord Selkirk, considering it British territory, built a fort near Pembina in 1810. Previously, about 1780, French Canadians had settled at this place. Frémont in 1839 explored much of the country, and Lieutenant Warner in 1855 made a report on the region for the Government. The Sioux Indians in 1851 ceded a portion of their lands to the Government and they were opened for settlement. The part east of the Missouri River was first attached to the Territory of Minnesota in 1849. The part west, together with much of Idaho, Wyoming, and Montana, became part of Nebraska Territory in 1854. On March 2, 1861, the Territory of Dakota was organized.

The Indians were hostile and population was sparse until after 1866. With the growth of population came agitation for Statehood, and the Territory was divided into two (see **SOUTH DAKOTA**), and on February 22, 1889, Congress authorized the calling of conventions to form constitutions. The convention for North Dakota met at Bismarck July 4, and formed a constitution. It was ratified in October, together with a prohibitory article which was submitted separately. On November 2d President Harrison declared the State admitted. Politically the State has been Republican from its admission, with the exception of one election (1892), when a fusion of the Farmers' Alliance with the Democrats gave them control.

GOVERNORS OF NORTH DAKOTA

John Miller.....	Republican.....	1889-91
Andrew H. Burke.....	".....	1891-93
E. C. D. Shortridge.....	Democratic-Independent.....	1893-95
Roger Allin.....	Republican.....	1895-97
Frank A. Briggs.....	".....	1897-99
Frederic B. Fancher.....	".....	1899-1901
Frank White.....	".....	1901 —

Consult: *Commission of Immigration Report*. *The State of North Dakota: An Official Statistical, Historical, and Political Abstract* (Aberdeen, S. D., 1889); Hagerty, *The Territory of Dakota* (Aberdeen, S. D., 1889).

NORTH DAKOTA, UNIVERSITY OF. A co-educational State institution at Grand Forks,

N. D., established in 1883. By the enabling act of Congress under which the State was admitted, the university received a grant of 86,080 acres of land, and the School of Mines, a grant of 40,000 acres. The university comprises a college of arts, a normal college, and departments of law, mining engineering, mechanical and electrical engineering, military science, and pharmacy, together with a preparatory department. In 1902 it had 500 students, 35 instructors, and a library containing 10,000 volumes. The college property was valued at \$2,500,000, including a campus of 80 acres, valued with the college buildings at \$350,000, and the income was \$80,000. University extension work is carried on by means of lectures given in different parts of the State.

NORTH DOWNS. A ridge of hills in England. See under **DOWNS**.

NORTHEAST BOUNDARY DISPUTE.

In American history, the name applied to the long-standing dispute between the United States and Great Britain concerning the northeastern boundary of the United States. The controversy grew out of a difference in interpretation of the second article of the Treaty of Paris of 1783, which undertook to define the boundaries between the United States and Canada. In this article the boundary between Maine and New Brunswick was described as the Saint Croix River, and it was soon found to be a difficult matter to determine what was the Saint Croix River. Complaints were made that the British were encroaching upon American territory, and collision between the Americans and the English intruders gave forebodings of international trouble. In 1794 John Jay was charged, among other things, with the settlement of the dispute. The only thing he accomplished in this connection was the securing of a provision in the treaty negotiated by him (see **JAY TREATY**) for the appointment of three commissioners to determine the Saint Croix River. The commissioners met at Halifax in March, 1798, and determined the Saint Croix River, but left unsettled the place of its source. A new difficulty arose over the ownership of the Passamaquoddy Bay Islands, which lie near the mouth of the Saint Croix River. No settlement could be reached on this point until 1814, when an article was incorporated in the Treaty of Ghent for the appointment of a commission to bring about some adjustment. By a decision of the commission rendered in 1817, Moose, Dudley, and Frederick islands were awarded to the United States, the others to Great Britain.

Still another disputed point was the determination of the boundary line from the source of the Saint Croix to the highlands which separate the waters flowing into the Saint Lawrence from those which make their way into the Atlantic Ocean. Various efforts were made by the two governments to reach an agreement on this point, and provisions for this purpose were made in treaties both in 1803 and in 1807, but neither treaty was ever ratified. Finally the Treaty of Ghent provided for the appointment of a commission to settle the dispute, with the reservation that if an agreement could not be reached the disputed question should be referred to the arbitration of a friendly sovereign. The chief task of the commissioners was the determination of the 'northwest angle of Nova Scotia' mentioned in the treaty and the 'northwesternmost head of

the Connecticut River.' The commissioners were unable to agree as to the location of these points. In 1827 a convention was concluded between the two Powers for the reference of the question to the King of the Netherlands. In January, 1831, he made his decision awarding part of the disputed territory to the United States and part to Great Britain. Finding it next to impossible to execute the treaty of 1783, the King drew a boundary line of his own. The decision was satisfactory to neither party, and was formally rejected by the Government of the United States. Meantime border riots and collisions were occurring in the disputed territory to the disturbance of the general peace and security. Several efforts were then made to reach a compromise, but without effect. Finally, the dispute was settled by the Webster-Ashburton Treaty (q.v.) of 1842.

NORTHEAST CAPE. The most northerly point of Asia. See **TCHELYUSKIN, CAPE.**

NORTHEAST PASSAGE. See **POLAR RESEARCH.**

NORTHEN, nôr'ten, ADOLF (1828-76). A German battle painter, born at Münden, Hanover. He studied from 1847 to 1851 at the Academy of Düsseldorf, and made that city his permanent home after having declined to accept a Hanoverian stipend coupled with the condition that he should complete his studies under Horace Vernet in Paris. Most of his pictures represent episodes from the campaigns of Napoleon, such as "Encounter Near the Göhrde Forest" (1852, Hildesheim Museum); "Battle of Waterloo" (1855) and "Defense of a Farm" (both in the Hanover Museum); "Napoleon's Retreat from Moscow" (several times); "Episode in Battle of Waterloo" (1861) and "Storming of Planchenois in 1815" (1862, both in the Hamburg Gallery). His observations on the battlefields in Denmark, 1864, and in Bohemia, 1866, resulted in the depiction of various scenes in those campaigns, notably the "Engagement Near Oeversee" (1866, Rudolphinum, Prague). Although his health was failing at the time of the Franco-German War, he followed the armies to France, and among other war scenes he produced "Attack of Prussian Hussars at Vionville," his last painting.

NORTHER. See **COLD WAVE.**

NORTHERN LIGHTS. See **AURORA BOREALIS.**

NORTHERN TERRITORY. A vast region in the northern part of South Australia, under whose control it is (Map: Australia, E 1). It has an area of 523,620 square miles. The Minister appointed to have charge of the district has his official residence at Palmerston. The climate is tropical, and sections of it are well adapted to the growing of tropical plants, particularly sugar-cane. Parts of it are devoted to sheep and cattle grazing, but the greater portion is wholly unoccupied. Tin, copper, silver, and gold are found. A telegraph line connects Port Darwin with Adelaide, and all messages intended for the southern colonies are received by way of Port Darwin. In 1900 the population was estimated at 1560 Europeans, 2200 Chinese, and 515 others. See **SOUTH AUSTRALIA.**

NORTHFIELD. A town in Franklin County, Mass., 50 miles northwest of Worcester; on the Central Vermont Railroad (Map: Massachu-

setts, C 2). The birthplace of Dwight L. Moody (q.v.), Northfield has become, as a result of his influence, a noted centre of religious education and training, being the seat of Northfield Seminary for Young Ladies, founded in 1879, and the Northfield Training School. Mount Hermon School for Boys, which is associated with the work of Northfield, is in the town of Gill. The annual summer conference of Christian workers and the student conference have made the town of considerable repute as a summer resort. Northfield has the Dickinson Public Library. The inhabitants are interested principally in agriculture. It was incorporated in 1672. Its affairs are administered by town meetings. Population, in 1890, 1869; in 1900, 1966.

NORTHFIELD. A city in Rice County, Minn., 43 miles south of Minneapolis; on the Cannon River, and on the Chicago, Milwaukee and Saint Paul and the Chicago Great Western railroads (Map: Minnesota, E 6). It is the seat of Carleton College (Congregational), opened in 1870, and of Saint Olaf College (Lutheran), opened in 1875, and has an Odd Fellows' Widows' and Orphans' Asylum, Scoville Library, Goodsell Observatory, and a handsome Y. M. C. A. building. The city is the centre of a productive farming section, and has manufactures of brick and woolen knit goods. Settled in 1856, Northfield was chartered as a city in 1875, the charter of that date, as revised in 1889, being still in operation and providing for a government vested in a mayor, elected every two years, and a unicameral council. The water-works are owned and operated by the municipality. Population, in 1890, 2659; in 1900, 3210.

NORTHFIELD. A village in Washington County, Vt., 10 miles south by west of Montpelier, the State capital; on the Dog River, and on the Central Vermont Railway (Map: Vermont, D 5). It is the seat of Norwich University, established in 1819 and incorporated in 1834. The village has a Soldiers' Monument and another to Charles Paine, Governor of the State (1841-43); other features of interest are the neighboring heights, Paine and Bald mountains. Valuable deposits of granite and black slate are found in this vicinity. Granite-working, dairying, and the manufacture of lumber products and woolen goods are the principal industrial interests. The village of Northfield was first incorporated in 1855. There is a municipal electric light plant. Population, in 1890, 1222; in 1900, 1508.

NORTH FLEET. A town in Kent, England, on the Thames, one and one-half miles west of Gravesend (Map: England, G 5). Its industries comprise shipbuilding, chemical works, chalk and lime pits, cement factories, and brick yards. It has an interesting church of the thirteenth century; Huggen's College, established in 1847; and a workingman's club. Population, in 1891, 11,700; in 1901, 13,000.

NORTH FORELAND. See **FORELAND, NORTH AND SOUTH.**

NORTH GERMAN CONFEDERATION. A union of German States north of the Main, formed in 1866 under the hegemony of Prussia, following on the defeat of Austria in the Seven Weeks' War (q.v.) and the dissolution of the Germanic Confederation. (See **GERMANY.**) It

was first organized in August with 18 States, the number being increased to 22 before the end of October. A constitution was adopted which, with slight modifications, is that of the present Germany. Offensive and defensive alliances were concluded with Bavaria, Baden, and Württemberg, by which these States agreed to place, in case of war, their military forces under the command of the King of Prussia. The Franco-German War brought complete unity to Germany. On January 18, 1871, the King of Prussia, at Versailles, assumed the title of German Emperor, and in April the Constitution of the Confederation, so amended as to provide for the rights of the newly admitted South German States, was promulgated for the Empire.

NORTH HOLLAND. A province of the Netherlands occupying the peninsula lying between the Zuider Zee and the North Sea, and bounded on the south by the provinces of Utrecht and South Holland (Map: Netherlands, C 2). It includes also the islands of Texel and Vlieland of the West Friesian Islands. Area, 1069 square miles. The province contains but little forest, the greater part being low meadow and moorland protected along the coast by dunes and dikes. Agriculture, gardening, and cattle-raising, and in the cities linen manufacturing are the principal industries. The province is traversed by a number of canals, the most important of which are the North Holland Canal, between Amsterdam and Helder, and the North Sea Canal, connecting the Zuider Zee and the North Sea directly. Population, in 1899, 968,105. The capital is Haarlem and the largest city is Amsterdam. For history, see HOLLAND; NETHERLANDS, THE.

NORTHINGTON, ROBERT HENLEY, Earl of (c.1708-72). An English Lord Chancellor, son of Anthony Henley. Educated at Westminster, and at Saint John's and All Souls, Oxford, he studied at the Inner Temple. For ten years he was a representative of Bath in Parliament, and afterwards he became Attorney-General, Keeper of the Great Seal, and Speaker of the House of Lords. In 1760 he was made Lord Henley and presided at the trial of Lord Ferrers. The year following he became Lord Chancellor. He retired from the Chancellorship in 1767. He was a great favorite of George III., and was commonly known as 'Tom Tilbury,' or 'Surly Bob.' Consult Lord Henley's *Memoir* (London, 1831).

NORTH ISLAND. See NEW ZEALAND.

NORTH PLATTE. The county-seat of Lincoln County, Neb., 294 miles west of Omaha; at the junction of the North and South Platte rivers, and on the Union Pacific Railroad (Map: Nebraska, D 2). It has a United States land office, a Y. M. C. A. library, with about 2000 volumes, and a high school that cost \$35,000. The principal industrial establishments are railroad machine shops, employing several hundred men, and a large cold storage plant. North Platte is the centre of an irrigated section, and is an important shipping point for alfalfa, sugar beets, and cattle. Population, in 1890, 3055; in 1900, 3640.

NORTH RIVER. The name applied to the lower course of the Hudson River.

NORTHROP, nôrth'rûp, CYRUS (1834—). An American educator, born in Ridgefield, Conn.

He graduated at Yale in 1857, and at the law school there in 1859. Two years later he was appointed clerk of the Connecticut House of Representatives, and in 1862 of the Senate. In 1863 he was made professor of rhetoric and English literature in Yale, and he held this chair until 1884, when he became president of the University of Minnesota.

NORTH SEA, or GERMAN OCEAN (Lat. *Germanicum Mare*, Ger. *Nord See*, Dan. *Vesterhavet*, West Sea). That portion of the Atlantic Ocean included between Great Britain and the Continent of Europe (Map: Europe, D 3). It is pear-shaped in general outline, with a wide opening northward into that part of the Atlantic Ocean known as the Norwegian Sea, and with a narrowing arm extending from the main oval body southward to the Strait of Dover, which, with the English Channel, forms the southern communication with the Atlantic. On the east the Skagerrak leads between Jutland and Norway into the Cattegat, which connects through the Sound and the Great and Little Belts with the Baltic Sea. The greatest width of the North Sea, between Dundee, Scotland, and the entrance of the Limfjord in Jutland, is 412 miles; its greatest length from north to south is 680 miles; and its area is about 200,000 square miles, of which 2500 square miles are occupied by islands. A number of large rivers flow into the southern part of the North Sea; the chief of these are the Elbe, Weser, Ems, Rhine, which is joined at its mouth by the Meuse, and Scheldt on the Continent, and the Thames and the Humber in Great Britain. These render the water less saline than that of the main ocean, though the salinity is greater than that of the Baltic, the percentage of salty constituents being 1.025 in the southern part of the sea. They also contribute their sediment to the formation of the numerous shoals and sandbanks which line the southern and southeastern shores. These shores are very low, the land in many places lying below the sea-level. They have been much encroached upon by inundations, which have left the higher portions of the former coast-line as a chain of islands. Behind these are a series of shallow lagoons and inlets, of which the most notable are the Jade (q.v.) in Germany, and the Zuider Zee (q.v.) in Holland.

In general the depth of the North Sea increases gradually northward. The mean depth of the southern portion is about 100 feet, near the middle it is 250, and in the north 400 feet. Along the steep, rocky coast of Norway there runs a trough with a depth of nearly 1000 feet within 20 miles of the shore. On the other hand, there are in the southern half of the sea, besides the shoals mentioned along the coast, several shallow regions rising considerably above the mean level of the bottom. Among these the Dogger Bank occupies a large portion of the south-central part of the sea, with a depth of 60 to 100 feet, the surrounding depths being 150 to 200 feet. The tides of the North Sea are very irregular, owing to the fact that two tidal waves enter it, one from the north and one from the south. The former sweeps southward along the west shore, the latter northward along the eastern coast. Midway between the shores there seems to be very little rise and fall and at some points none at all, while in some places on the southern shore, where the two waves unite, there is a difference

of 20 feet between high and low tide. The winds on the North Sea are variable, those from the west being the most prevalent. Rain and fogs occur at all seasons, and the violent northwest storms blowing toward the shoals on the southeast coast make navigation there exceedingly dangerous, especially along the coast of Jutland. Nevertheless, owing to its favorable position, the North Sea is one of the most frequented and most important commercial highways of the world. Its fisheries are also among the foremost, providing support for many thousand inhabitants of the surrounding countries.

By means of the Kaiser Wilhelm Canal ships can now enter the Baltic Sea without making the passage around Jutland.

Consult: Fulton, "On the Currents of the North Sea, and Their Relation to Fisheries," *Scotland Fishery Board Report for 1896*; Haas, *Deutsche Nordsee Küste, friesische Inseln und Helgoland* (Bielefeld, 1900).

NORTH SHIELDS. A seaport of England. See SHIELDS, SOUTH AND NORTH.

NORTH STAR, ORDER OF THE. A Swedish civil order of merit with four classes, founded in 1748 by Frederick I. The decoration is an eight-pointed white star surmounted by a crown and suspended from a black ribbon. The round, blue shield bears the polar star with five rays, and the device "Nescit occasum" ("It never sets"). It is conferred especially for notable scientific achievements. See Plate under ORDERS.

NORTH TONAWANDA, tōn'ā-wōn'dā. A city in Niagara County, N. Y., 10 miles north of Buffalo; on the Niagara River, at the mouth of Tonawanda Creek, which separates the city from Tonawanda, also on the Erie Canal, and on the Erie, the Lehigh Valley, and the New York Central railroads (Map: New York, B 3). Several other lines pass through the city on leased roads. It is an important industrial and commercial centre, known especially for its lumber and iron interests. There is an extensive production of pig iron, nuts and bolts, barrel organs, and steam merry-go-rounds. The manufactures include also roofing material, steam piping, steam radiators, steam pumps, and miniature railroads. According to the census of 1900, an aggregate capital of \$5,027,000 was invested in the various industries, the production of which was valued at \$6,446,000. There is a public library with over 5400 volumes. North Tonawanda, chartered as a city in 1897, is governed by a mayor, chosen every two years, and a unicameral council, elected two from each ward and three at large. The water-works are owned and operated by the municipality. Population, in 1890, 4793; in 1900, 9069.

NORTHUMB'ERLAND. The northernmost county of England, bounded on the east by the North Sea, and on the south, in part, by the River Tyne (Map: England, D 1). The River Tweed and the Cheviot Hills are on the Scottish border. The whole surface, except the narrow coastal region, is uneven, with rounded hills, moorlands, and fertile wooded valleys. The summers are cooler, but the winters milder, than in the southern counties. The coast region and the valleys are cultivated, producing turnips and cereals; the western part is largely pastoral. The chief industries are coal-mining and the

manufactures which depend upon the coal supply; the salmon fisheries are also of importance. Population, in 1891, 506,030; in 1901, 602,900. The county returns four members to Parliament. Newcastle-upon-Tyne, the chief city of Northumberland, is a separate county borough. Among the considerable towns are Tynemouth, Wallsend, and Cowpen. Northumberland contains numerous historic landmarks, including remains of Hadrian's Wall and of Roman military roads and famous battlefields of the Scottish wars.

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NORTHUMBERLAND, EARLS OF. See PERCY.

NORTHUMBERLAND, JOHN DUDLEY, Duke of. An English politician, father-in-law of Lady Jane Grey, whom he plotted to place on the throne of England. See GREY, LADY JANE.

NORTHUMBERLAND, ROBERT DE MOWBRAY, Earl of (?-c.1125). An English baron, whose father and uncle came over with William the Conqueror. He was created Earl of Northumberland about 1081, and seven years afterwards fought to support Robert of Normandy's claim to the English crown against that of the latter's younger brother, William Rufus. He burned Bath, besieged Ilchester, carried fire and sword over western Wiltshire, and then began a conflict with the Bishop of Durham. His next antagonist was King Malcolm of Scotland, whom he slew near Alnwick in 1093, and two years afterwards he headed an insurrection against William II. in favor of his cousin, the Count d'Aumale. The King besieged Northumberland in his strong castle at Bamborough, and the Earl, being lured therefrom on a pretense, was captured after a stout resistance at Tynemouth Monastery. It is supposed that he was kept a prisoner for the remainder of his life.

NORTHUMB'RIA (ML. *Northumbria*, from AS. *norþ*, north + *Humbre*, Humber). In Anglo-Saxon England, a kingdom of the Heptarchy (q.v.) formed out of the two earlier kingdoms of Bernicia, established by Ida in 547, and extending from the Forth to the Tees, and Deira, extending from the Tees to the Humber. Æthelric of Bernicia in 588 drove out Ælla of Deira and united the two under his rule. Under Oswald (died 642) it was the strongest kingdom in the Heptarchy and the champion of Christianity against pagan Mercia. Its separate existence was brought to an end by Egbert in 827. The name survives in the modern county of Northumberland.

NORTHWEST BOUNDARY DISPUTE. The dispute between the United States and Great

Britain concerning the northwest boundary of the United States. By the Treaty of Ghent, concluded between the two governments, December 24, 1814, provision was made for the appointment of two commissions to determine the northern boundary from the Saint Lawrence River to Lake Superior, and from Lake Superior to the Lake of the Woods. At the same time the American commissioners proposed the 49th parallel from the Lake of the Woods to the Rocky Mountains as a continuation of the northern boundary between the United States and Canada. This proposition, however, was not acceptable to the British negotiators, nor was any agreement upon the subject reached at the time. Meanwhile the occupation of Oregon had extended the boundary dispute to the territory west of the Rocky Mountains. Russia, which claimed part of Oregon, ceded her claims of all territory south of 54° 40' N. lat. to the United States in 1824. Spain also claimed Oregon on the ground of discovery, but by the treaty of 1819 quitclaimed her title to land north of the 42d parallel to the United States, leaving Great Britain and the United States as the only disputants. By the convention of 1818 the two governments accepted the 49th parallel as the boundary between Canada and the United States from the Lake of the Woods to the Rocky Mountains. The proposition of the United States to accept a continuation of that line to the Pacific as a suitable division of the Oregon country between the two claimants was rejected by Great Britain on the ground that it would give the Columbia River to the United States. After fruitless negotiations, the United States agreed to accept an arrangement by which the two Powers were to occupy the Oregon territory jointly for a period of ten years. This was embodied in the convention of 1818. By a convention concluded at London, August 6, 1827, the two governments agreed to extend indefinitely the stipulation of 1818 for joint occupation, with the reservation that the convention was subject to abrogation after October 20, 1828, by either party giving twelve months' notice. During the administration of President Tyler negotiations for the permanent settlement of the dispute were carried on between Secretary of State Calhoun and the British Minister Pakenham, who offered to accept the 49th parallel as far as the Columbia River, and from thence onward the Columbia River itself, as the boundary. The Government of the United States declined to accept this proposition, as well as a proposition to submit the question to arbitration. The American public, moreover, was very insistent that no essential rights be waived, and the popular opposition to the making of any concession gave rise to the political watchword, "Fifty-four forty, or fight." Matters thus stood when the Presidential election of 1844 occurred. The Democratic Party, in its national platform, asserted the right of the United States to the whole of Oregon, and won the election partly on this issue. Notwithstanding this emphatic position of the party, the new Administration resumed the negotiations, offering substantially the same proposition as Calhoun had offered. This was refused by the British Government, whereupon negotiations were broken off. The President formally withdrew the proposal and reasserted our "rightful claim to the whole of Ore-

gon." In April, 1846, Congress authorized the President at his discretion to give the notice required by the convention of 1827 for its abrogation, and this was accordingly done. Finally the dispute was amicably settled by a treaty concluded in July following (1846), by which it was provided that the boundary line should be the 49th parallel to the middle of the channel which separates Vancouver's Island from the continent, and thence southerly through the channel, and the Straits of Juan de Fuca to the Pacific Ocean, the navigation of the channel and straits to remain free and open to both parties. A subsequent dispute between the two governments as to the meaning of the provisions in respect to the channel was referred to the German Emperor (1871) as arbitrator. He decided the following year in favor of the American claim. See SAN JUAN BOUNDARY DISPUTE.

NORTHWESTERN UNIVERSITY. A co-educational institution at Evanston-Chicago, Ill., in affiliation with the Methodist Episcopal Church, founded in 1851. It comprises a college of liberal arts, and schools of law, medicine, pharmacy, dentistry, and music and oratory. The college of liberal arts and the school of music are at Evanston, the professional schools in Chicago. Students are admitted on certificate from accredited schools or on examination in three groups of studies. The courses in the college lead to the bachelor's and master's degree in arts, philosophy, science, and letters, and to the degree of doctor of philosophy. The college course is largely elective after the second year, and provision is made for advanced credits by which the time required for subsequent professional studies may be shortened. Advanced courses in certain departments are offered to graduate students, but this work is not organized into a distinct graduate school. Two schools of preparatory instruction are maintained by the university, the Academy, in Evanston, and the Grand Prairie Seminary at Onarga. The Garrett Biblical Institute, under Methodist Episcopal control, forms the theological department of the university, and maintains close relations with the Norwegian-Danish Theological School and the Swedish Theological Seminary, both at Evanston. In 1903 the university had 305 instructors and 3691 students, of whom 769 attended the college. The college campus covers about 45 acres, on the shores of Lake Michigan, with well-equipped buildings, including the Dearborn Observatory and the Library building, the latter containing the general and Greenleaf libraries, with about 52,000 volumes and 33,000 pamphlets. The endowment in 1902 was \$4,000,000, the income \$465,000, and the total value of property under the control of the colleges, \$6,761,250.

NORTHWEST FRONTIER PROVINCE. A province of British India, bounded on the west and north by Afghanistan, on the east by Kashmir and the Punjab, and on the south by Baluchistan. It was formed in 1901 by separating from the Punjab the District of Peshawar and other portions lying mainly west of the Indus. These districts, which are directly under British administration, have an area of 16,466 square miles, and had a population in 1901 of 2,125,480. The Chief Commissioner of the province has also political control over the remaining region along

the Afghan frontier, a country covered by the Suleiman Mountains. About 2,500,000 acres of the districts around Peshawar are cultivated, and a large portion of this area is irrigated. The capital of the province is Peshawar (q.v.).

NORTHWEST PASSAGE. See POLAR RESEARCH.

NORTHWEST PROVINCES. The former designation of the United Provinces of Agra and Oudh, British India.

NORTHWEST TERRITORIES. The designation for the sparsely inhabited region of Canada which includes the organized territories of Assiniboia, with a land area of 88,279 square miles; Alberta, 101,520 square miles; and Saskatchewan, 103,845 square miles; and the unorganized territories of Athabasca, with about 239,500 square miles of land area; Mackenzie, about 481,200 square miles; Ungava, with about 276,000 square miles; and Franklin, area unknown. The term 'Northwest Territories' probably referred originally to the region over which the Northwest Company exercised authority, the territorial limits of which do not seem to have ever been clearly defined. An Imperial act of 1868 enabled the Crown to accept of the Hudson's Bay Company the surrender of the lands known as Rupert's Land, the limits of which were also indefinite, for admission into the Dominion. An act of 1869 provided that Rupert's Land and the Northwest Territories be admitted as a part of Canada under the name of the Northwest Territories. In 1870 Manitoba was made a province, under which in 1876 Keewatin was made a district. Manitoba was slightly enlarged in 1881, and in 1901 the Yukon Territory was established. In 1833 the districts of Assiniboia, Saskatchewan, Alberta, and Athabasca were formed, and in 1895 the remaining portion was divided into the districts of Ungava, Mackenzie, and Franklin. Of the Northwest Territories, a portion of the southwest belongs to the greater interior American Plain, and is less broken than the region farther north, much of it being prairie. North of this prairie region lies an immense wooded area. As the inhospitable Arctic regions are approached the forest growth becomes very scanty or disappears entirely, so that there is a very considerable area of barren land where little is found save lichens and mosses. The northern portion of the Northwest Territories is mainly a broken plain draining into the Arctic Sea. The greater part of the Northern Territories is characterized by short summers and long and very severe winters. For a fuller statement of physical conditions, see CANADA.

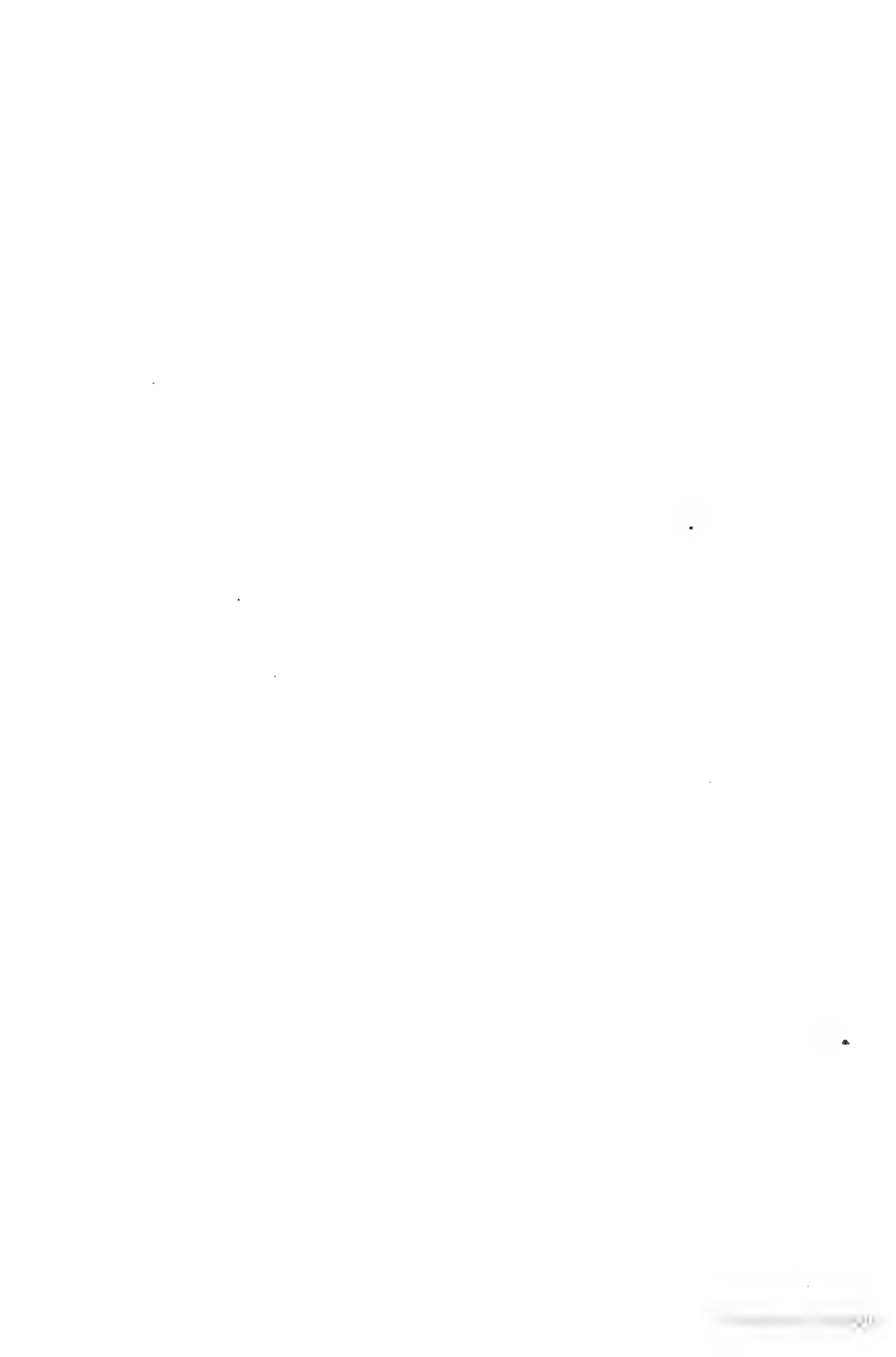
A large variety of minerals are known to exist, bituminous coal and lignite being very abundant in southern Alberta. Coal is mined in considerable quantities in the foothills of that region. In the southwest the soil is generally very fertile, and the climatic conditions are such that hardy crops can be profitably grown. This region is practically all comprehended in the districts of Assiniboia, Alberta, and Saskatchewan. In the census of 1901 it was found that 6,569,064 acres of this region, or 3.50 per cent. of the land surface, is occupied as farms and lots. Of the 22,813 farms of five acres and over, 64.08 per cent. were between 100 and 201 acres each. Over 93 per cent. of the farmers owned the farms they occupied. Over 24 per cent. of

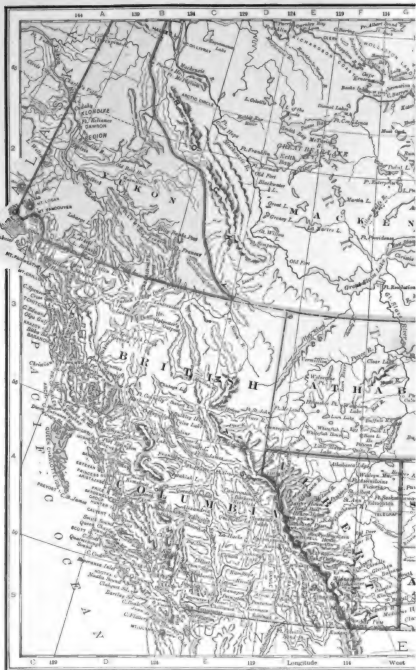
the farm land was in an improved state. Hay leads in respect to acreage, 155,870 acres in 1891, 831,157 in 1901. The acreage of wheat increased during the same period from 113,811 in 1891 to 530,274 in 1901, and oats gained from 61,637 acres to 259,552. In the latter year there were 22,897 acres in barley, 9925 acres in potatoes, and 15,095 in forage crops for winter feeding. Small fruits are successfully raised, but the climatic conditions are not favorable for orchards. The increase in the live stock was equally marked, as is seen in the following table:

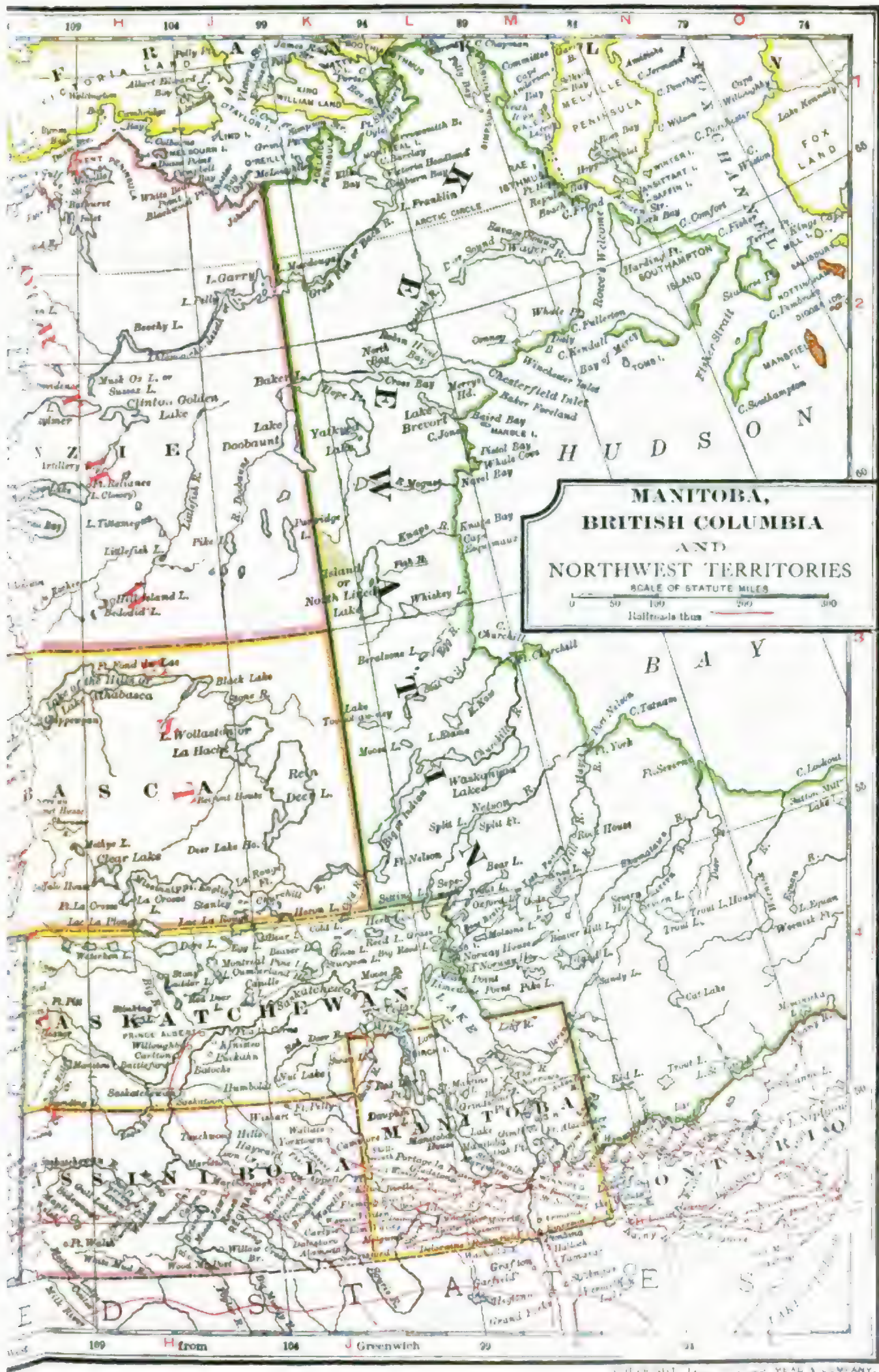
LIVE STOCK	1901	1891
Horses three years and over.....	132,942	39,267
Horses under three years.....	43,520	21,709
Milch cows.....	102,735	37,003
Other horned cattle.....	489,004	194,824
Sheep.....	144,152	64,920
Swine.....	73,926	16,263

The prairie land affords excellent facilities for pasturage. Only the three southernmost districts have the advantage of railroad transportation. Settlements are being made in the territories of Alberta, Assiniboia, and Saskatchewan, and the total population of this area increased from 66,799 in 1891 to 145,000 in 1901, of whom a little over one-sixth are in Saskatchewan, and the remainder about evenly divided between Alberta and Assiniboia. In Ungava, Franklin, and Mackenzie there are large areas as yet unvisited by white man. The population of this region, together with Athabasca and Keewatin, increased from 32,168 in 1891 to 75,000 in 1901. There is a scattered Indian population in the Northwest Territories and Keewatin, amounting in 1900 to 27,057, besides about half that number of half-breeds. The Northwest Territories are under the administration of a Lieutenant-Governor, appointed by the Governor or Council of the Dominion. He has an executive council of three members. There is a Legislative Assembly of 31 members. Only Alberta, Assiniboia, and Saskatchewan have a form of local government with representation in the legislature. The Territorial Government meets at Regina. For a more detailed statement concerning settlements, etc., see under titles of the separate districts. Consult Blanchard, *The Discovery and Conquest of the Northwest* (Chicago, 1880).

NORTHWEST TERRITORY. In American history, that portion of the national domain lying, roughly speaking, north of the Ohio River, east of the Mississippi, south of the Great Lakes, and west of Pennsylvania, and embracing territory which constitutes the present States of Ohio, Indiana, Illinois, Michigan, Wisconsin, and part of Minnesota—a total area of about 265,878 square miles. This territory passed into the possession of Great Britain by the Treaty of Paris in 1763, and by her was ceded to the United States of America in 1783. The greater part of it was claimed on the basis of their early charters, by Virginia, New York, Massachusetts, and Connecticut. The other States refused to recognize these claims, and insisted that this territory should belong to the country as a whole. In 1780 Congress gave a solemn pledge that if the lands thus claimed were ceded to the Confederation they should be disposed of for the common benefit of all the States and admitted into the Union







as republican States, and on an equal footing with the original States. On the strength of this pledge New York ceded her claims in 1781, Virginia hers in 1784, Massachusetts hers in 1785, and Connecticut hers in 1786. All of these colonies, however, reserved for special purposes certain lands from the cession. Thus Virginia retained in what is now the southern part of Ohio a considerable area, known as the Virginia Military District, and Connecticut retained 3,250,000 acres, known as the Western Reserve (q.v.), in what is now the northern part of Ohio. By an ordinance of 1785 Congress made provision for surveying the lands thus ceded. The lands were then thrown open for sale, and the result was a great influx of immigrants from the older States. On the first of March, 1784, the very day on which Virginia completed her cession, Jefferson, as chairman of a committee, reported to Congress a temporary plan of government which was adopted on April 23d. Jefferson's scheme contemplated the division of the territory into new States, divided by lines of latitude two degrees apart, and intersected by two meridians of longitude to be drawn through the mouth of the Kanawha and the falls of the Ohio, and to the new States thus created were to be given the names of *Sylvania*, *Michigania*, *Chersonesus*, *Assenisipia*, *Mesopotamia*, *Illinoia*, *Washington*, *Polypotamia*, and *Pelisiopia*. The ordinance further provided that after the year 1800 neither slavery nor involuntary servitude should exist in any of the said States except as a punishment for crime. This ordinance never went into effect, and was repealed by the celebrated ordinance of 1787. This latter ordinance was prepared by a committee of which Nathan Dane, of Massachusetts, was chairman, and received the approval of Congress, July 13, 1787. It was a constitution of government for the Northwest Territory, and contained, besides, six articles of compact between the old States and the new States to be created out of the said territory. It provided that there should be formed out of the territory in question not less than three nor more than five States, and undertook to define their boundaries. For the purposes of temporary government this vast domain was constituted into one district, and was committed to the rule of a governor, a secretary, and three judges, all appointed by Congress. Until the election of a legislature, the Governor and the judges sitting together were authorized to adopt such laws of the original States as they deemed necessary and suitable, subject to the approval of Congress. Provision was made for a legislature to be called into existence as soon as there were 5000 free male inhabitants of full age in the territory. It was to consist of a Legislative Council composed of five members chosen by Congress, and a House of Representatives chosen by freeholders. There were also a number of organic provisions regarding land tenure, taxation, inheritances, and the alienation of property. The articles of compact constituted a sort of bill of rights, and guaranteed freedom of religious worship and belief, the privilege of the writ of *habeas corpus*, trial by jury, benefit of the common law, the security of private contracts, and freedom of navigable waters. Finally the Northwest Territory was dedicated to freedom by the famous article that prohibited slavery and

involuntary servitude. In October, 1787, General Arthur St. Clair, a veteran of the French and Revolutionary Wars, was appointed the first Governor of the Territory. In July of the following year he reached Marietta, the seat of government for the Territory, and his first act was an order for the creation of Washington County. Shortly thereafter he appointed a number of magistrates and established a Court of Quarter Sessions. In 1798, the population having far exceeded the required number, a legislature was called and met for the first time at Cincinnati, September 24, 1799. The Lower House consisted of 22 members, representing the nine counties of the Territory. In July, 1800, the western part of the Territory was constituted into the District of Indiana, with William Henry Harrison as Governor, and with Vincennes as capital. In January, 1805, Michigan Territory was created, with Gen. William Hull as Governor; in February, 1809, the Illinois Territory was organized, with Kaskaskia as its seat of government, and in April, 1836, part of Michigan Territory was organized into the Territory of Wisconsin. Consult: Hinsdale, *The Old Northwest* (New York, 1891); and Moore, *The Northwest Under Three Flags* (New York, 1900).

NORTHWICH, north'wich. A market-town and railway junction in Cheshire, England, at the confluence of the Weaver and Dane, nine miles south-southeast of Warrington (Map: England, D 3). It is noted for its salt mines, brine springs, and supplemental industries. The town has an ancient and dilapidated appearance, owing to land subsidences wrought by the mining and brine-pumping. The Marston mine, 300 feet deep, its vault supported by enormous salt pillars, is the most picturesque of the excavations. The municipality is progressive; maintains a free public library, technical schools, gymnasium, and park; owns remunerative markets, water-works and public baths, which include medicinal brine baths. The brine springs have been worked from prehistoric times. During the Civil War Northwich was fortified by Parliament, and was the scene of exciting encounters. Population, in 1891, 15,000; 1901, 17,600.

NORTON, ANDREWS (1786-1853). An American theologian and scholar. He was born at Hingham, Mass., and graduated from Harvard College in 1804. He studied theology and in 1809 became a tutor in Bowdoin College. He went to Harvard in 1811 to teach mathematics, but resigned the next year to conduct the *General Repository*, a magazine devoted to the propagation of liberal Christianity. In 1813 he was made librarian of Harvard, in addition to which he was appointed lecturer on the criticism and interpretation of the Scriptures. He was in the Harvard Divinity School, 1819-30, Dexter professor of sacred literature. The remainder of his life was devoted to literary pursuits. His first work of importance was *A Statement of Reasons for Not Believing the Doctrine of Trinitarians concerning the Nature of God and the Person of Christ* (1833; new edition with memoir by W. Newell, 1856; 11th ed., 1876). In 1833 he became associated with Charles Folsom in the publication of the *Select Journal of Foreign Periodical Literature*. Other works of importance were: *Evidences of the Genuineness of the Gospels* (1837-44), and *On the Latest Form of*

Infidelity (1839). Specimens of his verse may be seen in Griswold's *Poets and Poetry of America* (Philadelphia, 1842).

NORTON, CAROLINE ELIZABETH SARAH (1808-77). A British author, born in London. Her father was Thomas Sheridan (q.v.), and her grandfather Richard Brinsley Sheridan (q.v.). Her talent developed at an early age, and when only thirteen she wrote *The Dandies' Rout*. Her *Norrows of Rosalie: a Tale, with Other Poems*, appeared in 1829, two years after her unfortunate marriage to an impecunious barrister, the Hon. George Chapple Norton, whom she virtually supported for many years. Her marital troubles led her to publish a pamphlet on *English Lares for Women in the Nineteenth Century*, which, together with some other writings, undoubtedly had considerable influence in causing those laws to be changed. Her reputation rests chiefly upon her poems, most of which were written in the style of Byron, though a few, like "The Faded Flower" and "Joe Steel," show that she could have written equally well in quite a different vein had she so chosen. Among her other works are *A Voice from the Factories* (1836), and *The Child of the Islands* (1845).

NORTON, CHARLES BOWYER ADDERLEY, first Baron (1814—). An English public man, born in Knighton, Leicestershire. He graduated at Christ Church in 1835, and was Conservative member of Parliament for North Staffordshire in 1841-78. During that time he was president of the Board of Health, vice-president of the Education Council (1858-59), Colonial Under Secretary (1866-68), and president of the Board of Trade (1874-78). He was knighted (1869) and made a peer of the realm (1878), with a title taken from his estate, Norton-on-the-Moors, Staffordshire. He interested himself in education, particularly in reformatory schools, and published books on the subject, besides one on *Socialism* (1896), and another on *High and Low Church* (1898).

NORTON, CHARLES ELIOT (1827—). An American scholar, son of Andrews Norton. He was graduated from Harvard in 1846, and began his career in a business house in Boston engaged in the India trade. In 1849 he went to India and to Europe, and thenceforth devoted himself to scholarship and literature. During the Civil War he was editor of the *Loyal Publication Society* papers, and from 1864 to 1868 was editor, with J. R. Lowell, of *The North American Review*. In 1875 he became professor of the history of art in Harvard University, and was made professor emeritus in 1900. He came to stand, more than any other American perhaps, for the finer ideals of culture, and was in consequence often misjudged for utterances which seemed unpatriotic, but were really inspired by a desire to promote the higher interests of his fellow citizens. His work in literature, which deals chiefly with Italy, consists of: *Consideration on Some Recent Social Theories* (1853); *The New Life of Dante* (1859; parts translated with essays; complete translation in 1867); *Notes of Travel and Study in Italy* (1860); *Historical Study of Church-Building in the Middle Ages* (1880); *The Divine Comedy of Dante* (1891-92), a very helpful prose translation. He was also the literary executor and editor of several important men of letters, as Lowell, Carlyle, Emerson, G. W. Curtis, Ruskin

(the *Brantwood Edition*), and A. H. Clough (*Poems*), of all of whom he was a personal friend.

NORTON, CHARLES LEDYARD (1837—). An American journalist and author, born in Farmington, Conn., and educated at Yale, where he graduated in 1859. He continued his studies at the Sheffield Scientific School until the outbreak of the Civil War, when he enlisted in the Seventh Regiment, New York State National Guard. In 1862 he was appointed captain in the Twenty-fifth Connecticut Volunteers, and from 1863 until he was mustered out in 1866 was colonel of the Seventy-eighth Regiment United States colored troops, with main duties in the Department of the Gulf. He commanded a large district in western Louisiana during the early months of reconstruction, and then for a year was manager of a cotton plantation in southern Louisiana. Forced by ill health to turn to literary pursuits, he edited the *Christian Union* from 1868 to 1878, and was subsequently connected editorially with the *Domestic Monthly*, *Our Continent*, and *Outing*. His published works include: *Canoeing in Kanuckia* (with John Habberton, 1878); *A Handbook of Florida* (3d ed. 1892); *Political Americanisms* (1890); and *Jack Benson's Log* (1895).

NORTON, FRANK HENRY (1836—). An American author and journalist, born in Hingham, Mass., and educated at the Dwight School in Boston and at the Pictou Academy, Nova Scotia. He was assistant librarian and then assistant superintendent of the Astor Library, New York City, from 1855 to 1865, and from 1866 to 1867 was head librarian of the Mercantile Library of Brooklyn. In 1872 he entered journalism, from 1879 to 1881 was editor and owner of the *New York Era*, and from 1883 to 1891 was a member of the New York *Herald* staff. He wrote various burlesques and melodramas, among which are *Alhambra*, *Azrael*, *Cupid and Psyche*, and *Leonic*, and published *Historical Register of the Centennial Exhibition, 1876, and of the Paris Exposition, 1878* (1878); *Life of Winfield Scott Hancock* (with D. K. Junkin, 1880); *Life of Alexander H. Stephens* (1883); *Daniel Boone* (1883); and *The Malachite Cross* (1894).

NORTON, SIDNEY AUGUSTUS (1835—). An American chemist, born at Bloomfield, Trumbull County, Ohio. He graduated at Union College in 1856, and at the Miami Medical College in 1867, and studied chemistry at Bonn, Leipzig, and Heidelberg. He then taught for a number of years, and in 1873 was appointed professor of chemistry at the Ohio State University. He published: *Elements of Natural Philosophy* (1870); *Essays and Notes* (1874); *Elements of Physics* (1875); *Elements of Inorganic Chemistry* (1878); and *Organic Chemistry* (1884).

NORTON, THOMAS (1532-84). An English poet, born in London. When a boy he became amanuensis to the Protector Somerset; and at the age of eighteen published a translation of the "Letter which Peter Martyr wrote to the Duke of Somerset," a valuable document, as the original is lost. In 1555 he entered the Inner Temple as student, and afterwards practiced law, becoming counsel for the Stationers' Company (1562), and solicitor to the Merchant Tailors' Company (1581). Entering Parliament in 1558,

he was soon known as a bold and eloquent debater. He took an active part against the Catholics; and as licenser of the press, was engaged in several most cruel tortures. Toward the close of his life he was imprisoned for a short time in the Tower on a charge of treason. He died March 10, 1584. Norton wrote much verse in English and Latin. He is, however, most remembered for his share in *Gorboduc*, the first English tragedy in blank verse (performed in the hall of the Inner Temple on Twelfth Night, 1560-61). The first three acts were written by Norton; the last two by Thomas Sackville (q.v.).

NORTON, THOMAS HERBERT (1851—). An American chemist, born at Rushford, N. Y. He studied at Hamilton College and at the University of Heidelberg, and then held the post of manager in a large chemical factory in Paris. In 1883 Norton was chosen professor of chemistry and librarian in the University of Cincinnati. He traveled afoot through Greece and Syria, and in May, 1900, was appointed by President McKinley to establish the American consulate in Harput, Turkey, as a recognition of his knowledge of the Orient.

NORTON SOUND. An arm of Bering Sea, on the west coast of Alaska, south of Cape Prince of Wales (Map: Alaska, C 3). It is 200 miles wide at its entrance, extends about the same distance into Alaska, and receives the waters of the Yukon River. It is ice-bound from October to June. Norton Sound was discovered by Captain Cook in 1778.

NORUMBEGA. A name given by early explorers and map-makers to various portions of the eastern coast of North America, and also to a river and a mythical city. Upon the map of Verrazano's voyages, published 1529, Aranbega appears as a place on the New England coast. The narrative of the anonymous "Dieppe Captain," in 1539, makes Norumbega stretch from Cape Breton to Florida. Mercator's map of 1541 apparently locates Anorumbega around the Hudson River, and that of 1569 represents Norumbega as a city with high towers. Jean Allefonsee, the pilot of the Cartier-Roberval expedition (1541-44), speaks of a great river, brackish forty leagues from its mouth, rocky, and filled with islands. This has been variously identified as the Hudson, Long Island Sound, and the Penobscot. Gastaldi's map, in 1556, makes Nurumbega the region near Cape Breton, while Thevet, in the same year, apparently makes the Norumbega the Hudson. David Ingram, a sailor, claimed that in 1568 he was put ashore on the Gulf of Mexico by Sir John Hawkins and made his way by Indian trails to the Saint John's River in Canada in 1569. While passing through Norumbega on his route he visited a city three-fourths of a mile through, the houses of which had pillars of crystal and silver. He saw a peck of pearls and rubies six inches long, while all the inhabitants had heavy ornaments of gold, and the richest furs were plentiful. This story was printed by Hakluyt in his *Principall Navigations* (1589), but Sir Humphrey Gilbert (q.v.) secured a copy before, and, in 1583, set out to explore the country. With him he carried the poet Parmenius to sing the praises of the country. Michael Lok's map, in 1582, represents the Penobscot as a strait reaching to the Saint Lawrence, and makes Norumbega the country included between the two. Other

maps of the sixteenth century locate the country in New England and indicate a city about the 43d degree. Champlain, in his explorations of the Maine coast (1604-06), searched for the city, and ascended the Penobscot to the site of the present city of Bangor, but found no trace. The name begins to disappear in the seventeenth century; but John Smith, in 1620, applies it to New England and the coast down to Virginia, while Lucini, an Italian engraver, represents it as alternative with Nova Anglia in 1647. Heylin, in 1609, still dreams of a wonderful city.

The etymology of the word 'Norumbega' is vague and uncertain. Grotius first identified the term with Norbergia, and suggested a Norse origin. Prof. E. N. Horsford derives it from *Norvegr*, Norway, and identifies the river with the Charles. He claims to have discovered ruins of a Norse city, subsequently occupied by Breton French, near Watertown, Mass., and in 1889 he erected a memorial tower at the junction of Stony Brook and the Charles. An Indian origin meaning 'still water,' or 'place of a great city,' has been suggested, while others call attention to the Spanish 'vagas,' or 'bagas,' fields. Weise, in his *Discoveries of America to 1525* (New York, 1884), derives the name from the Old French *L'Anorméc Berge*, the Grand Scarp, i.e. the Palisades. Fiske also identifies the Hudson as the Norumbega River and locates an old French city on Manhattan Island.

Consult: Winsor, *Narrative and Critical History of America*, vols. iii.-iv. (Boston and New York, 1884); Beauvois, *La Norambegue* (Brussels, 1880); Fiske, *Dutch and Quaker Colonies in America*, vol. vi. (Boston and New York, 1899); Horsford, *Defenses of Norumbega* (Boston, 1891), and *Discovery of Ancient City of Norumbega* (privately printed, 1890).

NORVAL, nôr'val. The son of Lady Randolph and her first husband in Home's tragedy *Douglas*. He was exposed at birth and brought up by an old shepherd, Norval, whose name he took. His identity was discovered by his mother after he had saved Lord Randolph's life, and he was advanced by his stepfather, but was killed by him as the result of jealousy aroused by Glenalvon, Randolph's heir presumptive. His mother then took her own life. The part was played by both Kemble and Macready.

NORWALK, nôr'wak. A city in Fairfield County, Conn., 14 miles west by south of Bridgeport; on the Norwalk River, near Long Island Sound, and on the New York, New Haven and Hartford Railroad (Map: Connecticut, B 5). It is attractively situated on the Sound, and is a popular residential place as well as a noted summer resort. Its more prominent buildings include the Carnegie Library, Norwalk Hospital, Fairfield County Children's Home, and the State Armory. There are extensive manufactures of hats, corsets, shirts, shoes, cassimeres, felt goods, silks, locks, air compressors, etc. The oyster interests also are important, and considerable coastwise trade is carried on. The New York and Norwalk steamboat line maintains regular service to New York. The government is vested in a mayor, annually elected, and a unicameral council. There are municipal water-works. Population, in 1900, 6135. Norwalk was settled in 1649 and incorporated as a town in 1651. It embraced what is now the cities of South Nor-

walk, chartered in 1870, and Norwalk. The latter was incorporated in 1836, as a borough, and was chartered as a city in 1893. On November 11, 1779, Norwalk was burned by a British and Hessian force under Generals Tryon and Garth. Consult: Selleck, *Norwalk* (Norwalk, 1896); and Byington, "Ancient and Modern Norwalk," in the *Connecticut Quarterly*, vol. i. (Hartford, 1895).

NORWALK. A city and the county-seat of Huron County, Ohio, 55 miles west by south of Cleveland; on the Lake Shore and Michigan Southern and the Wheeling and Lake Erie railroads (Map: Ohio, E 3). It is a city of fine residences, particularly on the main street, and has a handsome court house and jail. Norwalk is well situated for a commercial centre in an agricultural and stock-raising country; its extensive industrial interests are represented by piano works, iron and steel works, railroad shops, pickling works, manufactories of interior decorations, curtain poles, novelties, umbrellas, tobacco, etc., and by a printing and publishing house. The government is vested in a mayor, elected every two years, and a unicameral council. The water-works, with reservoirs having a capacity of 500,000,000 gallons and covering an area of about forty acres, are owned and operated by the municipality. Settled in 1817, Norwalk was incorporated first in 1828, and in 1881 received a city charter. Huron County is the westernmost of the ten counties in northern Ohio composing the 'Connecticut Reserve,' or 'Western Reserve,' part of which was granted to Revolutionary sufferers. Population, in 1890, 7195; in 1900, 7074.

NORWAY (AS. *Norwæg*, *Norþwæg*, Icel. *Noregr*, *Norvegr*, Norw., Dan., Swed. *Norge*, ML. *Norregia*, *Northwagia*, North Way). A long, narrow coast country of Europe on the North Atlantic, constituting with Sweden the Scandinavian Peninsula. The length of the coast around the outer belt of rocks is 1700 miles, the entire shore line, including the fiords and the large islands, being about 12,000 miles, long enough to stretch half around the globe. The country extends from latitude 57° 58' to 71° 11' N. Its width in the south is about 250 miles, in the northern half about 60 miles, and in Finmarken, the extreme north, a little greater. The area is 124,120 square miles—a little more than that of New Mexico. The northern coast is washed by the Arctic Ocean; Norwegian sealers sail every year as far north as it is open. On the south the Skagerrak, connecting the North Sea with the Cattegat, separates Norway from Jutland. Toward the east Norway has a land frontier 1500 miles long, being bordered by the Russian Government of Archangel for about 50 miles, by Finland for nearly 500 miles, and by Sweden for 950 miles. The eastern boundary extends most of the way in the midst of a belt of desolate plateau land through which the boundary with Russia was defined only in 1826 and with Sweden in 1751. At three places, at the head of the Gulf of Bothnia, the Trondhjem depression, and farther south, complete land connections have been made by means of railroads across the peninsula. Two-thirds of the people live in the south.

TOPOGRAPHY. The coasts are remarkable as a region of fiords. The shore line is everywhere broken by deep incisions of the sea into the rocky cliffs. Traces of the glacial period are found all over the land, and the fiords and islands fronting

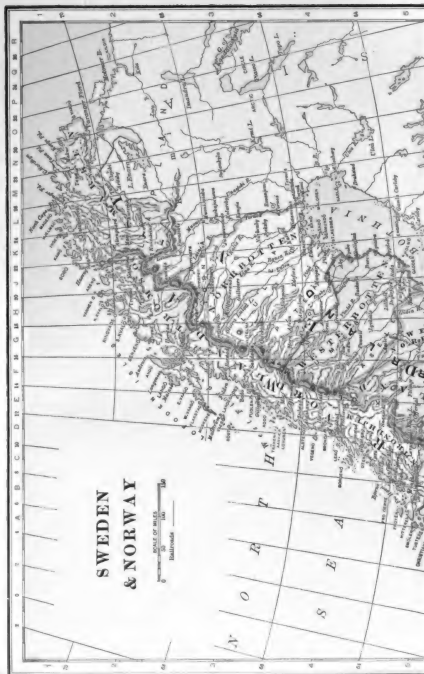
them are ascribed to the work of glaciers. Norway as a whole is a rugged plateau, with deep-cut valleys, the whole surface greatly denuded, peaks and groups of peaks rising, here and there, above the general level of the more plain-like region of the east. In the west, near the sea, are very ancient mountains worn down and rounded by denudation, and chiefly composed of hard igneous rocks that have better withstood the destructive forces which leveled the eastern districts to a plain.

In the southeast and the middle north (mainly north of Trondhjem) is the woodland rising to an average height of from 300 to 1500 feet, with forest-clad hillsides from which Norway's lumber is derived. The highland begins in the southwest with a width of 60 miles, and a plateau height which soon reaches 3000 feet, merging finally into the wide waste through which the eastern boundary passes. In the extreme west geographers distinguish three mountain ranges—the Langfjeld in the south, the Dovrefjeld between the northern and southern districts, and the Kjölen between Norway and Sweden farther north.

HYDROGRAPHY. The height axis is not far from the west coast, and the western rivers therefore are short, although their volume of water is large on account of the heavy rainfall. The eastern rivers flow along fairly regular parallel valleys, which are open and flat in the mountains, but are cut deep through the plateau. A few of the eastern fluvial basins are large, that of the Glommen being 16,000 square miles, that of the Drammen 6600 square miles, and that of the Skien 4250 square miles, but the volume of water is comparatively small on account of the smaller rainfall. The slope is great and the rivers are filled with falls and rapids, which impart great beauty, but prevent navigation. The mountain highland and woodland are dotted with an enormous number of lakes, most of them narrow and long, due to the intense action of glaciers. It is supposed that in the great glacial period the inland ice must have extended even above the highest peaks. Most of the larger lakes are found in the long valleys—the largest of them, Mjøsen (140 square miles, 60 miles long, 1500 feet deep), Randsfjord, Spirilen, Kröderen, and others, lying at a height of about 400 feet above the sea just outside the border of the highland in the east country.

CLIMATE. Norway reaches 300 miles into the Arctic zone, and nearly a third of the country is in the domain of the midnight sun and winter darkness. The summer day is long and bright, but the winter day is short and dark. At Christiania, in the far south, the sun is above the horizon on the shortest day less than six hours. The west coast is warmer than the interior because it has the full effect of the westerly winds, whose temperature is modified by blowing from the temperate waters of the Atlantic. The fiords therefore do not freeze, but are navigable the year around. The land, rising from the coast into mountain tops and plateaus, in places rises into regions of perpetual snow where glaciers descend into the valleys. The line of perpetual snow, at the parallel of 62° N., is between 4500 and 5000 feet above the sea; at 66° 30' the snow line falls to 3900 feet, and at 70° to about 3000 feet.





The climate varies in different parts of the country. Southeast Norway, limited on the north by the Dovrefjeld, has a mean annual temperature varying from 44° to 31° F. July is the warmest month, with a mean temperature of 61° at Christiania. The winter is most severe in the heart of the country. At Christiania the mean winter temperature is 25°. The temperature of West Norway is fairly uniform, the mean annual temperature being highest (44° to 45°) at the extreme western ends of the land. The annual rainfall is greatest along the western coast, ranging from 50 to over 80 inches. On the southeast coast, near Grimstad, it is 48 inches, while on the Dovrefjeld it is only 12 inches. Snow is less frequent in the west than in the east on account of the milder winter temperature. The country north of the Dovrefjeld is colder than in the south, but the climate of the coast region is also modified by oceanic influences. The most varied shades of continental and maritime climates are thus represented in Norway. The inland districts of Southeast Norway and Finmarken, with their severe winters and relatively high summer temperature, their gentle breezes and small rainfall, are examples of typical inland climate. The whole coast line, with mild winters, cool summers, abundant rainfall, and unsettled weather, is an example of typical maritime climate. On the whole, the climatic conditions are favorable to the development of a strong, healthy, energetic people.

FLORA. The richest vegetation is found in the southeast around Christiania Fiord and the large lakes. Considering its northerly position, Norway has a luxuriant vegetation. About 1500 species of phanerogams alone grow wild. In the southeast conifers form thick forests from sea-level to 3000 feet. Up to about 1600 feet above the sea a luxuriant growth of oak, ash, lime, maple, elm, and lowland birch is found, secondary to the conifers, but giving its characteristic stamp to the lowland flora. Above the limit of conifers is the birch zone, reaching 3500 feet above the sea, where the true mountain plants begin to be prominent. Above the birch limit the willow and the lichen zones are distinguished. In the willow zone there are no trees—only a dense growth of low bushes. Reindeer moss predominates in the lichen zone. The extreme coast region is destitute of forest, and also of some continental plants found inland, but is especially rich in mosses. The arable soil is found in narrow strips of deep valleys and around fiords and lakes. Large continuous tracts fit for cultivation do not exist, and only 1-140th of the total surface is in grain fields.

FAUNA. The animal life is that of the rest of North Europe, with relics, chiefly in the north, of Arctic elements such as the mountain or Arctic fox, the ptarmigan, the snow bunting, and various insects. With its long coast line Norway is richer in species of fish than most northern lands, more than 200 species being found. There are a number of Arctic contributions, including the Greenland shark, which is fished for its liver. Very numerous are fishes which belong to the north or general European fauna, including most of the food fishes, such as cod, haddock, coalfish, pollack, torsk, herring, sprat, and mackerel. The salmon is caught along the coast and in the rivers, where it comes to spawn. Trout and red char are the most widely dis-

tributed fresh-water fish. Of the ten species of reptiles and amphibia, the lizard and the frog are found everywhere, but the viper has its northern limit at the Polar circle. The birds number 280 species, of which 190 breed in the country. Most of them are birds of passage, as the falcon, geese, and ducks. The mild climate of the south and west coasts induces the starling, blackbird, woodcock, duck, swan, etc., to winter there. Along the west and northern coasts are numerous colonies of swimming birds. The birds of the lowlands are similar to those of Europe in general. There are 67 mammals. The hedgehog is found in the south, the lynx in unfrequented forests, and the glutton, a great enemy of the reindeer, among the mountains of the north, where the reindeer grazes. Wolves, formerly numerous, have nearly disappeared, except in North Norway. Bears are gradually disappearing, and the commonest beast of prey is the fox among the mountains. The common seal and the gray seal breed on the Atlantic islands, and all the Arctic seals, and even the walrus, sometimes appear on the north coast. The lemming lives in the mountain wastes and sometimes overruns the lowlands, damaging crops. A few beavers remain, and the mountain hare, which turns white in winter, is found all over the country. The ruminants are represented only by the red deer, the elk, and the reindeer among wild animals. The wild reindeer is decreasing on account of over-hunting, but many herds of tame reindeer are kept in the north and even among the mountain wastes of the south that lie too high for general grazing.

GEOLOGY AND MINING. Archæan rocks have a wide extension in Norway, particularly through the mountain regions of the west and in the districts from Lake Mjösen southward. Gneiss and granitic gneiss are the prevailing rocks in these regions. During Cambrian and Silurian time the open sea extended over the greater part of Norway, and on its bottom lime, mud, sand, and gravel were laid down, forming a series of strata rich in fossils and very thick. Cambrian and Silurian rocks are thus widely represented, particularly east of the mountains and north of Lake Mjösen, and also among the northern mountains behind the coastal areas of igneous rocks. A belt of Post-Silurian and Cambrian rocks extends from Lake Mjösen southward through the Christiania region to the south coast, forming the subsoil of that beautiful and undulating country. Over large areas of the ancient rocks are spread the deposits of the Ice Age to no great depth. Raised beaches along the outer parts of many fiords are proof of the former lower position of the land. The mining industry is not important, for Norwegian ores are not rich nor large in extent. The Kongsberg silver mines, owned by the State, yielded 898 tons of silver between 1624 and 1898. The Røros copper mines, owned by a joint stock company, yielded 73,000 tons of copper between 1647 and 1897. Iron ores occur in many places, but little is mined, and coal does not occur except on the remote island of Andø. At the end of 1900 there were about 40 mining establishments, employing 3017 workpeople, and 6 smelters, with 302 laborers. The chief mineral products of 1900 were silver, worth \$88,440; copper ore, \$679,487; pyrites, \$630,872; and iron ore,

\$35,644. Fine marble, building stone, roofing slate, soapstone, and millstones are produced in large quantities and are important exports.

FISHERIES. Fishing is among the oldest of the country's industries. The value of the large fisheries has averaged for 31 years \$5,796,400 a year. This does not include the catch (daily fishing, as the Norwegians call it) which supplies the wants of the home population. The value of all the fisheries, including the Arctic fisheries and various extra sources of profit, such as oil and fish guano, is about \$13,400,000 a year. The cod is the largest fishery, the number of persons engaged in it in 1900 being 82,098, and the value of the catch \$3,636,492. The largest centre of the industry is the Lofoten Islands, where, in the first few months of the year, about 40,000 men are engaged in fishing or in preparing the catch for market. The average per man for the whole of the fishing is from 900 to 1000 cod. The fish are sold partly to traders on the islands who have warehouses with salting and storing rooms, and partly to merchant vessels, which carry their purchases to other ports. The herring fisheries, next to the cod in importance, are carried on all along the coast, the summer fisheries employing over 20,000 men, and the value of the product being usually over \$2,400,000. The catch in recent years has not been so large as formerly, but is now improving. The mackerel is rare north of Trondhjem Fjord, and is fished chiefly in the Skagerrak and the fiords off it. The industry in 1900 employed 2741 men, the product being worth \$152,492. The salmon, sea trout, lobsters, and oysters (small yield) also figure in the total product of the large fisheries, the total value in 1899 having been \$6,510,256. The mackerel is also caught in the North Sea, and the Arctic fisheries engage every season about 2000 men who sail over the Arctic Sea from Greenland and Jan Mayen Island in the west to Spitzbergen and Finmarken in the east, for sealskins and oil, whale oil, and bearskins.

AGRICULTURE. Of the total area, 59 per cent. is bare mountain, 21 per cent. woodland, and only 10 per cent. is in pastures, hay lands, and fields. In the southeast cultivated plants and fruits ripen in the open air, but in the north and on the higher tracts there is little or no agriculture. Crop and cattle raising are usually carried on together. Oats is the chief grain, but none of the cereals suffices for the needs of the country. Barley and rye are grown much farther north than oats, but wheat is rarely found north of the Trondhjem Fjord. The area annually sown to wheat is about 10,000 acres, with a yield of about 255,000 bushels. Rye is the great bread cereal, its cultivation extending to the 70th parallel, the area annually sown being about 34,000 acres, and the yield about 900,000 bushels. Among root crops only potatoes are cultivated to a large extent, and they are one of the chief foods. The average production is about 23,000,000 bushels. The yield of the different kinds of grain is large compared with that of most European countries, due to careful cultivation and heavy manuring.

LIVE STOCK. Norway has only about one-third of the cattle of Scandinavia, but the pastures give adequate grazing for most of the sheep. In 1900 there were in the country 172,999 horses,

950,201 cattle, 998,819 sheep, 214,594 goats, 165,348 swine, and 93,576 reindeer.

Of the two types of horses, the small flord horse is an excellent working animal in the mountain districts, where good roads are lacking. The larger Gudbrandsdal is quick and strong as a farm and carriage horse. The cattle of several different breeds are small, but good milkers. They often seek their food over large areas of sparse pastures. Attempts to improve them by an admixture of foreign blood have not been very successful. Most of the butter and cheese is made in coöperative dairies with the best equipment, and brings the highest price in the British market. Norwegian sheep are small, slender, and fine woolled. They have been crossed with foreign breeds to their advantage. The gross return of the live stock industry annually averages about \$37,520,000, which, added to the average return of \$18,760,000 a year from the farm crops, gives a gross income from Norwegian husbandry of over \$56,000,000 on an average. The buildings on Norwegian farms are comparatively expensive on account of the severity of the winter. Domestic animals require warm barns, and everything, including hay, must be housed. The number of farms in 1890 was 236,286.

FOREST INDUSTRIES. Lumbering has always been one of the greatest industries. The large forests lie far from the inhabited districts as a rule, and the timber-cutters and log-drivers live in huts, most of them being strong and hardy single men. Three-fourths of the forests are pine lands, but the Norway pines and spruces convenient to Christiania and other shipping points have been depleted in many places so that the more northern forests in Sweden are now the larger source of Scandinavian lumber. Norway's forest products, however, form about one-third of the country's total exports. The value of the unwrought or partly wrought timber exported in 1901 was \$9,539,888, and of wrought timber (mostly wood pulp) \$6,436,448.

OTHER INDUSTRIES. About 50,000 persons are engaged in the manufacturing and other industries outside of those mentioned above. The production of lumber and wooden ware is the oldest and largest branch, employing in 1895 12,073 work people. There are many saw and planing mills, chiefly along the rivers. The most important machine shops are in Christiania. Iron ships are built and there are carriage and car works. In machine production Norway has yet much to learn from other countries. The textile industries, spinning and weaving mills, jersey factories and roperies, employ about 9000 persons, and number 64 establishments, most of them situated in the outskirts of the towns. Paper-making derives its importance from the large resources of wood pulp. Small tanneries and flour mills are scattered all over the country. Breweries, tobacco and tinning works, are chiefly in the larger towns, and particularly in Christiania. Potteries, china factories, iron foundries, nail-rolling and wire mills, have a considerable output. Only about 2000 persons are employed in making articles of attire. As the country is deficient in industrial development, the imports of manufactures are large.

COMMERCE. The growth and average annual amount of Norway's trade may be seen from the following table:

	1881-85	1891-95	1901
Imports.....	\$40,500,000	\$59,500,000	\$76,900,000
Exports.....	28,500,000	35,000,000	41,400,000

The aggregate foreign commerce since the middle of the nineteenth century has more than quadrupled. The imports largely exceed the exports, but this difference is covered to a great extent by the profits from the shipping trade, as Norway is a great carrier of freight for foreign countries. Articles of food and drink are the largest imports. Nearly half the value of the imports is represented by cereals, rye being the chief item, with barley, wheat flour, rye flour, and wheat following. Groceries, particularly sugar and coffee, are large imports. Bacon and other meats are brought chiefly from the United States. Cotton and woolen goods and yarn are the chief textile purchases. Among the imports of raw material are coal, hides and skins, iron and steel, cotton, wool and hemp. The country buys over 1,250,000 tons of coal every year. Oils, particularly kerosene, hempseed, and linseed, amount to about \$1,500,000 a year. Steam-engines, locomotives, metal goods, and vessels are also large imports. Timber and fishery products are the most important exports. About one-fourth of the timber is sent abroad as deals and boards. Some 350,000 tons of wood pulp are annually sold. The increased sales of the products of agriculture and cattle-raising, which have quadrupled since 1871-75, are especially due to exports of butter and condensed milk. Among other important exports are packing paper, ships, ice, dressed stone, iron and steel nails, and metal and ores. The United Kingdom and Germany are most important in Norwegian commerce, the United Kingdom commanding about one-third and Germany one-fourth of the entire trade, while Sweden has less than a tenth. The sales to the United States are very small, as the latter country produces in great abundance most of the export commodities of Norway; but Norway buys from this country cotton, wheat, provisions, tools, machinery, fertilizers, locomotives, and leather goods to the value of several million dollars a year. The foreign commerce is carried on chiefly through the ports of Christiania, Bergen, and Trondhjem, the timber-trading towns of Fredrikstad and Drammen being also especially important. Christiansand is widely known for its export of salted and dried fish.

TRANSPORTATION AND COMMUNICATIONS. The Norwegians are a race of sailors. Their merchant marine is the fourth largest in the world, and in proportion to population it heads the list. While the natural commerce is comparatively small, Norwegian vessels and sailors are conspicuous in the sea carriage of freight for foreign nations. A considerable number of their vessels are engaged in the fruit trade between the United States and Latin America. In 1902 the mercantile marine included 5445 sailing vessels (935,947 tons) and 1223 steamers (531,142 tons), or a total of 6668 vessels with a tonnage of 1,467,089. The total length of railroads in 1901 was 1308 miles, of which the State railroads had a mileage of 1168.

BANKS. The right to issue paper money is reserved to the Bank of Norway (Norges Bank), a joint stock bank owned in part by the State. The bank has charge of the money transactions

of the State, and does business as a loan, circulation, discount, and deposit institution. The head office is at Christiania, and it has twelve branch offices in the most important towns. The balance sheets for 1901 showed total assets of \$26,578,926. The Mortgage Bank of the Kingdom of Norway, "Kongeriget Norges Hypothekbank," makes loans on real estate. The capital of the bank is partly supplied by the State, and amounted in 1901 to \$4,690,000; the loans on mortgage at the end of 1901, \$36,159,560, of which about one-fourth had been granted on town and three-fourths on country property; the total amount of bonds issued was \$34,062,671. There were 78 private joint stock banks, with a paid up capital of \$11,373,492. The number of chartered savings banks, all controlled by the Ministry of Finance, was 421, with 695,524 depositors and \$86,292,423 deposits.

GOVERNMENT. Norway, though united to Sweden since 1815, under the same King, retains its own Government with a separate Ministry and Legislature. The law of succession to the crown is the same in both countries, and commissioners appointed by the two Parliaments regulate the questions touching the transmission of the crown. Affairs common to the two governments are attended to by a Council of State composed of both Swedes and Norwegians. The form of government in Norway is fixed by the Constitution or fundamental law of May 17, 1814, which has undergone several subsequent modifications. The Norwegian State is a constitutional monarchy with the parliamentary or responsible system of government. The legislative power is vested in a Parliament or Storting, which, upon assembling, divides itself for legislative purposes into two chambers, the Odelsting and the Lagthing. The former consists of three-fourths of the whole number of members chosen to the Parliament. The members include representatives from the cities and representatives from the country, all chosen for a period of three years and renewed integrally. All male citizens twenty-five years of age who have resided in the State for a period of five years are qualified to vote for members of the Storting unless disqualified for special causes. To be eligible to membership in the Storting one must be a male citizen thirty years of age, and must have resided in Norway for a period of ten years. Certain high State functionaries are disqualified. The elections are indirect and in the second degree. A certain number of primary electors in the country choose one secondary elector; the secondary electors then assemble in the chief towns of the electoral district and choose a certain number from their own body to serve as representatives in the Storting. The Storting meets annually, but cannot remain in session for a longer period than three months without the authorization of the King. The King may call extraordinary sessions of the Storting and dissolve it, but he does not have power to dissolve the ordinary sessions and order new elections. The members receive a compensation of about \$3 per day during the session.

After the separation of the Storting into two chambers, each meets separately, chooses its own officers, and is the judge of the election and qualifications of its members. Bills are first presented to the Odelsting by its own members or by the Government, and after passage are sent to the Lagthing, which must either accept or re-

ject them *in toto*. In case of a deadlock between the two chambers they come together in united session and deliberate and vote as a single assembly. The chief powers of the Storting are to enact laws, impose taxes, raise loans, supervise the finances, vote appropriations, and approve treaties concluded with foreign powers. The Lagthing has the exclusive right of choosing the justices of the High Court, while to the Odelsting belongs the right to inspect the public accounts and to prefer impeachments against public officials, including members of the Storting. The members of the Lagthing, together with the justices of the Supreme Court, form a court (Rigsret) for the trial of ministers, members of the Storting, and justices of the Supreme Court. To the King belongs the right of sanctioning laws passed by the Storting. If, however, he withholds his sanction and the law is passed a third time by the Storting, it becomes valid without the royal approval. The King is commander of the army and navy, may declare defensive war, make treaties, levy troops, etc. He is declared to be inviolable and irresponsible. He exercises his authority through a Council of State composed of two Ministers and at least seven Councilors, appointed by himself from among Norwegians. One of the Ministers, together with two of the Councilors (who change annually), form a 'delegation,' which resides permanently at Stockholm near the King. The King can take no official action without consulting the Council of State or that part of the Norwegian Government which has its seat at Christiania. The Ministers and Councilors preside over the departments of administration and have access to the Storting, where they are allowed to take part in the deliberations, but with no right to vote. The departments are as follows: Worship and Education; Justice; Interior; Public Works; Finance and Customs; Defense; Public Accounts.

The judicial system consists in the first place of a Supreme Court (Höiesteret), composed of a president and at least six other justices, elected by the Lagthing, and having a territorial jurisdiction embracing the whole Kingdom. There are also three Superior Courts (Stiftesverretter), each consisting of a bench of three justices, one of whom bears the title of Chief Justice. For the administration of civil justice Norway is divided into 111 districts, each with an inferior court. There is also a court of mediation, so called, in each town and district, composed of two laymen popularly elected and before whom, as a rule, civil cases must first be brought. According to the new code of criminal procedure, adopted in 1887, all criminal cases must be tried before a jury court (Lagmandsret) consisting of three judges and ten jurors, or before the Meddomsret, a tribunal consisting of one professional judge and two lay assistants, summoned for each case. The former has jurisdiction of the more important offenses, while the latter is a court of first instance for the trial of misdemeanors. For the purposes of local government, Norway is divided into 20 districts, in each of which is an executive officer called an amtmana. These districts embrace the two cities of Christiania and Bergen and 18 counties (Aemter). Smaller administrative divisions are the communes and wards. Each commune has a representative assembly (its size

varying according to the population of the commune), and a smaller council, chosen by the representatives from their own body. They also elect triennially a chairman. All the chairmen of an amt form with the amtmana a sort of county diet, which meets annually under the presidency of the amtmana to fix the amt budget. The members of the local governing bodies are chosen by an electorate more narrow than that which chooses the members of the Storting.

FINANCE. The total revenue in the year 1902-03 was \$27,403,000. A little over a third of it is derived from the customs, and less than a tenth from the railroads. The other sources of income include the excise tax, stamps, income tax, post office, State telegraphs, State mines, and other State property. The total debt in 1901 was \$61,300,756. Gold is the standard of value. The crown (26 4-5 cents) is the unit of coinage. The metric system of weights and measures is obligatory.

ARMY AND NAVY. See the articles **ARMIES** and **NAVIES**. The six strongest fortresses are Oskarsborg, Tönsberg, Bergen, Fredriksten, Ogdenes, Christiansand.

POPULATION. By the census of 1900 the population was 2,239,880, or 18 to the square mile. Norway is thus the most thinly populated country in Europe. About two-thirds of the entire population live upon the coast and along the fjords; about a fourth in the interior lowland districts; the remainder belong to the mountain districts. Three-fourths of the inhabitants dwell in the rural districts. Nearly all the sixty-one towns in Norway are small. The population of Christiania (the capital) and Bergen together is about half the town population of the country. A small proportion of the inhabitants are of foreign birth.

The list of the political districts, with areas and populations, is as follows:

DISTRICTS	Area, square miles	Population Dec. 3, 1900
Christiania (town).....	6	227,626
Akershus.....	2,017	116,228
Smaalenene.....	1,600	136,886
Hedemarken.....	10,600	126,182
Kristians.....	9,785	116,280
Buskerud.....	5,721	112,676
Jarlsberg and Laurvik.....	896	104,554
Bratsberg.....	5,805	99,052
Nedene.....	3,610	79,935
Lister and Mandal.....	2,806	81,567
Stavanger.....	3,552	127,592
Søndre Bergenhus.....	6,026	135,762
Bergen (town).....	5	72,251
Nordre Bergenhus.....	7,136	89,041
Romsdal.....	5,788	136,137
Søndre Trondhjem.....	7,185	135,382
Nordre Trondhjem.....	8,696	83,433
Nordland.....	14,804	152,144
Tromsö.....	10,134	74,362
Finnmarken.....	17,918	32,800
Total.....	124,129	2,239,880

EMIGRATION. In the nineteenth century Norway lost by emigration to the United States a comparatively larger part of its population than any other country in Europe excepting Ireland. Most of them made their new homes in the Northwestern United States. Emigration has greatly fallen off in the past few years, and amounted to only 12,488 in 1901.

EDUCATION. The Norwegian primary school has a seven years' course adapted for children between seven and fourteen years of age. Every

child that does not receive an education equivalent to the primary course by its fifteenth year may be compelled to attend these elementary schools, which in 1898 numbered 5971, with 259,460 pupils in the country, and 73,313 in the towns. Secondary schools numbering 86, of which 30 are private, give a higher course of instruction, and have about 16,000 pupils. The Royal Frederick University in Christiania has 63 professors and 1400 students.

RELIGION. The Evangelical Lutheran creed is the State religion, and the Church is called the Norwegian Established Church, most of the inhabitants being members. All other religions are tolerated. Norway is divided into 6 bishoprics, and each diocese into deaneries, which are again subdivided into livings at present numbering 478. The total number of parishes is 956. The dissenters in 1900 numbered 52,680, including 1969 Roman Catholics and 10,286 Methodists.

The poor are provided for by local taxes, though the counties and the State assist. The number of persons receiving relief of any kind in 1899 was 80,730.

ETHNOLOGY. Since Neolithic times Norway has been mainly inhabited by tall, blonde longheads, of Teutonic stock, who are believed to have come from the Caucasian steppes during the prehistoric migrations. Because of the great ice cap which lingered on the mountains, Norway was peopled much later than Sweden, which shows Paleolithic inhabitation, while the former has revealed only the Neolithic. There were three land bridges by which man may have come to the Scandinavian peninsula, one on the west joining the British Isles to Norway; the second from Rügen in North Germany to Scania in Sweden; and a third much later bridge from Finland to East Sweden. By the middle bridge Sweden and Norway received the red deer and the Teutonic longhead population, which is almost pure in the former country. Whatever Finnic elements are present may have come by the Bothnia bridge. On the west there came a dark, short type of probably Round Barrow or Pictish origin. It would seem that these people brought the Shetland pony. The longheads coming in from Sweden around the southwest coast lowlands occupied the interior of the country after the melting away of the ice cap. This region was never touched by that tremendous wave of migration of short, dark longheads called 'Mediterraneans' by Sergi, coming, it is conjectured, originally from North Africa. Thus there has been forming here for a long period from these light and dark elements a virile race in an environment whose stress was a spur to the education of manly qualities for which the Norwegians have excelled since they came in the purview of history.

The Norwegians prefer a country life, but little of the modern movement toward cities being noticed until recently. They are of tall stature (5 ft. 8 in.), with strong, well-knit frames, and good muscular development. Fair skin, blue eyes, and light flaxen hair characterize the bulk of the population, but the dark type is often recognized. Among the children flaxen hair is almost universal, but with development the hair, eyes, and skin become darker in a majority of cases. As a people the Norwe-

gians are remarkably hardy and show a preference for athletic sports which require great endurance. For this reason they are typical explorers. In character they are frank, yet cautious and reserved, honest, and religious. While modified Danish is the literary language, the old Norse survives in a few districts, as it does in Iceland. Since the peasants speak various dialects of Old Norse, and many of the educated consider the presence of the Danish language an anomaly, efforts to revive Norse have been zealously prosecuted for many years.

HISTORY. The early history of Norway is preserved only in the legendary sagas. The most recent archaeological researches show that the Scandinavian people were probably the autochthonous inhabitants of the peninsula. The historical period of Norway reaches no further back than the ninth century. The petty tribal kingdoms which existed here as in all northern countries were united under Harald Haarfagr or Fairhair (died c.933), who in the last third of that century established the seat of government at Trondhjem in the north. At this time the Danes and Norwegians (see NORMANS) were the terror of Europe through their plundering expeditions and invasions.

The introduction of Christianity, the result of the intercourse which the Norwegians had with the more civilized parts of Europe through their maritime expeditions, was gradually effected in the hundred years that followed the death of Harald Haarfagr. Haakon the Good, son of Harald Haarfagr, attempted vainly to establish it; but this result was brought about by Olaf Trygvasson (995-1000) and Olaf the Saint (c.1015-1030), wild northern missionaries who bore the cross in one hand and the sword in the other. Olaf the Saint zealously prosecuted the conversion of his countrymen and raised himself to supreme power in the land by the subjection of the small kings or chieftains who in the times of heathenism had subdivided the Kingdom among them. In 1028 Olaf was driven out by Canute the Great of Denmark, and, having attempted to recover his throne, was defeated and slain in 1030. On the death of Canute in 1035, Olaf's son, Magnus I., recovered possession of the throne, and thenceforth, till 1319, Norway continued to be governed by native kings. Of these the most noteworthy were Sverre Sigurdson (1184-1202), a statesman of considerable ability who was put in power by the nationalist democrat party, who after years of bitter strife had overcome the party of the nobles and clergy, and Haakon the Old (1217-63), in whose reign independent Norway reached the height of its prosperity. During these centuries the Norse adventurers had established permanent colonies in Iceland and Greenland, and for a time the Orkney and Shetland islands and the Hebrides were in the possession of the Norwegian kings, whose last inroad into Scotland was repelled in 1263. The thirteenth century saw the beginning of written Norse literature and law. The death of Haakon V. without male heirs, in 1319, threw the election of a new king into the hands of the national assembly, who made choice of Magnus of Sweden, surnamed Smek, the son of Haakon's daughter. He was in turn succeeded by his son, Haakon, and the latter's son, Olaf, after having been elected King of Denmark in 1376, became ruler of both Scandinavian king-

doms on the death of his father in 1380. This young king, who exercised only a nominal sway under the guidance of his mother, Queen Margaret (q.v.), the only child of Valdemar IV. of Denmark, died without heirs in 1387. The ambitious and capable Margaret succeeded to the thrones of Denmark and Norway, and in 1389 she became mistress also of Sweden, and the three kingdoms were bound together by the Union of Calmar in 1397.

From the Union of Calmar till 1814 Norway continued united with Denmark; but while it shared in the general fortunes of the latter State, it retained its own constitutional mode of government, and exercised its right of electing the sovereign until, like the sister kingdom, it agreed of its own free will to relinquish this privilege in favor of hereditary succession to the throne. (See DENMARK.) Norway declined in prosperity and energy after the fourteenth century, in the middle of which the Black Death swept over it, leaving the land exhausted and partially depopulated. Oppressed by Denmark, her colonies and her commerce lost, there seemed to be little left of the national life. The Napoleonic wars severed the union which had existed for more than 400 years; for Denmark, after having given unequivocal proofs of adhesion to the cause of Bonaparte, was compelled, after the triumph of the Allies, to purchase peace by abandoning its sovereignty over Norway. Crippled in her resources and also bankrupt, she saw herself constrained to sign the Treaty of Kiel in 1814, by which it was stipulated that she should cede Norway to Sweden, receiving by way of indemnity Swedish Pomerania and the island of Rügen, which were subsequently exchanged with Prussia for Lauenburg. The Norwegians refused to admit the validity of the Treaty of Kiel, and a National Diet, assembled at Eidsvold, tendered the crown of Norway, as an independent kingdom, to the Danish Crown Prince Christian Frederick (the future Christian VIII.). This Assembly drew up a constitution based on the French Constitution of 1791. These measures found, however, neither supporters nor sympathizers among the other nations; and with the sanction of the Great Powers, Bernadotte, Crown Prince of Sweden, led an army into Norway, and after taking Frederikstad and Frederikshald, threatened Christiania. Denmark being unable to support the cause of Prince Christian, and Norway being utterly destitute of the means necessary for prosecuting a war, resistance was of no avail, and the Norwegians were glad to accept the proposals made to them by the Swedish King for a union with Sweden on the understanding that they should retain the newly promulgated Constitution, and enjoy full liberty and independence within their own boundaries. These conditions were agreed to, and strictly maintained; a few unimportant alterations in the Constitution, necessitated by the altered conditions of the new union, being the only changes introduced in the machinery of government.

Norway has firmly resisted every attempt on the part of the Swedish monarchs to infringe upon the constitutional prerogatives of the nation, and the feeling of national autonomy has been intensified by a striking difference between the democratic population of Norway and the more conservative population of Sweden, where the aristocracy still exercises considerable influence on the Government. The national movement,

which continued throughout the nineteenth century in spite of repeated attempts on the part of the sovereign to mediate between the Norwegian and Swedish parliaments, had as its ultimate aim the reduction of the bond between the two kingdoms to a mere personal union. Conservative, Liberal, and Radical ministries succeeded each other in rapid alternation, but while the two former parties were too weak to effect any permanent arrangement, the Radicals, who were as a rule in a decided majority, failed in their policy against the resolute resistance of the Swedish Landsthing. The Norwegian Parliament, the Storting, for some time before 1890, sought to enforce its policy by refusing to vote adequate supplies for the defense of the united kingdoms, and attempted to organize the military strength of the nation in the form of a militia and volunteer corps, on whose sympathy the Storting might depend. After 1890 the policy of the Radical Party, which in secret was aiming at complete separation from Sweden, crystallized in the demand for a special Ministry of Foreign Affairs for Norway as well as a distinct diplomatic and consular service. This, however, the sovereign refused to concede. A temporary truce was concluded in 1895, when a new law regulating the commercial relations of the two countries went into effect, and a joint committee composed of Swedish and Norwegian representatives was intrusted with the execution of its provisions; but in the election of 1897 the Radical Party gained an overwhelming victory, and the conflict was renewed with increased ardor. In 1899 King Oscar II. finally gave his consent to a law removing the emblem of Sweden from the flag of Norway, which thus resumed the use of its old ensign. A bill, however, tending toward the final establishment of a separate consular service for Norway failed of the royal approval in 1900. In 1898 a law providing for direct election to the Storting by universal manhood suffrage went into effect. This was supplemented by a law in 1901 dealing with communal electors, by which the suffrage was granted to all adult males and such women as paid a tax on an income of more than 300 kroner.

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NORWEGIAN LANGUAGE. The language which, together with Icelandic and Faroese, forms the West Norse division of the Scandinavian group. Like the other members of this group division, the Norwegian is more homogeneous than either Danish or Swedish. Chiefly as a result of phonetic changes its inflections are less original than those of Icelandic, although it retains the three genders. Its common Scandinavian characteristics are the suffixed definite article, the medio-passive, and the neuter-ending -t. Norwegian was divided at an early period into two main dialect-groups, the Eastern, including the Gudbrandsdal and the Drontheim, which resembles the Swedish, and the Western, represented by Hardanger, Voss, Sogn, and Sætersdal, which approaches the Icelandic. A subdivision of the West Norwegian, spoken along the coast, resembles the Danish.

The early period of the language is similar to that of Icelandic (q.v.). During the period from 1350 to 1530 Norwegian was strongly influenced first by the Swedish and later by the Danish. As a result of the Union of Calmar (1397), by which Norwegian independence was lost, Danish was substituted for the native language for purposes of literature and public business, although the Norwegian survived in the country districts in various dialects, and was used for social intercourse and the composition of folk tales and ballads. The modern standard language shows many divergencies both in forms, in vocabulary, and in syntax from the Danish of Denmark, and is generally distinguished from it as Dano-Norwegian. By the Norwegians themselves the dialects and the standard language are alike called Norse, but this usage is not recognized by scholars. During the last fifty years efforts have been made to emphasize the Norwegian character of the language by adapting its orthography to local pronunciation, and by introducing forms from the native speech. Dano-Norwegian has been described as Danish with a Swedish pronunciation.

A peculiar language movement in Norway is attracting attention throughout Scandinavia. It

is no less than the creation and spread of a new form of Scandinavian speech, called by its originator, Ivar Aasen (q.v.), *Landsmaal* (national tongue). It is a written language, not used for social intercourse, and is based upon the existing dialects of Norway. At first this artificial language was used exclusively in poetry, but in 1858 the first newspaper in the *Landsmaal* appeared, and since then it has spread rapidly. In 1868 a society for the propagation of the new idea was established, branches of which now exist all over Norway. A number of acts have been passed by the Parliament in favor of the *Landsmaal*, among which may be mentioned that founding a chair in that subject at the University of Christiania. At present all acts of Parliament are published both in Dano-Norwegian and the *Landsmaal*. The principal literary supporter of the movement is the novelist Arne Garborg. Consult: Sargent, *Grammar of the Dano-Norwegian Language* (Oxford, 1892); Groth, *Danish and Dano-Norwegian Grammar* (Boston, 1894); Poestion, *Lehrbuch der norwegischen Sprache* (2d ed., Vienna, 1900); Noreen, *Altisländische und altnorwegische Grammatik* (2d ed., Halle, 1892); Aasen, *Norsk Grammatik* (Christiania, 1864), and *Norsk Ordbog*, with a supplement by Ross (ib., 1872-90); Larsen, *Oversigt over de norske Bygdemaal* (ib., 1898); Larsen, *Dictionary of the Dano-Norwegian and English Languages* (3d ed., Copenhagen, 1897); Brynildsen, *Dictionary of the English and Dano-Norwegian Languages* (ib., 1900—); Falk and Torp, *Etymologisk Ordbog over det norske og det danske Sprog* (Christiania, 1901—).

NORWEGIAN LITERATURE. Norwegian literature is commonly considered to have begun with the separation of Norway from Denmark and the adoption of the Norwegian Constitution in 1814. The history of literature in Norway, however, reaches back a thousand years before this time to Bragi (c.800), the first skald who is historically known to have composed poetry in the Old Norse language. His principal poem is the *Ragnarsdrapa*, which owes its preservation, in common with much of the skaldic poetry of old Norway, to the Icelandic Snorri Sturluson, who incorporated it in his *Snorra Edda*.

There are a number of other poets in this and the succeeding period in Norway. After Bragi, the next in importance is Thjodolf of Hvin (c.855-930), whose principal poem is the *Haustlög*, also contained in the *Snorra Edda*. Besides this poetry by known authors, most of the anonymous poems of the *Elder Edda*, composed, it is thought, between 875 and 1025, are doubtless ultimately of Norwegian origin. To the Old Norse prose literature of the thirteenth century Norway also made important contributions. At the head of these works stands the *Thidrekasaga*, the story of Dietrich of Bern, written about 1250 by an unknown author, and extremely valuable as a storehouse of Germanic legend. The *Karlamagnussaga*, the story of Charlemagne, from this same century, and the narrative of Barlaam and Josaphat, *Barlaamsaga ok Josaphats*, are also by Norwegian authors. There are in addition to these several old law codes of value as historical material, and the unique dialogue between father and son, the *Konungsskuggsjá*, or *Speculum regale*, written in the reign of Sverri (1184-1202), and possibly by the King himself.

After the accession of Olaf, the son of Margaret, in 1380, Norwegian history for four centuries becomes Danish history. Under Danish rule Norway underwent complete national extinction and became but a province of Denmark. Even the Reformation failed to arouse her from this lethargy, and not until 1814, when Norway was ceded to Sweden by the Peace of Kiel, was there evidence of a national awakening. The literary history of this whole period in Norway coincides with the history of Danish literature, with which it is inseparably connected.

After the *Eufemiavisur* of about 1300, so called from the German queen of Haakon Magnusson, who had these paraphrases of German originals—*Iuccin, Duke Frederick of Normandy*, and *Flöre and Blancheflur*—made in the Norwegian language, there is no poetry until the period of learning subsequent to the Reformation. The first names at this time are Peder Dass (1647-1708), and Dorte Engelbrechtsdatter (1635-1716). The former, a Norwegian clergyman, wrote secular and religious poems which have made him to this day the favorite poet of the common people of Norway. The names that follow are those of Norwegians, but, as has been indicated, their place is in Danish and not in Norwegian literature. This is true of Ludvig Holberg (1684-1754), the father of the Danish drama; of Kristian Bjaumann Tullin (1728-1765), the poet of nature; of Johan Herman Wessel (1742-1785), the dramatist and poet, after Ewald, the second great name in the literature of the so-called 'Age of Enlightenment.'

An important factor in the development of a national Norwegian literature, as it was a matter of the greatest significance for Danish literature itself, was the formation of the *Norske Selskab*, or 'Norwegian Society,' in Copenhagen, in 1772. The intentions of the 'Society' were by no means to make propaganda for things Norwegian, as opposed to things Danish, but it is interesting to note that among its members are a number of poets who already exhibited a distinctly national feeling, which in choice of material and natural environment, and in inherent spirit, is not Danish, but Norwegian. The Norwegian poets of the period—Johan Nordal Brun (1745-1816), who wrote *Zarina*, the first Danish tragedy produced on the stage, and some of the most popular of the patriotic songs of Norway; Claus Fasting (1746-91), distinguished for his epigrams and criticism; Claus Frimann (1746-1829); Envold Falsen (1755-1808)—important as they were, have but little meaning at the present time. Edvard Storm (1749-94), who wrote ballads and songs in Norwegian peasant dialect, some of which are known throughout Norway to this day, was the only Norwegian writer of importance who held to the Danish side of this controversy, which so strikingly marks the last days of what may be called the Danish period in the literary history of Norway.

The actual history of Norwegian literature as a product in Norway of purely national conditions finds its beginning at the time of the separation of the Kingdom, in 1814, from Denmark. The 'Norwegian Society' presently changed the scene of its activity from Copenhagen to Christiania, but, although its traditions subsequently influenced popular taste, it never afterwards played an active part in literature. The first poetry which arose under these new conditions in Nor-

way was vehemently patriotic, and is called by the Norwegians themselves, from the day of the adoption of the Norwegian Constitution, *Syttendemai-Poesi*, the 'poetry of the 17th of May.' From among the numerous writers of the time three only, the so-called 'Trefoil,' may be mentioned as of especial significance, the lyric poet C. N. Schwach (1793-1860), the poet and dramatist H. A. Bjerregaard (1792-1842), and the novelist Mauritz Christoffer Hansen (1794-1842), whose best work is contained in his stories of peasant life. The first great poet of modern Norway, Henrik Wergeland (1808-45), became, as no other writer in Norway before him, the poet of the people. His first great success was achieved with a volume of lyrics, published in 1829. In 1830 appeared the long dramatic poem *Skabelsen, Mennesket og Messias*, "The Creation, Man, and Messiah," which drew out, in 1832, a pamphlet on "Henrik Wergeland's Poetic Art and Poetry," by Johan Sebastian Welhaven (1807-73), mercilessly attacking him for his sins of poetical commission. The controversy between the two poets, at first personal, subsequently assumed a wider character and presently divided the whole country into a national and a critical faction, the one the embodiment of the pro-Norwegian spirit of the 17th of May, the other the party of 'intelligence,' which looked to perpetuate what were in reality the hereditary tendencies of the 'Norwegian Society,' and to develop Norwegian culture harmoniously with that of Europe and especially that of Denmark. The contest was waged even more violently after the publication, in 1834, of Welhaven's polemical poem, a cycle of sonnets called *Norges Dæmring*, "Norway's Twilight," in which he vigorously censured the mistaken zeal of the ultra-national faction which Wergeland represented. The battle was ultimately to Welhaven and his followers, who had, in point of fact, revolutionized the æsthetic taste of Norway, and by the introduction of a sound criticism had determined the direction of its future literary development. Welhaven, between 1839 and 1859, published numerous lyrical poems. His critical prose is among the finest that Norway has ever produced. Wergeland's best work was done after the downfall of his fortunes and his popularity. His last poem, *Den engelske Lods*, "The English Pilot," is his greatest. Andreas Munch (1811-84), poet and dramatist, followed the direction pointed out by Welhaven. His first work of importance was the romance *Den Eensomme*, "The Solitary," published in 1846. His *Billeder fra Nord og Syd*, "Pictures from North and South," is considered one of the best prose works in the language.

Important for its bearing upon the development of a national literature in Norway was the attention that was presently paid to the wealth of native material contained in the old folk-tales and popular poetry, which has been preserved among the peasantry in great abundance, and under the peculiar conditions of the country has retained an essentially national character in manner and matter. The principal workers in this field at the beginning were the naturalist Peter Christian Asbjørnsen (1812-85) and Jørgen Moe (1813-82), who published conjointly, in 1841, *Norske Folke-Eventyr*, "Norwegian Popular Tales." Asbjørnsen published subsequently *Norske Huldre-Eventyr og Folke-*

sagen, which contains descriptions of his own of natural scenery and popular life. The recognition of this material pointed out a new direction in Norwegian literature and has had a profound effect upon latter-day writers.

The present period of Norwegian literature, and the period of its broadest development, begins with Björnson and Ibsen, the greatest writers that Norway has produced. With them literature enters upon a new era of productivity at home, and, what had not been the case before, of influence abroad; for the work of these two poets, even at an early time in their career, had carried the name and fame of Norwegian literature far beyond the confines of Norway and of Scandinavia, until now, and principally through them, it has become in the widest sense a living and forceful part of the literature of the world. (For details see BJÖRNSON; IBSEN.) Jonas Lie (b.1833), who plainly shows the influence of Björnson, has written sea-stories that have attained great popularity. His first novel, *Den Fremgaaende*, "The Visionary," appeared in 1870. His most successful and widely known novel is *Lodsen og hans Hustru*, "The Pilot and His Wife." He attains, however, a higher artistic result in his later novels of modern social life, *Livssalen*, "The Life Convict;" *Familien paa Gilje*, "The Family at Gilje;" *En Malström*, "A Maelstrom;" and others that have been written since 1883. Anna Magdalena Thoresen (1819-1903) also shows the influence of Björnson in her tales of nature and popular life. Her *Billeder fra Midnatssolens Land*, "Pictures from the Land of the Midnight Sun," is possibly her best work. The most original of the woman writers of Norway is Camilla Collet (1813-95), the sister of the poet Wergeland, whose most important novel is the realistic *Amtmandens Døttre*, "The Magistrate's Daughters." After Ibsen, Björnson, and Lie, the fourth great name in Norwegian literature of the present period is Alexander Kjelland (b.1849). Although his subjects are exclusively Scandinavian, he belongs, more than any of his countrymen, in his literary affinities less to Norway and more to Europe, whose general cultural tendencies he reflects. Kjelland's best work is contained in his short stories, the first volume of which appeared as *Novelletter* in 1879. His novels, the greatest of which is *Skipper Worse*, whose theme is the pietistic movement in Norway, are all novels of tendency.

Learned literature in Norway, although it has made important contributions to theology, to the physical sciences, and to philosophy, has found its highest and most characteristic expression in history. The founder of historical writing in Norway was Rudolf Keyser (1803-64), who wrote *Norges Historie*, "History of Norway;" *Den norske Kirkes Historie*, "History of the Church in Norway;" and other works on the history and antiquities and literature of his native country. His pupil, Peter Andreas Munch (1810-63), wrote, as his most important work, *Det norske Folks Historie*, "History of the Norwegian People." In collaboration with Keyser and with Carl Richard Unger (1817-97), he also did philological work of value in editing Old Norse texts. Johan Ernst Sars (b.1835), in his *Udsigt over den norske Historie*, "Review of Norwegian History," has produced one of the most notable prose works in the language.

In every field of literary activity modern Norway has unfolded, and is still unfolding, an extraordinary development, and this not only from the point of productivity, but in the quality and character of the work produced. The most distinct tendencies in Norwegian literature of the present period are the pessimistic-naturalistic direction originally pointed out by Ibsen, and the optimistic-realistic direction of Björnson and his followers, but there are writers who belong to neither school. Other writers than those mentioned have made a name outside of Norway, as well as at home. Among them are Aasmund Olafsson Vinje (1818-70), Kristoffer Janson (b.1841), Arne Garborg (b.1851), Amalie Skram (b.1857), and still more recently, Knut Hamsun, Gabriel Finne, and Vilhelm Krag.

Consult: Horn, *History of the Literature of the Scandinavian North*, trans. by Anderson (Chicago, 1884); Gosse, *Northern Studies* (London, n. d.); Schweitzer, *Geschichte der skandinavischen Literatur* (Gera, 1896); Jäger, *Illustreret Norsk Literaturhistorie* (Christiania, 1896); Halvorsen, *Norsk Forfatterlexikon, 1814-56* (ib., 1881).

NORWEGIAN MUSIC. See SCANDINAVIAN MUSIC.

NORWEGIUM (Neo-Lat., from ML. *Norwegia*, *Norvegia*, Norway). A name given by Dahl to a substance separated by him from the mineral *gersdorffite* found on the island of Ostveö, Norway. It is also said to exist in some specimens of unrefined lead. Its elementary character, however, has not been positively established.

NORWICH, nôr'rich or nôr'rij. Capital of Norfolk, England, and a county in itself, on the Wensum, immediately above its confluence with the Yare, 20 miles west of Yarmouth, and 98 miles north-northeast of London (Map: England, H 4). The town covers an area of about five miles in circumference, and is skirted on its north and east sides by the river. On the west and south it was surrounded by walls which have been removed to make room for the extension of the city. In the market-place and its vicinity are many large shops and good houses. The castle, finely situated on an elevation near the centre of the town, originally covered with its works an area of about 23 acres. The bridge over the ditch has one of the largest and most perfect Anglo-Norman arches in existence. The massive quadrangular Norman keep is now used as a museum. The cathedral, almost wholly Norman in plan, was founded in 1094 by Bishop Herbert Losinga. It is 411 feet long, 191 feet broad at the transepts, and is surmounted by a spire 315 feet high. Near the cathedral are a number of ancient and interesting structures now more or less in ruins, among which may be mentioned Saint Ethelbert's and the Erpingham Gate, the former in Decorated English, the latter in late Perpendicular, and both valuable and rich specimens of their styles. There are many places of worship, of which Saint Peter's Mancroft, a handsome cruciform edifice of the fifteenth century, with a remarkably fine peal of 12 bells, Saint Andrew's, Saint Clement's, Saint George's, Saint Giles's, Saint Michael's, and others are worthy of mention. The free grammar school was founded by Edward VI. The city possesses public recreation grounds covering an area of 200 acres,

and owns profitable real estate, markets, and a sewage farm. It also maintains a free public library, baths, Norwich Castle, gardens, and museum, and provides allotments and technical education. Three miles south of Norwich is Castor Saint Edmunds, which prior to the Roman Era was called Caister, and under the Romans received the name Venta Icenorum. It is the seat of extensive and flourishing industries, among which are the manufacture of mustard, starch, beer, shoes, foundry products, and agricultural implements, and dyeing and malting. It has also extensive nursery gardens. The city was one of the earliest manufacturing centres for textiles in England. This branch of industry, however, has declined. Its shipping trade, facilitated by a canal and river system of communication with the sea, is chiefly in agricultural products and coal. Annual fairs are held.

Norwich occupies a place in history from the time of the earliest Danish invasions. It had its origin in the castle erected as a stronghold by the East Anglian kings, and resorted to as a place of safety by the inhabitants of Venta Icenorum, who gave it the name of North-wic, or northern station or town. The East Anglian bishopric was removed hither in 1094. About 4000 Flemings settled at Norwich in the reign of Elizabeth, and gave great impetus to the prosperity of the town by the branches of manufacture which they introduced. The municipality dates from the reign of Henry II. Norwich returns two members to Parliament. Population, in 1851, 68,000; in 1891, 101,300; in 1901, 111,728. Consult: Jessopp, *Norwich* (London, 1884); Bayne, *History of Norwich* (Norwich, 1889); Quennell, *Norwich Cathedral, with a History of the See* (London, 1898).

NORWICH. A city and one of the county-seats of New London County, Conn., 90 miles southwest of Boston, Mass., and 50 miles southeast of the State capital, Hartford; on the Thames River, at the head of navigation, and on the Central Vermont and the New York, New Haven and Hartford railroads (Map: Connecticut, G 3). It is built among the hills, in the valleys of the Yantic and Shetucket, which here form the Thames; and has exceptional water power, a prominent feature in the development of its industrial interests. There is a large trade in lumber, coal, manufacturers' supplies, groceries, dry goods, etc. Norwich is one of the prominent manufacturing centres of the State, the chief articles produced being firearms, cotton, silk, and woolen fabrics, stoves and furniture, rolled and cast iron, leather and belting, and a great variety of machinery. The city is noted for its picturesque beauty, and possesses many fine residences, several public parks, and streets shaded with beautiful elms and maples. It has a Free Academy, which was built and endowed by private subscriptions from wealthy citizens. A fine new building, including an art museum, and costing nearly \$200,000, the gift of W. A. Slater, has been erected for the academy. Other institutions include the William W. Backus Hospital, representing an endowment of over \$500,000, the Otis Free Library, having 24,000 volumes with an annual circulation of nearly 100,000, and the Y. M. C. A. The courthouse and Saint Patrick's Roman Catholic Church are notable structures. The Indian bury-

ing ground where Uncas is buried is of historic interest. So is the spot where Miantonomoh fell. The government, under a revised charter of 1877, is vested in a mayor, chosen every two years, and a bicameral council, elected one-half each year on a general ticket, which controls elections of all administrative officials, with the exception of one water commissioner, who is annually chosen by popular vote. The water-works are owned and operated by the municipality. Population, in 1890, 16,156; in 1900, 17,251. Settled in 1659 by a company from Saybrook, Norwich (named from Norwich, England) was chartered as a city in 1784 and rechartered in 1871. It was the home of Samuel, Jabez, and Jedediah Huntington, Christopher Lessingwell, and Nathaniel Niles—all prominent during the Revolutionary period. Consult: Gilman, *Historical Discourse Delivered at Norwich in 1859* (Boston, 1859); and Caulkins, *History of Norwich* (Hartford, 1866).

NORWICH. A village and the county-seat of Chenango County, N. Y., 42 miles northeast of Binghamton; on the Chenango River, and on the New York, Ontario and Western and the Delaware, Lackawanna and Western railroads (Map: New York, E 3). It has a village hospital and a public library with 12,000 volumes; and among its fine structures are the municipal building, county jail, and the Lackawanna depot. Norwich is of considerable importance as an industrial centre, having railroad shops, a blast furnace, stone quarries, and manufactories of drugs and medicines, perfumes, furniture, gloves, silk ribbons, hammers, etc. There are also a number of creameries, the village being surrounded by a productive dairying and farming section. Population, in 1890, 5212; in 1900, 5766.

NORWICH, GEORGE GORING, Earl of (c.1583-1663). An English Royalist. He was made clerk of the Council of Wales, and among other important monopolies a large share of the tobacco grant was given to him (1636). After Charles I. had become a prisoner in the hands of Parliament, Goring headed an abortive Royalist rising in Kent. The Commons voted that he should be banished, but rescinded this vote, and a special court sentenced him to death, but he was not executed, either because the Speaker, Lenthall, who gave the casting vote, had received favor from Goring, or on the pleading of the Dutch and Spanish ambassadors. From 1652 to the Restoration he lived on the Continent, and Charles II. granted him a pension of £2000 and reappointed him to the Privy Council.

NORWICH CRESTED CANARY-BIRD. See CANARY.

NORWICH UNIVERSITY. An institution of learning at Norwich, Vt., founded at Middletown, Conn., in 1819, by Capt. Alden Partridge, and known as the American Literary, Scientific, and Military College. In 1829 it was removed to Norwich, Vt., and was incorporated under its present name in 1834. In 1898 it was officially recognized as the military college of the State of Vermont. It has long been known as an engineering and scientific school, and many of its graduates have served in the various wars. In 1903 the institution had 9 instructors and 70 students. Dewey Hall, a memorial building erected in honor of Admiral George Dewey, a former student, was opened in 1902.

NORWOOD. An electoral district and favorite residential section in the south of the metropolitan borough of Lambeth, London, England, eight miles south of Saint Paul's Cathedral (Map: London, F 7). It was formerly a suburban village noted for Beulah Spa, a popular pleasure ground picturesquely laid out around a mineral spring, now built over, and represented by the Beulah Spa hotel. Norwood is divided into Upper, Lower, and South Norwood. It adjoins the grounds of the Crystal Palace. Norwood Junction is an important suburban railway station. Population, in 1891, 28,248; in 1901, 35,887.

NORWOOD. A town in Norfolk County, Mass., 14 miles southwest of Boston; on the New York, New Haven and Hartford Railroad (Map: Massachusetts, E 3). It has the Morrill Memorial Library with 7000 volumes; and among its industrial plants are railroad repair shops, large tanneries, an iron foundry, manufacturing of glue and ink, and an extensive printing establishment. Norwood was incorporated in 1872; the government is administered through town meetings. The water-works are owned by the municipality. Population, in 1890, 3733; in 1900, 5480.

NORWOOD. A city in Hamilton County, Ohio, adjoining Cincinnati on the northeast; on the Baltimore and Ohio Southwestern, the Norfolk and Western, and the Cincinnati, Lebanon and Northern railroads (Map: Ohio, A 7). It is well laid out on a site of great natural beauty, and is a favorite residential suburb of Cincinnati. There are several important manufacturing establishments whose factory buildings are noteworthy for their architecture and for their splendid equipment. Among these plants are the lithographing and playing-card works, the elastic-bookcase factory, and the electrical manufacturing concern. Pianos, laundry machinery, washing-machines, machine tools and iron-working machinery, iron castings, wood-mill-work, and paper bags and specialties also are manufactured. Settled about 1790, Norwood was incorporated as a village under the general laws of 1888 and became a city in 1902. The water-works and electric light plant are owned and operated by the municipality. Population, in 1900, 6480.

NOSAIRIANS. A Mohammedan sect. See ANSARIES.

NOSE (AS. *nosu*, *nasu*, OHG. *nasa*, Ger. *Nase*, nose; connected with Lat. *nasus*, Lith. *nosis*, OChurch Slav. *nosŭ*, Skt. *nas*, nose). The nose is not only the organ of smell, but is likewise part of the apparatus of respiration and voice. Considered anatomically, it may be divided into an external part—the projecting portion, to which the term nose is popularly restricted; and an internal part, consisting of two chief cavities, the *nasal fossæ*, separated from one another by a vertical septum, and subdivided by spongy or turbinated cells, or *sinuses* in the ethmoid, sphenoid, frontal, and superior maxillary bones communicating by narrow apertures.

The external portion of this organ may be described as a triangular pyramid which projects from the centre of the face, immediately above the upper lip. Its summit or root is connected with the forehead by means of a narrow bridge, formed on either side by the nasal

bone and the nasal process of the superior maxillary bone. Its lower part presents two horizontal elliptical openings, the nostrils, which overhang the mouth, and are separated from one another by a vertical septum. The margins of the nostrils are usually provided with a number of stiff hairs (*vibrissæ*), which project across the openings, and serve to arrest the passage of foreign substances which might be drawn up with air intended for respiration. The skeleton or framework of the nose is partly composed of the bones forming the top and sides of the bridge and partly of cartilages, there being on either side an upper lateral and a lower lateral cartilage, to the latter of which are attached three or four small cartilaginous plates, termed *sesamoid cartilages*; there is also the cartilage of the septum which separates the nostrils, and is in association posteriorly with the perpendicular plate of the ethmoid, and with the vomer, forming a complete partition between the right and left nasal fossæ. It is the lower lateral, termed by some writers the *alar cartilage*, which by its flexibility and curved shape forms the dilatable chamber just within the nostril. The nasal cartilages are capable of being slightly moved, and the nostrils of being dilated or contracted by various small muscles, which it is unnecessary to describe.

The *nasal fossæ*, which constitute the internal part of the nose, are lofty, and of considerable depth. They open in front by the nostrils, and behind they terminate by a vertical slit on either side in the upper part of the pharynx, above the soft palate, and near the orifices of the Eustachian tubes, which proceed to the tympanic cavity of the ear.

The mucous membrane lining the nose and its cavities is called *pituitary*, from the nature of its secretion, or *Schneiderian*, from Schneider, the first anatomist who showed that the secretion proceeded from the mucous membrane, and not, as was previously imagined, from the brain; it is continuous with the skin of the face at the nostrils, with the mucous covering of the eye through the lachrymal duct (see EYE), and with that of the pharynx and middle ear posteriorly. On the septum and spongy bones bounding the direct passage from the nostrils to the throat, the lining membrane is comparatively thick, partly in consequence of a multitude of glands being disseminated beneath it, and opening upon it, but chiefly, perhaps, from the presence of ample and capacious submucous plexuses of both arteries and veins, of which the latter are by far the more large and tortuous. These plexuses, lying as they do in a region exposed more than any other to external cooling influences, appear to be designed to promote the warmth of the part, and to elevate the temperature of the air on its passage to the lungs. In the vicinity of the nostrils, the mucous membrane exhibits papillæ and a scaly epithelium, like the corresponding parts of the skin. In the sinuses, and in all the lower region of the nose, the epithelium is of extreme delicacy, being of the columnar variety, and clothed with cilia. In the upper third of the nose—which, as the proper seat of the sense of smell, may be termed the *olfactory region*—the epithelium changes from ciliated to columnar, and assumes a more or less rich sienna-brown tint, and increases remarkably in thickness, so that it forms an opaque soft pulp upon the surface. It is composed of an aggrega-

tion of nucleated particles, of nearly uniform appearance throughout, except that the lowest ones are of a darker color than the rest, from their containing a brown pigment in their interior. The olfactory region abounds in glands, apparently identical with sweat glands, which dip down in the recesses of the submucous tissue among the ramifications of the olfactory nerve. They are named Bowman's glands.

The nerves of the nose are the first pair or olfactory, which are specially connected with the sense of smell; branches of the fifth pair, which confer ordinary sensibility on its skin and mucous membrane; and motor filaments, from the facial nerves to the nasal muscles. The olfactory nerve on each side is connected with the inferior surface of the brain by an external, a middle, and an internal root, which unite and form a flat band (or, more correctly, a prism), which, on reaching the cribriform plate of the ethmoid bone, expands into an oblong mass of grayish-white substance, the olfactory bulb. From the lower surface of this bulb are given off the olfactory filaments, fifteen or twenty in number, which pass through the cribriform foramina, and are distributed to the mucous membrane of the olfactory region. The branches of the fifth pair (or trifacial) given to the nose are the nasal nerve (derived from the ophthalmic division), which supplies the skin and mucous membrane in the vicinity of the nostrils, and the nasopalatine nerve (derived from Meckel's ganglion, which is connected with the superior maxillary division), which supplies the mucous membrane on the spongy bones and on the septum. Whatever may be the nature of the odorous matter, it is necessary that it should be transmitted by a respiratory current through the nostrils to the true olfactory region, and dissolved or suspended in the fluid with which the olfactory membrane is normally covered. The proper condition of this fluid is one of the essential conditions of the perception of odors. If the membrane is too dry, or if there is an inordinate excretion of fluid from its surface (both of which conditions occur in catarrh or cold in the head), smell is impaired or lost, in consequence of the necessary penetration of the stimulating odor to the nervous filaments being prevented.

It has been observed that when the nostrils are filled with rose water or eau de Cologne, no odor is perceived, and simply filling the nostrils with distilled water suspends for a time the sense of smell. If, on the other hand, the scent be dissolved in 'normal saline solution,' which closely resembles the natural secretion, the odor is perceived.

The sense of taste is often confused with that of smell. We speak of 'tasting' an odoriferous substance, such as an onion, or a savory dish, or a wine, when in reality we perceive it through the olfactory nerves. This is proved by the fact that the taste for these substances is lost when the smell becomes impaired.

The acuteness of the sense of smell is far greater in many of the lower animals (dogs, for example) than in man, and they employ it in guiding them to their food, in warning them of approaching danger, and for other purposes. To civilized men the utility of this sense is comparatively small; but it is occasionally much increased when other senses are deficient. Among many savage tribes the sense is almost as acute

as in many of the lower mammals. See **NOSTRILS**; **SMELL**, **SENSE OF**.

NOSE, COMPARATIVE ANATOMY OF THE. In the ordinary usage of the word, no animals but mammals have noses; but in the widest sense of an organ of smell, the nose is found in all vertebrates and in some lower animals. Owing to the close relation that exists between the sense of taste and the sense of smell, it is impossible to determine beyond question the function of certain organs among the lower animals, but in several cases evidence has been produced to show that ciliated pits or patches have a function similar to, if not identical with, that of smell in vertebrates. Thus as low as the ctenophores and some medusæ, there occur special areas covered with cilia, to which the sense of taste or smell has been assigned. In many flatworms, in nemerteans, and in many true worms, ciliated grooves, pits, and prominences occur, which are certainly sensory and probably olfactory. Whether organs of smell occur among crustaceans and insects is not beyond doubt, but short processes, open at the point and with special nerve connections located on the antennæ, are regarded as organs of smell. There is much evidence in support of the belief that insects smell, and the antennæ are almost certainly the seat of whatever such sense they possess. Among echinoderms there are isolated cases of organs which may be olfactory, notably the sensory cups on the inner surface of the tentacles in Synapta. Among the mollusks, the patches of densely ciliated epithelium in the mantle-cavity, known as 'osphradia,' are very probably organs of smell. In Amphioxus and the cyclostomes there is a single pit or sac, lined with an epithelium consisting of ciliated and sensory (olfactory) cells. In the elasmobranch fishes the olfactory sacs lie on the under surface of the snout, but in all the vertebrates they are situated somewhere between the eyes and the end of the snout, on the upper surface.

In all animals above cyclostomes the nasal sacs are inclosed in cartilaginous or bony cases, forming a prominent part of the skull. The nostrils of bony fishes are divided into two parts by a septum, which is sometimes so wide as to give rise to four wholly distinct nostrils. The mucous membrane lining the nasal sacs of fishes is raised up into a number of complex radial folds, thus increasing the sensory surface. The dipnoid fishes differ from the other true fishes in that the nasal sacs communicate with the cavity of the mouth as well as with the exterior, just as they do in all higher vertebrates. In amphibians we find for the first time turbinal bones which serve to increase the sensory surface of the nasal cavities. There are also glands present in the sensory epithelium, serving to keep it moist. Moreover, there is a canal connecting the anterior angle of the orbit with the nasal cavity, known as the naso-lachrymal duct, which is of use in conveying surplus lachrymal secretion (tears) into the nasal cavity and thence into the pharynx through the posterior nares. This duct is present in all the higher vertebrates also. In reptiles the olfactory organ is rather simple, especially in lizards and snakes; there is only a single turbinal, though crocodiles have on the outer side of the cavity a second prominence called the pseudo-turbinal. Birds also have only

a single true turbinal, but two pseudo-turbinals are present, and the true turbinal is often more or less rolled on itself. In mammals the nasal cavity is large, and the turbinals are extended to form a spongy labyrinth, the projections of which, known as olfactory scrolls, are normally five in number, though they sometimes become more or less fused in pairs. Thus there is sometimes one, but usually two, superior or upper turbinals, and there is usually one, but sometimes two, middle turbinals. The so-called superior and middle turbinals of man are somewhat different in their origin, but the inferior turbinal is derived from and corresponds to the single turbinal of reptiles and birds.

The external nose of mammals is formed by an extension outward of the nasal bones, supported and strengthened by a cartilaginous outgrowth of the ethmoid. The size and appearance of the nose depends chiefly upon its function, for it is often elongated for some special purpose.

NOSE APE. See PROBOSCIS MONKEY.

NOSEBLEED. See EPISTAXIS.

NOS/ELITE (named in honor of K. W. Nose, a German chemist), or **NOSEAN**. A mineral made up of the sulphates and silicates of sodium and aluminum. It crystallizes in the isometric system, is translucent, and has a gray, blue, or brown color. It occurs in certain igneous rocks such as phonolite and nepheline syenite. It is found chiefly in Germany, and on the Canary and Cape Verde Islands.

NOSOL'OGY (from Gk. νόσος, *nosos*, disease + λόγος, *-logia*, account, from λέγειν, *legein*, to say). The branch of medical science which treats of the classification and nomenclature of diseases. The old idea was that diseases could be divided into classes, orders, genera, and species. Many systems have been proposed, used, and abandoned. Some of these have been based upon theories of causation, others upon the symptoms manifested, the part or system of the body affected, or the pathological effects observed.

For statistical purposes the system devised by Dr. William Farr, a distinguished medical statistician of London, has been more recently used in Great Britain and America, its most complete development being the nomenclature of diseases issued by the Royal College of Physicians and Surgeons in 1884, the latest revision being in 1894.

This system divides all diseases into two great classes, namely, general and local diseases. The first class includes all those maladies which affect the whole body, or which may affect several parts at one time, and is divided into four groups. The first group includes diseases due to morbid poisons or specific infections, such as scarlet fever, measles, etc. The second group embraces diseases which are dependent upon external agencies other than the specific infections, as parasites, chemical poisons, climate, etc. The third group includes the so-called developmental diseases, such as malformations and old age. The fourth group embraces a number of unclassified affections, as rheumatism, gout, leprosy, cretinism, etc. The second great class, that of local diseases, includes those peculiar to the various systems of the body, such as the nervous system, the circulatory system, etc.

It is evident that no single scheme of classification will answer every purpose. It is equally

obvious that every system must be subject to constant modification by the advances in medical knowledge. This is notably true of the recent discoveries in bacteriology. Among writers of the present day the tendency is toward a very simple classification, and the following arrangement of diseases may be accepted as the one which, with modifications, is in general use:

(1) *Specific infectious diseases*, represented by the exanthemata, syphilis, tuberculosis, and malaria.

(2) *Constitutional diseases*, for example, gout, rheumatism, and diabetes.

(3) *Diseases of the digestive system*, e.g. gastritis, jaundice, and enteritis.

(4) *Diseases of the respiratory system*, as nasal catarrh, laryngitis, bronchitis, and pneumonia.

(5) *Diseases of the circulatory system*, as endocarditis, aneurism, and arterio-sclerosis.

(6) *Diseases of the blood and ductless glands*, as anæmia, leucocythæmia, Addison's disease, and goitre.

(7) *Diseases of the kidneys*, as Bright's disease, uræmia, and pyelitis.

(8) *Diseases of the nervous system* (including the brain, spinal cord, and nerves), as epilepsy, chorea, myelitis, and sciatica.

(9) *Diseases of the muscles*, the muscular atrophies and dystrophies.

(10) *The intoxications*: alcoholism, the drug habits, lead and arsenic poisoning.

(11) *Diseases due to animal parasites*: tape-worm, trichiniasis, and pediculosis.

To these must be added the diseases peculiar to special organs, the eye, ear, skin, and generative organs.

NOSSI-BÉ, nôs'sé'bâ'. An island on the northwest coast of Madagascar, from which it is separated by a narrow channel. It has an area of 111 square miles, is volcanic and mountainous, and well wooded. Parts of it are well cultivated, and produce sugar-cane, coffee, rice, and vanilla. The chief town is Hellville, on the south coast, an important port of call with shipping amounting to more than half a million tons annually. The population of the island in 1901 was 9500, chiefly Sakalavas of Madagascar. The island was ceded to France by Madagascar in 1840, and in 1896, when the latter became a French possession, Nossi-Bé was placed under the authority of the Governor-General of Madagascar.

NOSTAL'GIA (Neo-Lat., from Gk. νοσταλγία, from νοσταλγῆν, *nostalgēin*, to be homesick, from νόστος, *nostos*, return + ἄλγος, *algos*, grief, distress). A feeling of melancholy, caused by grief on account of absence from one's home or country, of which the English equivalent is *homesickness*. Nostalgia represents a combination of psychic and bodily disturbances, and must be regarded as a disease. It may lead to melancholia and even death. It is more apt to affect persons whose absence from home is forced than those whose absence is voluntary.

NOS'TRADA'MUS (MICHEL DE NOTREDAME) (1503-66). A French astrologer of Jewish descent, born at Saint-Remy in Provence. He entered the College of Avignon, and after completing his course there went to Montpellier, where he studied medicine. At this time a terrible pestilence desolated the southern part of France, and during the four years that it continued

(1524-29) Nostradamus went from one city to another giving his aid to the stricken. After the pestilence had subsided he returned to Montpellier to finish his studies. He traveled for a number of years, and in 1544 settled at Salon. The next year a new epidemic of the pest swept over the country and he accepted the formal invitation of the authorities to visit Aix and Lyons, where he treated his patients with a secret remedy which worked marvelous cures. This gave him a great reputation, and a few years later his claim that he had the power of reading the future attracted widespread attention and became the subject of much controversy. In 1550 he began to write his famous *Centuries*, mystic prophecies in rhymed quatrains, the first series of which was published at Lyons in 1555. Catharine de' Medici invited their author to Court, where he reached the height of his fame. Soon afterwards he returned to Salon. Besides his *Centuries*, Nostradamus wrote: *Traité des fardements* (1552); *Le remède très utile contre la peste et toutes fièvres pestilentiellles* (1561); and *Opusculum de plusieurs exquisés receptes* (1572); and from 1550 to his death published an *Almanack* that had a wide circulation. Consult: Jaubert, *Vie de M. Nostradamus* (Amsterdam, 1656); Guynaud, *La Concordance des prophéties de Nostradamus avec l'histoire* (Paris, 1693); and Bareste, *Nostradamus* (ib., 1842).

NOSTRILS (AS. *nosþyrl, næs þyrl*, from *nosu, nasu*, nose + *þyrl, pyrel*, hole, from *pyrel*, OHG. *durihhil, durchil*, perforated, from AS. *urh*, OHG. *durnh*, Ger. *durch*, through), DISEASES OF THE. This classification is no longer used, and diseases formerly appearing under this head will be found under their respective titles. (See CATARRH; OZENA; EPISTAXIS; RHINITIS; POLYPUS; NOSE.) Foreign bodies are often inserted into the nostrils by children, and become impacted. They may usually be extracted by a small scoop, a bent probe, or forceps. If they cannot be removed by these means, they must be pushed back into the throat through the posterior nares. Children are occasionally born with imperforate nostrils. This congenital malformation may, however, usually be remedied by surgical means.

NOSTRUM (Lat., our own). A term applied to patent or quack medicines whose ingredients are kept secret by the inventor for the purpose of controlling the manufacture of them; hence the term has come to be used in a derogatory sense.

NOTA, ALBERTO, Baron (1775-1847). An Italian dramatist, born at Turin. He was educated for the bar, practiced law, and finally obtained the position of secretary to the future King Charles Albert. He afterwards was appointed administrator of the district of Bobbio (1820), and of San Remo (1823), and still later that of general intendant at Casale and Cuneo. He wrote comedies in imitation of Molière and Goldoni. His thirty or more plays have little originality. The best of them are: *La fiera*, *Rivoluzioni in amore*, *Il benefattore*, *La pace domestica*, *L'irrequieto*, *Il progettista*, *La vedova in solitudine*, and *L'amor timido*. His works were very popular, and went through ten editions between 1816 and 1829.

NOTABLES (OF., Fr. *notable*, from Lat. *notabilis*, noteworthy, from *notare*, to note, mark, from *nota*, mark, from *noscere*, to know; ulti-

mately connected with Eng. *know*). The name given in France before the Revolution of 1789 to persons of noble birth, social distinction, or political importance, who were summoned to meet in the Assembly of Notables. The States-General (q.v.) was too great a check on the despotism of the monarchy, and beginning with Charles V., the French kings adopted the expedient of calling in their stead Assemblies of Notables, composed of those who were likely to be in favor of the projects of the Crown. Their whole proceedings were guided by the King or his ministers. They showed a particular readiness in granting subsidies, from which they themselves, as belonging to the privileged classes, were exempt. An Assembly of Notables, convened in Paris by Richelieu in 1626, and presided over by Gaston d'Orléans, brother of Louis XIII., consisted of only 35 members. In 1678, when the state of the finances threatened the country with bankruptcy, Louis XVI., at the instigation of Calonne (q.v.), had recourse to an Assembly of Notables, which assembled on February 22, 1787. In spite of their readiness to accept certain reforms in the administrative and financial system, they showed themselves jealous of their ancient privileges and were inclined to shift the responsibility for the difficult state of affairs on the Government. Some of the Notables even advocated the summoning of the States-General in the expectation, probably, that the latter would devise some way of relieving the distressed conditions of the country without interfering with the prerogatives of the privileged orders. On May 25th the Notables were dismissed. Necker, who was later placed at the head of affairs, assembled the Notables for the last time on November 6, 1788, to consult with them concerning the form in which the States-General should be convened. The Notables declared against every innovation which they had sanctioned the year previous, and were especially opposed to the double representation of the Third Estate. This opposition compelled the Court to resort to half measures which helped to prepare the way for the Revolution. The Notables were finally dissolved December 12, 1788. See FRANCE; FRENCH REVOLUTION.

NOTARY PUBLIC (Lat. *Notarius*, one who writes, from *nota*, mark). An officer duly authorized to attest or certify legal instruments, and to perform certain other official acts, usually of a ministerial character. The office is created by statute, and the functions of a notary public vary in different jurisdictions. Notaries were known in England before the Conquest, and in all the countries of Europe at an even earlier time. They were appointed by the popes at Rome, and acted as officials in the ecclesiastical courts, in addition to exercising certain secular powers. In England the authority to appoint notaries was finally delegated by the Roman See to the Archbishop of Canterbury, and after the Reformation a statute was enacted (25 Hen. VIII., c. 21, § 4) confirming the right in the Archbishop as a high prelate in the English Church.

With the development of the commerce of England and the 'law merchant' the office of notary public increased in importance very rapidly. Notaries were employed to protest commercial paper, to witness certain papers under the maritime law, and were gradually vested with the

powers which they exercise generally to-day. In the United States, notaries are appointed by the Governors of the States; and the authority of a notary to act, therefore, does not extend beyond the limits of the particular territory in a State for which he is appointed. This territory is usually a county, and he cannot perform any acts in another county unless he complies with certain prescribed formalities, such as filing a certificate and paying an additional fee. In many States a notary may thus extend his official powers to all the counties of his State, but he cannot exercise his powers except for the county in which he is personally present at any given time.

In general, any male citizen is eligible to appointment as a notary. In most States, in order to qualify, a notary must take an oath of office, and in some he must give a bond to secure the faithful performance of the duties of his office; and a breach of his official duties is punished criminally. A notary's seal must be affixed to many legal instruments authenticated before him. The statutes of the different States vary as to the necessity of a notarial seal.

As notaries are State officers, their acts in matters in which the Federal Government is involved are not valid except in cases where their authority is specially recognized by the acts of Congress. These Federal statutes provide that a notary may administer all oaths and take all acknowledgments which a justice of the peace may do, and the authority of notaries to take depositions, affidavits, etc., for use in the United States courts is also expressly authorized. The notarial seal must be affixed to all documents intended to be used in the courts or any department of the Federal Government. The United States statutes in this regard are very strictly construed.

The general powers of a notary as a State officer are as follows: to take acknowledgment of legal instruments, such as deeds, mortgages, bills of sale, etc.; to take affidavits; to take depositions (q.v.); to protest commercial paper; and, in some States, to exercise the powers of a justice of the peace.

A notary may be disqualified to act by reason of his financial interest in a matter brought before him. Thus where a notary is a grantee in a deed, he cannot take the acknowledgment of the grantor, or person conveying the property. Relationship to one of the parties to a deed or other legal instrument will not ordinarily disqualify a notary from taking the acknowledgment of that party, as it is a ministerial act; but where the notary is commissioned to take depositions, it is considered more in the nature of a judicial act, and if he is a near relative to one of the parties to the suit, in most jurisdictions he is disqualified for that reason. The fees of notaries are fixed by statute in each State, and generally it is a misdemeanor for a notary to demand and receive more than the statutory fee for an act. By statute in most jurisdictions certain other officials, such as judges, justices of the peace, mayors of cities, etc., are vested with notarial powers. See EVIDENCE; ACKNOWLEDGMENTS; AFFIDAVITS.

NOTATION (Lat. *notatio*, designation, from *notare*, to mark, from *nota*, mark). In arithmetic, a term applied to a system of designating numbers by figures, or *notæ*, as they were often called in the Middle Ages. The chief number

notations of the early races, before the perfecting of the position system, conform to one of three systems, the repeating, the alphabetic, and the initial letter systems, although these are not mutually exclusive. By the repeating system is meant the plan of repeating a chosen symbol, especially for 1, 10, 100—on the additive principle, so as to represent other numbers twice, or three or more times as great. Thus, in the Egyptian system, the symbol \cap stands for 10, and the combination $\cap\cap\cap$ stands for 30. By the alphabetic system is meant the plan of representing numbers by letters in alphabetic order. And by the initial-letter system is meant the plan of representing numbers by the initial letters of the corresponding language forms. These tendencies are exhibited in the following tables:

REPEATING SYSTEMS.

Egyptian	I, \cap , @, ---
Babylonian	Y, \angle , Y, ---
Early Greek	I, Δ , H, M, ---
Early Roman	I, X, \ominus , \oplus , ---
Late Roman	I, X, C, M, ---

ALPHABET AND INITIAL-LETTER SYSTEMS.

Hebrew	א, ב, ג, ד, ---
Hindu	—, =, ≡, and the initial letters.
Late Greek	α, β, γ, ---

The Hebrew system was used by Hebrew writers as late as the twelfth century, in connection with zero, after contact with the Arabic system.

Among the Egyptians numbers were written running from right to left in the hieratic writing, with varying direction in the hieroglyphics. In the latter the numbers were either written out in words or represented by symbols for each unit, repeated as often as necessary. In the hieratic symbols the figure for the unit of higher order stands to the right of the one of lower order. The Phœnician system contained twenty-two characters, derived from the symbols of the Egyptians.

The Babylonian cuneiform inscriptions proceed from left to right, which must be looked upon as exceptional in a Semitic language. The units of higher order stand on the left of those of lower order. The symbols used in writing are chiefly a horizontal wedge, a vertical wedge, and a combination of the two at an angle. The symbols were written beside one another, or, for ease of reading and to save space, over one another. The symbols for 1, 4, 10, 100, 14, 400, respectively, are as follows:



For numbers exceeding 100 there was also used, besides the mere juxtaposition, a multiplicative principle; the symbol representing the number of hundreds was placed at the left of the symbol for hundreds, as in the case of 400, already shown. The Babylonians probably had no symbol for zero.

The oldest Greek numerals (aside from the written words) were, in general, the initial letters of the fundamental numbers. I for 1, II for 5 (*πέντε*), Δ for 10 (*δέκα*), and these were repeated as often as necessary. These numerals are described by the Byzantine grammarian Herodianus (c.200 A.D.), and hence are spoken of

SCALES OF NOTATION. The explanation of the fact that 10 is almost everywhere found as the base of the system of counting is seen in the common use of the fingers in elementary calculations. In all ancient civilizations finger reckoning was known, and even to-day it is carried on to a remarkable extent among savage peoples. It is evident that any integer may be made the base of a scale of notation, the number of symbols being the same as the number of units in the base. Some languages contain words belonging fundamentally to the scales of 5 and 20, without these systems having been completely elaborated. In the Roman and Babylonian systems 12 and 60 appear as bases. The New Zealanders have a scale of 11, their language possessing words for the first few powers of 11, and consequently 12 is represented as 11 and 1, 13 as 11 and 2, 22 as two 11's, and so on. (See NUMERATION.) What has been said concerning the development of the number symbols illustrates the power of a well-arranged number system and its necessity for progress in mathematical science. For reasons already stated, the world has generally adopted the decimal notation. In this system each place has a value ten-fold that of the place at its right, the general form of the integers being $10^a \cdot m + 10^{a-1} \cdot l + \dots + 10^3 \cdot d + 10^2 \cdot c + 10b + a$, and that of the fractions being $10^{-1} \cdot a' + 10^{-2} \cdot b' + 10^{-3} \cdot c' + \dots + 10^{-n} \cdot m'$. The decimal fraction was a relatively late development of the system. During the Middle Ages the sexagesimal fractions (see FRACTIONS), inherited from the Babylonians through the later Greeks, had been generally used by physicists and astronomers, and had therefore received the names 'physical' and 'astronomical fractions.' We have the remains of the system in our degrees, minutes, and seconds. The mediæval fractions were not limited to seconds, however, but extended to 'thirds,' 'fourths,' and so on. For example, $12^\circ 5' 3'' 16''' 18''''$ means in modern

symbols $12 + \frac{5}{60} + \frac{3}{60^2} + \frac{16}{60^3} + \frac{18}{60^4}$. To distinguish the fractions of trade from the 'fractiones astronomicae,' the former were called 'fractiones vulgares,' from which come the English 'vulgar fractions' and the American 'common fractions.'








The constant advance of science, calling for larger numbers and more elaborate fractions, finally demanded some improvement on the sexagesimal system. As early as the latter part of the fifteenth century some indications of the approach of the decimal fraction are seen. During the sixteenth century several efforts were made in the same direction, notably that by Stevin (q.v.). But it was the advent of logarithms at the opening of the seventeenth century that made the necessity apparent and gave to decimal fractions a general recognition in the scientific world. It was, however, fully a century later that they began to be recognized in business; the establishment of the metric system (q.v.) and the decimal coinages of the various countries finally compelled their general use. A comparison of the three systems is seen in the following representation of one-tenth: $\frac{1}{10}$ (common), 0.1 (decimal), $\frac{6}{60}$ (sexagesimal).



Index notation may also be mentioned as a recent example of the power of symbolism. Astronomers and physicists, having to employ both exceedingly large and small numbers in calcula-

tion, find it advantageous in approximations to introduce powers of ten. Thus 284,000,000,000 may be expressed by $284 \cdot 10^9$, and 0.00000000035 by $3.5 \cdot 10^{-10}$. If these numbers are to be multiplied, the process is simply $284:3.5 \cdot 10^{9-10}$ or $994 \cdot 10^{-1} = 99.4$.

Consult: Cantor, *Vorlesungen über Geschichte der Mathematik* (Leipzig, 1880; 2d ed. 1894); Unger, *Die Methodik der praktischen Arithmetik* (ib., 1888); Günther, *Geschichte des mathematischen Unterrichts im deutschen Mittelalter bis zum Jahr 1525* (Berlin, 1887); Woepeke, *Sur l'introduction de l'arithmétique indienne en Occident* (Rome, 1859); "Mémoires sur la propagation des chiffres indiens," in *Journal Asiatique* (VIème série, part i., Paris, 1863); Friedlein, *Die Zahlzeichen und das elementare Rechnen der Griechen und Römer* (Erlangen, 1869); Pihan, *Exposé des signes de numération usités chez les peuples orientaux* (Paris, 1860). For the history and bibliography, consult: Treutlein, *Geschichte unserer Zahlzeichen* (Karlsruhe, 1875); and Cantor, *Geschichte der Mathematik* (Leipzig, 2 editions, 1880-98), both of which give extensive tables showing the development of the forms of the numerals.

NOTATION, MUSICAL. See MUSICAL NOTATION.

NOTE (OF, Fr. *note*, from Lat. *nota*, mark). In music, a character which by the degree it occupies on the staff represents a sound, and by its form the period of time or duration of that sound. The notes commonly in use in modern music are the semibreve, ; minim, ; crotchet, ; quaver, ; semiquaver, ; demisemiquaver, ; and semi-demisemiquaver, . Taking the

semibreve as a unit, the minim is $\frac{1}{2}$ its duration, the crotchet $\frac{1}{4}$, the quaver $\frac{1}{8}$, the semiquaver $\frac{1}{16}$, the demisemiquaver $\frac{1}{32}$, and the semi-demisemiquaver $\frac{1}{64}$. Notes of greater length than the semibreve were formerly in use—viz. the breve, twice the duration of the semibreve; the long, four times; and the large, eight times the semibreve. Of these, the breve,  or , is still sometimes met with in ecclesiastical music. According to their numerical proportions, it is customary to speak of notes as whole, half, quarter, eighth, sixteenth, etc. See LEADING NOTE; MUSICAL NOTATION.

NOTE (in Law). See PROMISSORY NOTE.

NOTHING TO WEAR. A humorous poem by William Allen Butler (q.v.), which appeared anonymously in *Harper's Weekly* in 1857. The heroine is Miss Flora McFlimsey. Many editions of this popular satire on dress have been issued.

NOTHNAGEL, nôt'nä'gel, HERMANN (1841—). A German physician, born at Alt-Lietzegörke. He studied medicine at Berlin, taught at Königsberg, Berlin, and Breslau, and was appointed professor at Freiburg (1872), at Jena (1874), and at Vienna (1882). Besides his *Topische Diagnostik der Gehirnkrankheiten* (1879), and *Beiträge zur Physiologie und Pathologie des Darms*, Nothnagel wrote *Handbuch der Arzneimittellehre* (1870; 7th ed. 1894), and contributions to *Spezielle Pathologie und Therapie* (1894 et seq.), of which he is an editor.

NOTHOMB, nò'tòn', JEAN BAPTISTE, Baron (1805-81). A Belgian statesman and diplomat, born at Messancy. He studied law at Liège, and entered politics in Brussels as a contributor to the *Courrier des Pays-Bas*. He played an important part in the Revolution of 1830, and in November of that year was appointed by the Provisional Government a member of the Diplomatic Committee. In 1837 he received the portfolio of Public Works, and in that department founded the Belgian railway system, and in 1842 became Minister of the Interior. He formed a new Cabinet in 1843, but his moderate policy was not long successful, and he was forced to retire by the coalition of 1845. He was Minister at Berlin from 1843 until his death. His chief works include *Essai historique et politique sur la révolution belge* (1833; 4th ed. 1876). Consult *Juste, Le Baron Nothomb* (Brussels, 1874).

NOTICE (Lat. *notitia*, knowledge, idea, from *noscere*, to know). Notice in law denotes existing knowledge of a fact based upon information communicated by another, which knowledge has the effect of fixing the rights and liabilities of the party giving and the party receiving the information. The term is also sometimes applied to the act of giving the information which constitutes the notice. Unless otherwise stated, the term will here be used as first defined. Notice may be either (a) actual or (b) constructive.

Actual notice is knowledge of a fact based upon information communicated by either written or spoken language.

Constructive notice is knowledge which may not in fact exist, but which the law may presume to exist upon grounds of policy, as where notice to an agent is deemed to be notice to the principal, although in fact the information is never communicated to the principal; or where notice of pendency of action affecting real estate is constructive notice of the action to any one dealing with the title to the real estate, whether he has actual notice of the action or not (see *LIS PENDENS*); or where notice to the purchaser of negotiable paper of facts by which he is 'put upon inquiry' as to its validity may be constructive notice of a defense of the maker to any action founded upon the paper, or where one accepting a conveyance containing a reference to some other deed is deemed to have constructive notice of the other deed, although he may never have read it.

The doctrine of notice as a means of fixing rights and liabilities has many applications at common law, the more important of which are:

Liability of an indorser of negotiable paper, or of a promissory note, or a bill of exchange, is fixed by a notice of dishonor. The notice in order to charge an indorser must be given with due dispatch after dishonor or protest, usually on the day following; it must describe the bill or note and the nature of the dishonor. It may be oral, although usually in writing, and may be served personally or by mail. If the holder or prior indorser is unable after due diligence to find the indorser or serve him with notice, necessity of notice to charge the indorser is dispensed with. See *NEGOTIABLE INSTRUMENT*.

In general any one purchasing property with actual notice of any equitable claims or rights that there may be with respect to the property, or with notice of facts sufficient to put him upon

inquiry, takes the property subject to such claims; as, for example, an equitable defense to negotiable paper, or fraud in the contract by which the vendee obtained title to the property, although a purchaser for value without notice would acquire the property free of claims. See *FRAUD*.

Notice by the landlord is necessary to terminate the tenancy of a tenant at will or by sufferance, or of a tenant from year to year. In the latter case the landlord must give notice at least a reasonable length of time before the end of any year of his election to terminate the lease. This time is now fixed by statute in some States. The landlord may, however, waive his right acquired by notice given, and continue the tenancy by expressly giving his consent, or by continuing to accept payment of rent.

When a creditor assigns his claim against his debtor without notice to the debtor, the debtor may pay the assignor and may thus discharge the debt. If, however, the assignee give the debtor notice of the assignment, the debtor is bound to pay the assignee; and if he pays the assignor, notwithstanding the notice to pay the assignee, he may nevertheless be compelled to pay the amount due to the assignee. See *ASSIGNMENT*.

The right of an insured to abandon the property insured to the insurer upon the happening of a partial loss is fixed by notice given by the insured to the insurer. If a proper case for abandonment, the mere giving of notice is sufficient. If not a proper case for abandonment, the insured may not abandon unless the notice is accepted by the insurer. See *INSURANCE*.

In addition to the various general rules of common law requiring notice to be given, notice may be required in special cases, as where statutes require notice to be given as a condition of fixing rights and liabilities; or where the parties to a contract stipulate expressly or impliedly for notice as a means of defining their rights under the contract.

Whether notice must be personally served upon the person to be notified depends upon the particular kind of notice. In general all notices, except those required in the course of litigation, must be personally served. Notice required between litigants may be served upon the attorneys in the case. When notice is required by statute, it must be served upon the person to be notified, unless otherwise specified in the statute. When the giving of notice is a condition precedent to creating a legal liability, a plaintiff seeking to enforce the liability must allege the giving of notice in his declaration or complaint. And in general it may be said that the party relying upon notice as a part of his cause of action or defense must plead and prove it. When, however, the condition is in the nature of a condition subsequent, it is not a part of the pleader's cause of action, and need not be pleaded by him. See *PLEADING*. Consult: Wade, *Treatise on the Law of Notice as Affecting Civil Rights and Remedies* (San Francisco, 1886); Bennett, *Treatise on the Law of Lis Pendens* (Chicago, 1887); and for the rules affecting notice in cases of motions in actions or proceedings at law, notices of protest of negotiable paper, etc., consult the authorities referred to under *PROCEDURE*; *PLEADING*; *NEGOTIABLE PAPER*, ETC.

NOTKER. The name of two monks of the Swiss Monastery of Saint Gall. **NOTKER BALBULUS** (c.840-912) did much for church music by perfecting the 'sequence' (q.v.). More than thirty melodies and about forty arrangements of words are ascribed to Notker, who was canonized in 1513.—**NOTKER LABEO**, the 'Thick-Lipped' (c.950-1022), was a great teacher, and it is probably to his school rather than to him individually that we should ascribe the many translations which bear his name. Among these are versions in German of Boëthius's *On the Consolation of Philosophy*, Aristotle's *Categories* and *Hermeneutics*, and the Latin Psalter. These works have great value from the philological point of view as examples of Old High German. They are edited by Piper, *Notkers und seiner Schule Schriften* (1883-84). Consult Kelle, *Die Sankt Galler deutschen Schriften und Notker Labeo* (Munich, 1888).

NOTO, nō'tō. A city in the Province of Syracuse, Sicily, 17 miles southwest of the city of Syracuse, and three miles from the Mediterranean (Map: Italy, K 11). It is a handsome town with rich churches, beautiful palaces, and broad straight streets, and is the see of a bishop. Its academy has a library and a collection of antiquities. A trade is carried on in corn, wine, and oil. Noto was built in 1703 near the site of an older town of the same name (the ancient *Netum*), destroyed by an earthquake in 1693. Population (commune), in 1881, 18,239; in 1901, 22,564.

NOTOCHORD (from Gk. νῶτος, nō'tos, back + χορδή, chordē, cord). A cellular, cartilage-like rod, arising in the embryo as an axial thickening of the hypoblast. It forms the basis of the vertebral column, i.e. the segmented axial skeleton of vertebrate animals. It is composed of a peculiar form of cellular tissue, called notochordal tissue, formed of large vacuolated cells extending from side to side of the notochord and having the nuclei confined to its dorsal and ventral regions. Around these tissues is a 'notochordal sheath' of connective tissue, which is produced dorsally into a canal for the nervous system. In all except the lower vertebrates, Amphioxus (q.v.), lampreys, sharks, and certain armored fishes, the notochord is a transitory embryonic structure, replaced later by the permanent vertebral column. Its presence in embryonic or adult structures is the primary characteristic of the phylum Chordata (q.v.); and the traces of it in ascidians, Balanoglossus, etc., led to the inclusion of those worm-like forms in this phylum as *Adelochorda* and *Urochorda* (qq.v.). See *Plate of ASCIDIANS*.

NOTOGÆA, nō'tō-jē'ā (Neo-Lat., from Gk. νότος, notos, south + γαῖα, gaia, earth). A term in zoogeography used as the name of a great faunal region in two different senses: (1) as embracing the whole Southern Hemisphere except Africa, and opposed to 'Arctogæa' or the Holarctic Region; and (2) as the equivalent of Neotropical Region (q.v.; see also *DISTRIBUTION OF ANIMALS*). The first use of the term was proposed by Huxley in 1868, to reconcile certain striking resemblances between Australasia and South America—such, for instance, as the presence of marsupials in both, and not elsewhere; he also applied the synonymical name *Austro-Columbian Region*. The implication of this collocation in the same category of two continents,

now so remote from one another, was that in ancient times there was a land-connection between them.

The secondary use of 'Notogæa' for South and Central America and the Antilles has not come into general use; nor has the term 'Dendrogæa,' proposed by Selater.

NOTONECTA. See *WATER-BUG*.

NOTORNIS (Neo-Lat., from Gk. νότος, notos, south + ὄρνις, ornīs, bird). A genus of large flightless rails or gallinules now nearly extinct. Only one living species is known, *Notornis Mantelli*, of the southern island of New Zealand, which was first described by Owen from remains found with those of various moas. A living specimen, however, was taken in 1849, a second in 1851, a third in 1879, and a fourth, now well preserved at Dunedin, New Zealand, in 1898. A second, purely white species, has become extinct within historic times on Norfolk Island, a single skin in Vienna being its sole remnant. See *EXTINCT ANIMALS*; *FLIGHTLESS BIRDS*.

NOTOSUCHUS, nō'tō-sū'kūs (Neo-Lat., from Gk. νότος, notos, south + σόυχος, souchos, sort of crocodile). A small unarmored crocodile found fossil in Patagonian formations regarded as of Cretaceous age. It had a short, broad skull, blunt nose, mesosuchian palate, and the teeth few, small (except the unusually large canines) and laterally compressed.

NOTOTHE'RIMUM (Neo-Lat., from Gk. νότος, notos, south + θῆρ, thērion, diminutive of θῆρ, thēr, wild beast). A fossil marsupial mammal of the suborder Diprotodontidæ, found in the Pleistocene beds of Australia. See *DIPROTODON*; and *MAMMALIA*.

NÔTRE, nō'tr', **ANDRÉ LE.** A French architect and landscape gardener. See *LENÔTRE*, **ANDRÉ**.

NOTRE DAME (nō'tr' dām) **DE PARIS**, **CATHEDRAL OF.** A church in Paris, the most celebrated among the many churches dedicated to the Virgin in France. It is situated on the Ile de la Cité. The remains of a temple of Jupiter Cernunnus and the image of a horned god were found on the spot about 375, when a church was erected on the same site. In the sixth century there were two churches there, dedicated to Saint Stephen and the Virgin. Childebert rebuilt the latter about 520 in a Roman style, considered very grand. The first glass window now known of in France was placed in it. Fragments of mosaic and precious marbles supposed to be from the floor and columns of this church were discovered in excavations in 1847, and are now in the Musée de Cluny. This church was pillaged and partly destroyed by the Normans in 857, but it was repaired by Bishop Anseric. In 1140 the Abbé of Saint Denis put in a glass window of great beauty. It was then called the *église neuve*, to distinguish it from Saint Etienne, called *le vieux*. In the twelfth century both were falling into ruins, though they had for centuries been used for the great religious ceremonies and royal pageants of France.

About 1160 Bishop Maurice de Sully resolved to replace both old churches with a single edifice worthy of the capital of the kingdom, and in 1163 the foundation of the present majestic pile was begun, its corner stone being laid by Pope Alexander III., then a refugee in France. The choir was the first part begun and the work was pushed

rapidly, so that in 1182 the great altar was consecrated by a legate of the Pope. In 1185 Heraclius, Patriarch of Jerusalem, came to Paris to officiate with the Bishop in the dedication of the choir. Henry II., King of England, was interred before its high altar in August, 1189. The choir, transepts, and adjoining bays of the nave were completed in about 1196. The lower part of the nave was then run out to the main façade, which, with its two towers and three portals, was only begun by Bishop Pierre de Nemours in 1208. The portal of the south transept façade was built still later, as shown by an inscription of the architect Jean de Chelles, who began work upon it in 1257, in the reign of Saint Louis. The chapels in the rear of the transepts were not a part of the original design, and were added in the last part of the thirteenth century, about which time, also, the towers of the west front were completed. In 1699 Louis XIV. was seized with the ambition to place in the cathedral an altar piece in the Renaissance style, and removed the original altar to give place to it. Other alterations were made by Soufflot in 1771-78. During the Revolution the statues of the old kings of France, which were upon the gallery of the main façade, were destroyed, and in 1793 the cathedral became, by law of the Revolutionists, the Temple of Reason. Victor Hugo's literary masterpiece, *Notre Dame de Paris* (1830), attracted popular attention to the venerable edifice, and in 1845-55 it was subjected to a thorough and successful restoration, under the architects Lassus and Viollet-le-Duc. From 1182 to the present its nave, its altars, and its chapels have been the scenes of the most important ceremonies of Church and State in France.

The architecture is the noblest expression of simple early Gothic before its richer flowering in Amiens, Rheims, and Bourges cathedrals, and for simple majesty of expression its façade has no superior in France. The plan of Notre Dame is exceedingly compact; there is no break in the line of radiating chapels in the choir and the transepts do not project beyond the chapels. The inner narthex, of a double bay, is beneath the line of towers; the body of the church consists of a high central nave and four aisles flanked by an outer continuous line of chapels and cut by transepts almost in the centre. The vaulting is superb. The early features of sex-partite vaulting, heavy round pillars, and high triforium gallery characterize the interior. The beginnings of tracery are illustrated by its lack in the earliest parts at the choir end and in its use in simpler forms in the windows and details of nave and façades. The portals, instead of being, as in the more developed cathedrals, projected from the façade, are recessed in its mass, and of their rich sculptures, one tympanum is an interesting survival of the earlier church (c.1140), the rest, barring restorations, dating from between 1215 and 1225. The extreme length of the cathedral is 430 feet; width at transept, 170 feet; across nave and aisles, 124 feet; area covered by it, 64,108 square feet; height of towers, 223 feet; height of vault, 108 feet.

NOTRE DAME DU LAC, du lak, UNIVERSITY OF. A Roman Catholic institution at Notre Dame, Ind., founded in 1842 and chartered in 1844. The university comprises schools of arts and letters, science, engineering, pharmacy, archi-

teature, and law, and a large preparatory department. In 1902 a branch was established at Portland, Oregon, under the name of Columbia University. There are other branches at Austin, Tex., New Orleans, La., Cincinnati, Ohio, and Watertown, Wis. In 1902 the faculty numbered 70, and the attendance was 872, of whom 348 were preparatory students. The library contained 60,000 volumes. The college property was valued at \$2,700,000, of which sum \$2,200,000 was represented by the buildings and grounds.

NOTT, ELIPHALET (1773-1866). An American educator. He was born at Ashford, Conn., June 25, 1773. He was left an orphan at an early age, and had to earn his own support while striving for an education. Nevertheless he received the degree of M.A. from Brown University in 1795, and the same year was licensed to preach. He was missionary and school teacher at Cherry Valley, N. Y., in 1796-97, and pastor of the Presbyterian church in Albany (1798-1804). In the latter year he was elected president of Union College at Schenectady, N. Y., and filled the position for more than sixty-two years. He found the college without funds, buildings, or library, and in debt, but he soon provided for its needs, and during his presidency more than 4000 students were graduated. He possessed no small mechanical genius, and among about 30 patents granted to him was one for the first stove to burn anthracite coal. He was considered one of the most finished pulpit orators of his time. Besides sermons, addresses, etc., he published *Counsels to Young Men* (1810) and *Lectures on Temperance* (1847). Consult his *Life* by Van Santvoord, revised by Tayler Lewis (New York, 1876).

NOTT, JOSIAH CLARKE (1804-73). An American physician and ethnologist, born in Columbia, S. C. He graduated at the South Carolina College in 1824, and at the medical school of the University of Pennsylvania three years later. After practicing for a time in Columbia, he went in 1835 to Europe, and spent a year in the hospitals of Paris. On his return he settled at Mobile, where in 1858 he founded a medical school, which became a part of the University of Alabama. He served for a time on the staff of General Bragg during the Civil War. He was much interested in ethnology and kindred sciences, and published, besides many contributions to medical journals and other periodicals: *Two Lectures on the Connection Between the Biblical and Physical History of Man* (1849); *The Physical History of the Jewish Race* (1850); *Types of Mankind* (1854); and *Indigenous Races of the Earth* (1857). The last two books he wrote in conjunction with George R. Gliddon (q.v.), an English scientist, and one of the aims of the authors was to disprove the unity of the human race. Some of Nott's theories have been severely criticised, and they are perhaps more original than profound.

NOTTEBOHM, nôt'te-bôm, GUSTAV (1817-82). A German musician and writer, born at Lüdenscheld, Westphalia. After he had studied for a year in Berlin with Berger and Dehn, he went to Leipzig (1840), where he became the friend and pupil of Mendelssohn and Schumann. He then studied under Sechter in Vienna (1846), and afterwards taught music himself in that city. He became famous through his editions of musi-



CATHEDRAL OF NOTRE DAME, PARIS



cal classics, and his critical reviews of the lives and works of great composers, notably Beethoven. His publications include: *Ein Skizzenbuch von Beethoven* (1865); *Thematisches Verzeichnis der im Druck erschienenen Werke von Beethoven* (1868); *Beethoveniana* (1872-87); *Beethovens Studien* (1873); *Thematisches Verzeichnis der im Druck erschienenen Werke Franz Schuberts* (1874); *Mozartiana* (1880); and *Ein Skizzenbuch von Beethoven aus dem Jahre 1803* (1880).

NOTTINGHAM, nōt'ing-am. An inland county of England, between Lincolnshire on the east and Yorkshire and Derbyshire on the west (Map: England, E 4). Area, 826 square miles. The eastern portion is comparatively level, the western undulating; in the south are the upland moors and pasture lands, and in the west are remains of the royal forest of Sherwood. The soil is fairly productive; the agricultural industries include market gardening and hop-raising. There are important domestic manufactures and some coal-mining. The principal river is the Trent, connected by canals with the Witham. Population, in 1891, 445,823; in 1901, 514,537. Capital, Nottingham.

NOTTINGHAM. A municipal borough and county, the capital of Nottinghamshire, England, on the Leen, at its junction with the Trent, 130 miles north-northwest of London (Map: England, E 4). It is built principally on the slope and at the foot of a rocky eminence crowned by an ancient castle. The market place, 5½ acres in extent, is surrounded by fine buildings. The Exchange, the town and county halls, the house of correction, Saint Mary's Church, the Roman Catholic Chapel, the new free grammar school, erected in 1868, and the University College, with its fine buildings, are edifices worthy of special mention. The free grammar school was founded in 1513. There are numerous hospitals for the poor and infirm, a public park of 150 acres, a common, called Bulwell Forest, of 135 acres, and a fine arboretum of 17 acres. The municipality owns property which returns a revenue of \$150,000 yearly, namely, the water, gas, and electric lighting plants, markets, free libraries, baths, cemeteries, parks, garden allotments, tramways, artisans' dwellings, hospitals, lunatic asylums, and a large sewage farm. It is the sole municipality in England that maintains a university college. Connected with the college are well-equipped technical schools, including an agricultural department and a natural history school. It is one of England's leading educational institutions. In 1874 the town acquired Nottingham Castle and installed art galleries and a museum. Nottingham is an important industrial centre, the principal manufactures being bobbinet and lace, and cotton and silk hosiery. Cotton, silk, and flax mills, iron, wire, bicycle, basket, brass, and bleaching works are in operation. Formerly the city was noted for its manufactures of woollens.

As the Snottengaham, 'home of the caves,' of the Saxons, the place first became important in the ninth century. It was one of the five Danish boroughs. Nottingham Castle was built by William the Conqueror, and was the seat of parliaments and other important historical events. Charles I. set up his standard at Nottingham, and the castle was held at times by both Royalists and Parliamentarians. It was dismantled by Cromwell in

1644, rebuilt after the Restoration, and suffered severe damage from fire during the Reform Bill riots of 1831. Nottingham has been a manufacturing town for over 600 years. Its oldest charter, dated 1155, confirmed privileges granted by former kings. Its latest royal charter of 1897 conferred the rank and title of city under the designation of "City of Nottingham, and the County of the same City," in commemoration of Victoria's diamond jubilee. Nottingham is the seat of a suffragan bishopric to Lincoln, and of a United States consulate. It sends three members to Parliament. Population, in 1851, 57,400; in 1891, 213,900; in 1901, 239,750. Consult Bailey, *History of Nottinghamshire* (London, 1853-65).

NOTTINGHAM, HENEAGE FINCH, Earl of (1621-82). An English lawyer and statesman, the son of Sir Heneage Finch, Speaker in Charles I.'s first Parliament. He was educated at Christ Church, and then studied law. He sat in the Convention Parliament, and in 1660 he was appointed Solicitor-General and created a baronet. In religious affairs he was a conservative, insisted on the maintenance of bishops as a part of the Church establishment, and opposed all toleration of dissenters. In 1670 Finch became Attorney-General, and from 1673 to 1676 he was Chamberlain of Chester. Having gradually become the spokesman of the Court in the House of Commons, he was appointed on November 9, 1673, Lord Keeper of the Seals, and the following year was raised to the peerage as Baron Finch of Daventry. The same year he resigned as Lord Keeper of the Seals to become immediately Lord Chancellor, and as such presided over the many important political trials of the day. On May 12, 1681, he was created Earl of Nottingham. He died December 18, 1682. In a time of violent partisanship Finch is remarkable in that in his long career he never was attacked by either the Court or Parliament, and always enjoyed the full confidence of both, though he was chairman of nearly every important committee while he sat in the House of Commons.

NOTTOWAY. An Iroquoian tribe, formerly living upon the river of the same name in south-eastern Virginia. In language and alliances they were closely connected with the Tuscarora of North Carolina. When the English first occupied Virginia, the Nottoway seem to have been one of the strongest tribes in the region, but in the later colonization period they were already hastening to swift decay. In 1701 they occupied a palisaded village on the west bank of the river, where they still numbered about 500 souls in 1722. In 1785 they held a reservation of 27,000 acres, very little of which, however, was under cultivation. In 1825 there were still 47 persons bearing the name, although their blood was probably more negro than Indian.

NOTUS (from Gk. νότος, south). The south-west wind, called by the Romans Auster (q.v.).

NOUMÉA, nō-mā'a. The capital of New Caledonia, situated near the southern extremity of the island (Map: Australasia, J 5). It is a railroad terminus and has a good harbor. The population, in 1898, was 6968.

NOUN (OF. *noun*, *non*, *nun*, Fr. *nom*, from Lat. *nomen*, name; connected with Gk. *ὄνομα*, *onoma*, Ir. *ainm*, OPruss. *emnes*, OChurch Slav. *imen*, Goth. *namo*, OHG. *namo*, Ger. *Name*, AS.

nama, Eng. *name*; and probably ultimately with Lat. *gnoscere*, *noscere*, Gk. γινώσκω, *gignōskein*, Skt. *jñā*, AS. *cnāwan*, Eng. *know*). In grammar, a word denoting a thing. Of the eight so-called parts of speech (see GRAMMAR) the noun is one of the four primitive ones, the other three being the interjection (q.v.), pronoun (q.v.), and verb (q.v.). The noun is sharply distinguished both from the verb and from the pronoun, not only by its function, but by its inflection (q.v.), although the pronoun and noun show frequent similarities, and in certain languages, as in Hottentot and in the Polynesian dialects, the noun and the verb coincide in form. Traces of these points of contact survive in Semitic and Indo-Germanic, especially in the verbal nouns, i.e. the infinitives, which are nouns in form and verbs in force. Moreover, in the Indo-Germanic languages there are many instances in which, on account of the similarity of function of nouns and pronouns, pronominal inflection has been extended by analogy (q.v.) to the nouns and nominal inflection to the pronouns. Nouns are inflected for gender (q.v.), number, and case. Conventionally they are divided into common, proper, abstract, and collective. Common nouns denote material, concrete things, as *table*, *cat*; proper nouns denote particular individuals and personifications, as *John*, *Liberty*; abstract nouns denote qualities, as *goodness*, *pleasure*; and collective nouns denote masses of units, as *army*, *bundle*. This classification is valuable in certain grammatical and logical analyses, but from a philological point of view it is worthless. It should also be noted that in many instances the adverb (q.v.), and by implication the preposition (q.v.) and conjunction (q.v.), were originally a stereotyped case-form of a noun, as in the French adverbial suffix *-ment*, which is derived from the Latin *mente*, ablative of *mens*, mind, as *amiablement*, 'amiably,' from Latin *amabili mente*, 'with lovable spirit.' Consult: Fr. Müller, *Grundriss der Sprachwissenschaft*, vol. i., part i. (Vienna, 1876); Brugmann, *Vergleichende Grammatik der indogermanischen Sprachen*, vol. ii. (Strassburg, 1889-92); Delbrück, *Vergleichende Syntax der indogermanischen Sprachen*, vol. i. (ib., 1893); Zimmern, *Vergleichende Grammatik der semitischen Sprachen* (Berlin, 1898); Audouin, *Déclinaison dans les langues indo-européennes* (Paris, 1898).

NOUVELLE FRANCE, nō-vēl' frāns (Fr., New France). The early name of Canada.

NOUVELLE HÉLOÏSE, A'lō'ez', LA. See JULIE.

NOVACULITE (from Lat. *novacula*, razor, from *novare*, to renew, from *novus*, new; connected with Gk. νέος, *neos*, Skt. *nava*, OChurch Slav. *novŭ*, Ir. *Gael. nuadh*, Goth. *niujis*, OHG. *niuci*, *niuci*, Ger. *neu*, AS. *nūre*, *neoce*, Eng. *new*). The name given to a fine-grained rock composed of minute quartz particles—probably a consolidated siliceous ooze. A variety of novaculite called 'Arkansas stone,' from its occurrence in Arkansas, is much used for whetstones.

NOVAIA PRAGA, nā'vā-yā prā'gā. A town in the Government of Kherson, South Russia, situated about 200 miles north of Kherson (Map: Russia, D 5). It carries on some trade in timber, and had a population of 12,400 in 1897.

NOVÁKOVIC, nō-vā'kō-vich, STOJAN (1842—). A Servian statesman and philologist, born at Shabatz, and educated at the University of Belgrade. In 1871 he was chosen professor of Servian philology in the University of Belgrade. Between 1873 and 1883 he was three times Minister of Education, in which post he reorganized Servian education; and in 1886 resigned from the Ministry of Interior, which he had occupied for two years, and received the appointment of Minister to Turkey, which he held until 1892. From July, 1895, to December, 1896, he was Prime Minister and Minister of Foreign Affairs, and then became once more Minister to Turkey. In 1900 he was transferred to Saint Petersburg. He wrote *Istoriya sprake književnosti* (1867) and a Servian grammar (1879).

NOVALIS, nō-vā'lis (Lat., fallow land). A name assumed by Friedrich von Hardenberg (1772-1801), a German romantic author, once of cosmopolitan renown. He was born in Prussian Saxony. His parents were Moravians, and he was much influenced by that mystic religion. He studied at Jena, Leipzig, and Wittenberg, and in 1794 went to Tennstädt to further his legal training. There he fell in love with a delicate thirteen-year-old girl, who died as his betrothed in 1797. Novalis was then auditor at the Weissenfels salt works. He thought he was a blighted being, but presently he went to Freiburg to continue technical studies and became again betrothed. He returned to Weissenfels in 1799, but was obliged by disease of the lungs to postpone his marriage and died in 1801. His writings were soon collected by the Schlegels and issued in two volumes, often reëdited, with a third volume in 1846. They are mainly fragmentary. Noteworthy among them is an unfinished romance, *Heinrich von Ofterdingen*, the mawkish Knight of the Blue Flower Poesy, whose 'apotheosis' Novalis tells us he intended the novel to be. Carlyle recommended its 'persual and reperusal.' Individual passages in it are charming, and good lyrics are interspersed in the narrative. Earlier in time than *Ofterdingen* is a romance, *Die Lehrlinge zu Sais*, wherein the 'Disciples' discover that "the secret of Nature is nothing else than the fulfilled longing of a loving heart." Famous also in their way are the *Hymnen an die Nacht*, sentimentally morbid musings on his quickly consoled bereavement, mingled with impressions of Young's *Night Thoughts* and Fichte's lectures at Jena. Some of the fragments are political and reveal an exaltation of patriotic idealism. Other fragments deal with natural science in the same dreamy spirit. His religious lyrics have an emotional tenderness and a nebulous charm. The rest of his work is all but forgotten. Consult: Haym, *Friedrich von Hardenberg* (2d ed., Gotha, 1883); id., *Die romantische Schule* (Berlin, 1870).

NOVARA, nō-vā'rā. The capital of the Province of Novara, Italy, and a railway centre, 30 miles west of Milan (Map: Italy, C 2). It commands fine Alpine views from the boulevards on the site of its dismantled fortifications, and has several notable churches, chief of which are the Romanesque cathedral, dating from the fourteenth century, and rebuilt between 1860 and 1870, with its fine frescoes and sculptures and grand high altar, and the Church of San Gauden-

zio, surmounted by a high dome. The city has a lyceum, museum, and bishop's seminary, with a library of 30,000 volumes. The principal industries are the spinning of silk, cotton, and linen cloths, weaving, and dyeing. The town is the centre of a fertile district, producing grapes, rice, and corn. Population (commune), in 1881, 33,077; in 1901, 45,248. Novara is the ancient Novaria. The town passed successively into the possession of Milan, Spain, Austria, and Sardinia. It was the scene of a battle March 23, 1849, between the Sardinians and the Austrians, which resulted in the complete defeat of the Sardinians, and led to the abdication of Charles Albert in favor of his son, Victor Emmanuel.

NOVA SCOTIA, nō'vā skō'shā. A province of the Dominion of Canada, bounded on the northwest by New Brunswick and the Bay of Fundy, on the north by the Strait of Northumberland (separating it from Prince Edward Island) and the Gulf of Saint Lawrence, and on the other sides by the Atlantic Ocean. It consists of two portions, Nova Scotia proper (a large peninsula connected with New Brunswick by an isthmus about 15 miles in width) and the island of Cape Breton (q.v.). The peninsula, about 280 miles in length, and from 50 to 100 miles broad, extends in a northeast and southwest direction. Cape Breton lies northeast of Nova Scotia proper, and is separated from it by a narrow strait called the Gut of Canso, 16 miles long and from half a mile to two miles wide. Sable Island (q.v.) is a dependency of the province. The area of the province is 20,600 square miles.

TOPOGRAPHY. The surface of Nova Scotia is undulating, and traversed by broken ranges of hills, whose direction is in general that of the long axis of the province. The direction of these uplifts, together with their rock-formation, identifies the region as a part of the Appalachian system. The highlands of the province may roughly be grouped into three sections: first, those running along the Atlantic coast, constituting the backbone of the peninsula, and forming a wide plateau narrowing to the northeast, where they represent the projection of Cape Canso; second, the Cobequid Hills, which form the isthmian projection into the Bay of Fundy, and run thence southeast, until, in the eastern end of the peninsula, they meet the first named range; third, a very narrow and detached range of trap rock on the coast of the Bay of Fundy, separated from the main plateau by Saint Mary's Bay and the valley of the Annapolis River.

The great plateau of the peninsula seems to have been originally a vast upheaval of Devonian age, probably as high as 10,000 feet. This has been denuded by the action of wind and water to its present condition of a peneplain not more than 600 to 1000 feet high. Some residual hills of hard rock have been left, and in many places the igneous granite core of the former mountain has been laid bare. The remaining rocks covering the core on either side belong chiefly to the Cambrian system, especially along the eastern coast. There are some outcroppings of the Algonkian group, and along the northern and western edge of the plateau there are remnants of highly fossiliferous Devonian and Upper Silurian strata. The triassic lowlands to the north and west of the plateau

around the Basin of Minas were probably formed by submarine denudation. They are underlaid by very thick strata of Carboniferous rock. The Cobequid plateau, which rises from the midst of these lowlands, has lately been shown to be of late Devonian origin.

The greater portion of the province drains to the southward, through numerous short rivers. Small lakes are also numerous, Lake Rossignol in the south being the largest on the peninsula. The large body of water in Cape Breton Island, called Bras d'Or Lake, is more properly an inland sea.

CLIMATE. The insular position of Nova Scotia renders its climate different from that of the other Canadian provinces. For instance, it is not subject to great extremes of heat and cold, but has, on the other hand, a larger amount of cloudy and foggy weather. The presence of the gulf current off the south coast lessens the severity of the winters, and the interior portions of the province are greatly protected by the ranges of hills which border the coasts. The northern hills are especially useful in warding off the north winds, and the range which borders the Bay of Fundy protects the Annapolis Valley from the winds and fogs, which are common to the bay region. The temperature seldom falls below zero, and the summer maximum in the region of Halifax (latitude 44° 38' N.) is about 86°, being somewhat higher than this in the interior. The annual precipitation averages about 45 inches.

MINERALS. The province is rich in mineral resources, and mining is a growing industry. The Carboniferous rocks of Northern Nova Scotia and Cape Breton Island contain coal seams of great thickness, the coal being a superior quality of the bituminous variety, and well adapted for coking. From 1890 to 1898 the annual production fluctuated between two and three million tons, but exceeded the latter figure in 1899 and 1900. This exceeds the combined production for all the rest of Canada, and constitutes the main source of supply for the Maritime Provinces. Gold is found in the quartzites and slates of the Cambrian Age that parallel the Atlantic coast of the peninsula. The vein ores (they have been worked since 1860) were formerly very rich, but have now become nearly exhausted. However, conditions favor a minimum cost of mining and milling the coarser gold ores, and they are being rapidly exploited. Prior to 1897 the product had fluctuated under \$500,000 in annual value, but rose to over \$600,000 in 1899 and 1900. Rich deposits of iron ore are found. Only small quantities of iron ore are now being mined, but the possibilities are great. Small quantities of gypsum and manganese are mined in Cape Breton Island, and antimony is exported from the region north of Halifax.

FISHERIES. Fishing is one of the leading industries. The province surpasses all other provinces and States of the continent in the annual value of its fish output. For a long period the value of this output has run from \$6,000,000 to \$8,000,000. The catch includes deep sea, inshore, and river varieties. The first two, however, are most important. Sea-fishing is encouraged by a bounty offered since 1882 by the Dominion Government. About two-thirds of it—\$100,000—has gone annually to the 18,000 Nova Scotia fishermen. The cod and lobster fisheries surpass in

importance, the annual product being about \$2,500,000 and \$1,500,000 respectively.

AGRICULTURE AND GAME. The valley lands of Nova Scotia are exceedingly fertile. Even the reckless method of cultivation often indulged in has failed to exhaust this fertility. The hill lands are more rocky and less fruitful. The flora is much the same as is found in other sections of Canada south of the Saint Lawrence. As a result of its somewhat insular climate, however, a few species are found which are unknown in other parts of the continent. Forests originally covered the greater portion of the province, the varieties of trees being well divided between the hard and soft woods, the former being more common in the protected valleys. At many points the original forests have been removed, resulting in a noteworthy climatic change—noteworthy because different from that which usually follows forest removals—namely, the moist coast air gains a more easy access to the interior, increasing the degree of moisture of both atmosphere and soil. Tamarack, spruce, balsam, and other soft woods have taken the place of the beech, maple, elm, walnut, and other hard woods, where these have been removed. Furthermore extra drainage is required and the agricultural industry has been materially modified.

The per acre yield of almost every crop raised is scarcely exceeded in any part of the continent. The cultivation of the soil, however, is confined to the valleys and has not more than held its own for a long time. Oats and potatoes are the most favored crops; hay, barley, wheat, buckwheat, and rye are next in importance. The root crops—especially turnips—receive much attention. The greatest agricultural activity centres in the protected Annapolis and Cornwallis valleys, which have become renowned for their production of fine fruits. Fruit-raising is receiving increased attention, and apples constitute one of the principal articles of export, their reputation having been won both by virtue of their flavor and their keeping qualities. The broken land is well adapted to grazing and the usual varieties of domestic animals are bred. Cattle, however, are the only species which has received much attention. Cattle were formerly raised chiefly for the butcher, but more recently for dairy purposes. The butter and cheese products are becoming important sources of revenue, and dairy farming will apparently control the industrial activity of the future.

In many districts birds and wild animals—bears, foxes, wolves, deer, and smaller varieties—are in sufficient numbers to afford excellent hunting.

MANUFACTURES AND TRANSPORTATION. The maritime situation of Nova Scotia is most favorable for purposes of trade with European and Atlantic seaboard States. The coast line (about 1000 miles long) has an unusual number of indentations, which offer exceptional harbor facilities. The harbors on the Atlantic and the Bay of Fundy coasts are accessible the year round. Halifax (q.v.), on the Atlantic coast, is the harbor most frequented. The registered vessels built by the province number 155 steamers and 1966 sail boats. The tonnage for both the over-sea and coastwise vessels which enter and leave the harbors is rapidly increasing, amounting in 1900 to a total of 3,700,000 and 6,000,000 respectively. The Intercolonial Railroad, with termi-

nals in Halifax on the east and in Sydney on the north coast, connects Nova Scotia with the other Canadian provinces. Other lines traverse the southern part of the peninsula, making a total of 943 miles for the province in 1901. As in the other provinces, Government subsidies have greatly aided in railroad construction. The largest items of export are fish, coal, lumber, and minerals, while the imports consist largely of West India produce and British and American manufactured products.

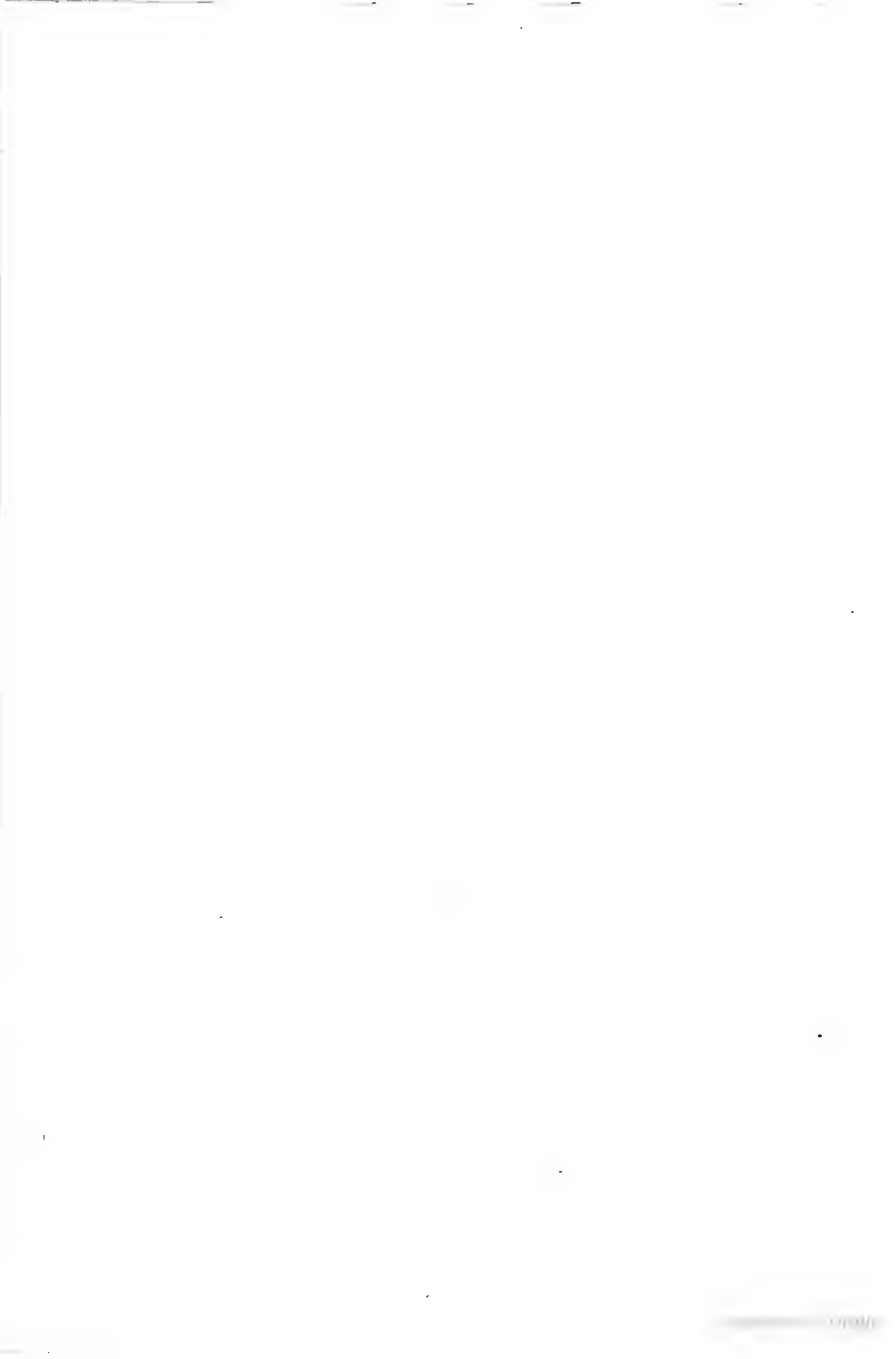
No industry of the province has so bright a prospect as manufacturing. Aside from ship-building, which has greatly declined, manufacturing has never been important. It has the exceptional advantage at home of the iron ore, coal, and limestone (used as flux), and therefore seems destined to be a seat of iron and steel manufacturing industries. Coke is being manufactured, and at Sydney in Cape Breton the iron and steel industry is being developed on an extensive scale. The forests afford a large supply of tanning barks. This has given rise to the tanning industry. Another natural advantage to manufacturing is the great water power afforded by the streams of the province. There are a number of cotton mills. Sugar is manufactured at Halifax. Extensive fruit-raising explains the number of canning factories. Butter and cheese factories are increasing in number.

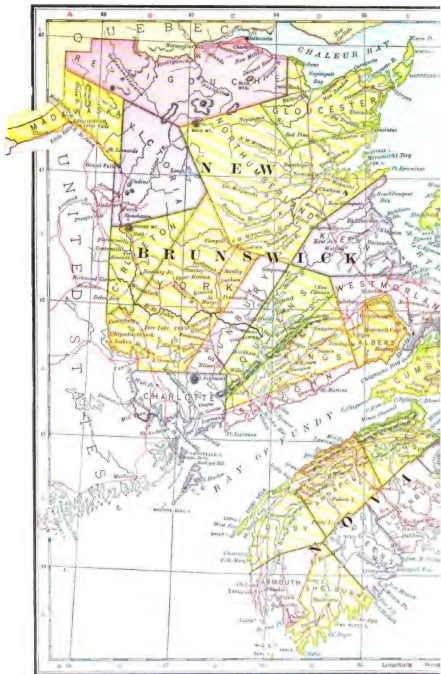
BANKS. In 1899 the chartered bank branches numbered 69. The clearing-house transactions in Halifax in 1900 amounted to \$77,600,000. The post-office savings banks numbered 56 (1900), with 13,125 depositors and an average deposit of \$261.44. There were also (1900) 15 Government savings banks, having 15,479 depositors, with an average deposit of \$306.64.

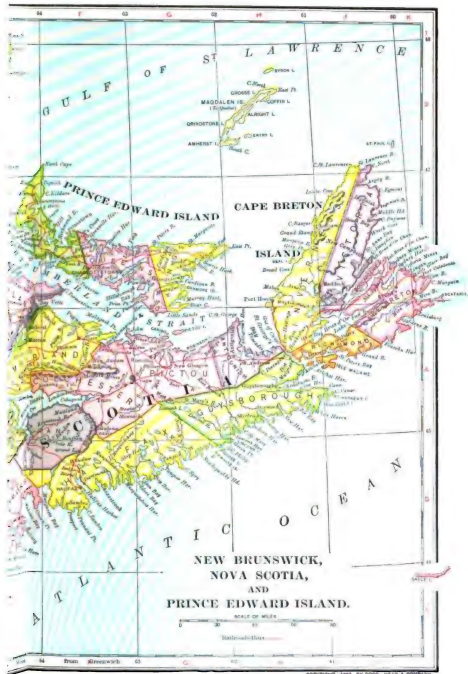
GOVERNMENT. Nova Scotia was incorporated with the Dominion of Canada in 1867, and is represented in the Canadian Parliament by 10 Senators and 20 members of the Lower House. It has also its own local Legislature and a Lieutenant-Governor. This official is appointed by the Governor-General of the Dominion and his Council. The Legislature consists of a Council and a House of Assembly elected by the counties—which are 18 in number—and by the cities, the municipal units of government being counties and towns. The people elect a county council—each polling district having one representative—which in turn appoints the other county officers. It is necessary to secure the sanction of the people in order to borrow money, and the Lieutenant-Governor of the province has a right of veto upon the money-borrowing powers, as well as the by-laws passed by the Council. The capital of the province is Halifax.

The principal sources of revenue for the Provincial Government consist of the Dominion subsidy of about \$432,000 annually and the mine royalties. These royalties are becoming almost as great as the Dominion subsidies. The total receipts for 1900 exceeded \$1,000,000, and the expenditures were \$937,000. The same year the net debt of the province amounted to \$2,713,000.

In 1900 the charitable institutions cost the province \$128,000. These consist of a deaf and dumb institution, a blind institution, a general hospital, and 24 poor-houses. Persons sentenced for crime are sent to the Dominion penitentiary, maintained for the Maritime Provinces at Dorchester, N. B.







POPULATION. The returns of the population for 1891 and 1901 were respectively 450,300 and 459,100. Nearly all of the inhabitants are of British origin, the Scotch being in the majority. There is not so much unoccupied territory as in the other provinces (excepting Prince Edward Island), and the density of population—22 per square mile—is accordingly greater. Halifax, the seventh largest city of the Dominion, had a population in 1901 of 40,700. Sydney, in Cape Breton Island, had a population of 9900, a gain of 75 per cent. during the decade.

RELIGION AND EDUCATION. While the Catholic Church is numerically the strongest, it contains but a little over one-third of the church following in the province. The Presbyterians, Baptists, Episcopalians, and Methodists follow in the order named. The great interest in education is shown by the fact that 1 out of every 4.4 of the population attends school. The schools are free and undenominational; there are no separate Catholic or Protestant schools maintained by the public system, as in Ontario and Quebec. The members of the Executive Council constitute the Council of Public Instruction, which, together with the Superintendent of Education, is at the head of the school system. The schools are carefully superintended, and gradation and uniformity of methods are generally maintained. There is one academy in each county. The province maintains a normal school, but no university. The total cost of the school system in 1901 was \$8.58 per enrolled child. About two-fifths of this is borne by Government grants and municipal aid, the rest by local taxation. The following are the denominational colleges: Acadia University, at Wolfville (Baptist); King's College (Episcopalian), at Windsor, the oldest chartered university in Canada; Saint François Xavier College, and Saint Anne's College (Catholic); and Dalhousie University, at Halifax—the last being undenominational, but receiving the support of the Presbyterian Church.

HISTORY. Nova Scotia is believed to have been first discovered in 1497 by John Cabot, who sailed under the English flag. It is probable that the Portuguese navigator Cortereal explored the coast in 1500. The first settlers, however, were the French, who took possession of the country in virtue of the explorations of Verrazano, Cartier, the Marquis de la Roche, and Champlain. French fishermen frequented this locality, and in 1598 Henry IV. of France granted Acadia (q.v.), as the country was called, to De la Roche. In 1604 the first settlement was made by the Sieur de Monts, Samuel de Champlain, and the Baron de Poutrincourt on the island of Saint Croix. This was removed in the following year to Port Royal (Annapolis). Throughout the French tenure the colonists of New England made attempts to obtain possession of the country, and in 1621 Sir William Alexander (q.v.) obtained from James I. of England a grant of Acadia, which was now named Nova Scotia. In 1710 the English captured Port Royal, and in 1713, by the Treaty of Utrecht, France gave up its claim to the country, except to Cape Breton or Isle Royale, which was ceded in 1763. In order to destroy the French influence, which continued to predominate, the English Government in 1755 deported a large number of the French Acadians, estimated at more than 6000 (probably about half of the total population of French descent), and scattered

them among English colonists from Massachusetts to Georgia. This act forms the theme of Longfellow's *Evangeline*. A blow was also struck at the French influence by the founding in 1749 of Halifax, which became a distinctly English centre. The development of the country was greatly aided by the arrival of Scotch settlers and by the large number of loyalists who left the United States at the time of the Revolution. Until 1758 the control of the colony was almost completely in the hands of the Governor appointed by the King, but in that year the first Legislature was created. The country increased in population to such an extent that in 1784 the Province of New Brunswick was formed from a part of its territory. The history of Nova Scotia since 1784 forms a part of the general history of Canada (q.v.).

Consult: Haliburton, *Papers on the History and Resources of Nova Scotia* (Halifax, 1862); Dawson, *Handbook of the Geography and Natural History of Nova Scotia* (6th ed., Pictou, 1863); Selwyn and Dawson, *Descriptive Sketch of the Physical Geography and Geology of the Dominion of Canada* (Montreal, 1884); *Nova Scotian Institute of Science Proceedings and Transactions* (Halifax, 1870 et seq.); Morley, *Record of Travel in Nova Scotia* (New York, 1900); and the authorities referred to under CANADA.

NOVATI, nò-và'tà, FRANCESCO (1859—). An Italian philologist, born in Cremona. He was made professor at the Academy of Milan in 1883, and went thence to Palermo (1886), to Genoa (1889), and to Milan (1892). By the establishment of the *Giornale storico della letteratura italiana* (1883, with Graf and Renier), and by constant contributions to the *Giornale storico*, the *Studj di filologia romanza*, he did much to spread the knowledge of his special branch of study throughout his own country and Europe. He devoted his attention especially to the Renaissance. A number of his critical essays are collected in the volume *Studj critici e letterari* (1889). He also published the *Correspondence of Coluccio Salutati* (1891-96).

NOVATIAN. A Roman presbyter of the third century, noted chiefly for the schism to which he gave his name. According to a late account, he was born in Phrygia, but it is more probable that he was a native of the West. He was converted in mature life, during an illness, and received only 'clinical' baptism (an incomplete form of the rite, sometimes administered to the sick), which was afterwards charged against him as a canonical defect, yet did not hinder his ordination to the priesthood. During the vacancy in the Roman See caused by the Decian persecution (250-251), when the presbyters directed the affairs of the Church, Novatian quickly assumed the leadership among them. It was he who wrote two of the letters addressed by the Roman clergy to Cyprian. In the discussion about the lapsed (i.e. apostates in the persecution), Novatian insisted upon excluding them from fellowship, in opposition to the milder discipline advocated by the newly elected Bishop, Cornelius. Many of the clergy sympathizing with Novatian, he was put forward as rival bishop, whereupon he was pronounced schismatic by a Roman synod, and excommunicated (251). This action, however, failed to check the movement he had inaugurated. The Novatianists, or

Cathari, as they were called (i.e. *the pure*), displayed increasing strength, and churches of their order sprang up all the way from Spain to Asia Minor. In Africa they were especially strong. They flourished for a long time, and traces of them are found as late as the seventh century. Of Novatian's end little is known. A late account (by Socrates, fifth century) says that he died a martyr in the reign of Valerian (254-c.260).

The difference between Novatianists and Catholics related to the theory of the Church. Both parties agreed that the Church was 'holy,' as asserted in the creed, but the Novatianists interpreted this to mean a holy membership, to be maintained by strict discipline, while the Catholics believed the Church was holy because of its sacraments, especially penance, by which holiness, if lost through sin, might be restored. The issue was similar to that raised by Montanus and Hippolytus (qq.v.), and it appeared again in the fourth century in the Donatist controversy. (See DONATISTS.) The Novatianists pushed their theory to its limit by insisting that even Catholics entering their communion should first be re-baptized.

Novatian's most important surviving work is *On the Trinity*. The tract entitled *Jewish Meats* relates to ceremonial questions. Some of the treatises formerly attributed to Cyprian are probably the work of Novatian, e.g. *Concerning Shows*, the *Value of Modesty*, and the *Praise of Martyrdom*. The anonymous treatise *Against Novatian* is held by Harnack to be from the Roman Bishop Sixtus II. (257-58). Consult: Migne, *Patrol. Lat.*, vol. iii.; *The Ante-Nicene Fathers*, ed. by Roberts and Donaldson, vol. v. (New York, 1896); Harnack, *Geschichte der altchristlichen Litteratur* (Leipzig, 1893); id., *History of Dogma*, vol. ii. (London, 1896); Benson, *Cyprian* (ib., 1897).

NOVATION (Lat. *novatio*, renewal, from *novare*, to renew). In law, the substitution of one legal obligation for another. Novation may be accomplished by the substitution of a new for an old party to a legal obligation, which is in effect the creation of a new obligation, or it may be accomplished by the substitution of a new obligation for an old one by the same parties. When the old obligation is extinguished by a new one without change of parties, the transaction is sometimes spoken of as a merger of the old obligation into the new. See MERGER.

At common law, as under the civil law, there are three important classes of novation, as follows: (1) Novation by substitution of debtors. By mutual agreement a substituted debtor may assume payment of a debtor's obligation upon agreement of the creditor or obligee to accept him as a debtor, and to discharge the original debtor or obligor.

(2) Novation by substitution of creditors. By mutual agreement of all the parties a creditor may agree to discharge his debtor upon the debtor's agreement to accept a third party as a new creditor and to pay the debt to him.

(3) A new debt or obligation may be substituted for the old by mutual agreement between the same debtor and creditor.

The first class is of the most frequent occurrence at common law, but as all novations are dependent upon the substitution of a new obliga-

tion for an old by mutual agreement between an obligor and obligee, or between an obligor and obligee and a third party, it is evident that there may be as many particular forms of novation as there may be combinations by agreement among the parties specified.

As the essential element of novation is the agreement or contract between the parties, it is necessary that the essential elements of a contract, including meeting of the minds, promise, and consideration, should all exist in order to establish the relationship. In general the promise of the obligee to release the first obligor is sufficient consideration for the promise of the new obligor, and vice versa, and as the promise of each party to the novation is given in exchange for the promise of each of the others, it is necessary that the several promises should be contemporaneous. In order that the promise to give up rights under the earlier obligation may be a sufficient consideration for the new obligation, it is essential that the earlier obligation should be valid. There can be no novation of a void obligation. See CONSIDERATION.

As the result of a novation is the extinction of the earlier obligation, it follows that all liens attaching to it are extinguished unless expressly preserved or continued by the new obligation.

Properly any new obligation which is created by the parties to an old obligation and operates merely to suspend the old obligation for a certain period, instead of extinguishing it, is not a novation, but a merger.

New collateral agreements entered into as security for a preëxisting obligation do not effect a novation, as the original obligation continues in full force and effect.

Upon analogous classes of contracts, see MERGER; ACCORD AND SATISFACTION; SECURITY. See also ASSIGNMENT.

In the case of novation by the substitution of debtors, the substance of the transaction is that the new debtor pays the obligation of the old debtor, and is thus within the express language of the Statute of Frauds. As, however, the purpose of the Statute of Frauds was to require contracts which were in effect contracts of suretyship, or contracts in the nature of suretyship, to be in writing, the courts have uniformly held that contracts of novation are not within the statute and need not be committed to writing. See FRAUDS, STATUTE OF. Consult the authorities referred to under CONTRACT.

NO'VA ZEM'BLA (Russian *Novaya Zemlya*). The name of a group of two large and numerous small islands in the Arctic Ocean, forming a crescent-shaped chain extending from 70° 30' to 77° north latitude, and separating Kara from Barents Sea (Map: Russia, G 3). It is separated by Kara Strait, 30 miles wide, from Vaigatch Island at the northeastern extremity of European Russia, and forms a part of the Russian Government of Archangel. The length of the two large islands, including the narrow strait between them, is about 740 miles; their average width is 60 miles, and their combined area about 34,500 square miles. The coasts are indented by numerous deep and narrow fiords, and the islands are rocky and mountainous, rising to a height of 3600 feet. The climate is cold throughout the year, and vegetation is dwarfed. Animals, however, are numerous, and

include bears, wolves and foxes, reindeer, ermines, and other fur-bearing animals, and large numbers of aquatic birds, while whales and seals are found in the surrounding seas. The islands are practically uninhabited, but are visited in summer by fishermen and hunters.

NOVEL (OF. *novelle*, *nouvelle*, Fr. *nouvelle*, from Lat. *novella*, fem. of *novellus*, new, diminutive of *novus*, new), **THE**. To designate modern prose fictions there are current two terms: *romance* and *novel*. The term *romance* (from the Latin adverb *romanice*), originally employed in Italy, Spain, and France (in other words, in the Romanic lands) to distinguish the common speech, i.e. the *lingua romana*, from the Latin of the learned, came in time to denote a composition in the vernacular—and finally any verse-tale of intrigue and adventure. The word 'romance' was established in English usage by the time of Chaucer. At first the word 'novel' was probably the name given to some new story. In the twelfth and thirteenth centuries it was common among the Provençal poets for a verse-tale of intrigue realistic in treatment. It was popularized in Italy by Boccaccio as the title of a short narrative in prose. When these Italian tales came into English, the word came with them. It first occurs (so far as has been discovered) in Painter's *Palace of Pleasure* (1566). In the hands of several English writers the Italian *novella* was by degrees expanded, until by the eighteenth century it filled a duodecimo volume. Then came Richardson and Fielding with their larger delineations of contemporary life, which with some hesitancy they and their public called novels. Somewhat after this fashion the word novel became in English the generic term for prose fiction. Up to March, 1766, the *Monthly Review* placed works of fiction under the head of "Miscellaneous Publications." In that month it made the subdivision "Novels." From the Renaissance down to the eighteenth century the word 'romance' was not much used in English. Then it began to appear as the explanatory title of the wild Gothic stories of Ann Radcliffe and her school. Since that time it has denoted a novel which represents men and women in strange, improbable, or impossible situations. Owing to very different literary conditions on the Continent, *romance* (French and German, *roman*; Italian, *romanzo*) is there the generic term, and *novel* still means a short tale. As its name by chance signifies, the novel as an easily recognizable literary species is a new thing. It hardly has a date before Defoe. And yet, in its genesis, the novel is as old as either the epic or the drama. Common to all peoples is the beast-tale, in which animals are made to speak and conduct themselves as men and women. Popular stories of this kind were taken up by scholars of a later period, trimmed, moralized, and preserved in writing. Fairy tales and anecdotes of every-day life undergo a similar process until transformed into the verse or the prose story possessing an art of its own. In Egypt story-telling belongs to the oldest times. Indeed, Egypt was the source of many a tale that long afterwards charmed Europe. (See *Egypt*, section *Literature and Science*.) The Sanskrit collection of tales known as the *Panchatantra* or *The Fables of Bidpai* (composed about 300 A.D.), and the fables attributed to Æsop,

likewise Eastern in origin, found their way into Western Europe, and, blending with native incidents, became the basis of many a mediæval fiction in verse and prose. Very interesting is the Oriental device for stringing together a long series of tales, as in the *Seven Wise Masters*, widely diffused in the Middle Ages, and the better known *Arabian Nights*. This manner was adopted by Boccaccio in the *Decameron* and by Chaucer in the *Canterbury Tales*.

In India the novel, in the technical sense of the word, began probably with the *Adventures of the Ten Princes* (*Daśakumāracarita*) by Dandin (q.v.) in the latter part of the sixth century A.D. This is a romance of roguery. The three remaining novels are in a totally different vein. They are the *Vasavadattā* of Subandhu (q.v.), and two romances by Bana (q.v.), the *Kādambarī* and the *Adventures of Harsha* (*Harshacarita*), an historical novel. Bana's works were influenced and in great part modeled on Subandhu. These three novels all belong probably to the seventh century A.D. In plot they show little action, but they abound in detailed description. The impression of both style and content, although monotonous to Occidentals, is sweet and smooth. The Pahlavi or Middle Persian literature has an interesting romance on the early Sassanian hero Ardashir Papakan. See *SASSANIDES*.

In China the novel did not develop until the Mongol dynasty (c.1260-1368). The Chinese classify their novels under four heads: usurpation and plot; intrigue and love; superstition; and roguery. These romances abound in action, but characterization is less developed. As examples of Chinese fiction, which is of vast extent, there may be mentioned the *San kuo chih yen i* of Lo Kuan-chung, which is historical; the *Shui Hu Chuan* of Shih Nai-an (?), a picaresque novel; and the *Hsi yü Chi*, which is based on the travels of Hiouen Tshang (q.v.) in India. The Ming dynasty, which followed the Mongol, produced many romances, most of which are by unknown authors.

Fiction developed in Japan earlier than in China. The first novel of importance is the *Genji Monogatari*, a long romance of love, containing much valuable information regarding society about A.D. 1000. Before this there had been a number of *Monogatari*, or narratives, many of them novelistic in character, such as the *Taketori*, *Ise*, *Utsubo*, and *Yamato*. In the seventeenth century Japanese fiction revived after a long period of decline, and though pornographic in the writings of Saikaku, was purified in the romantic novels of Kioden, Bakin, and Tanekiko. The masterpiece of Kioden is the *Inadzuma Hioshi*, a romance of roguery. Greatest of all was Bakin, who achieved his best in his *Yumi-baritsuki*, published in 1805, although his work is disfigured by extravagancies and impossibilities—a statement which holds good of another work of his, perhaps the most famous of all Japanese novels, the *Hakkenden*, which recounts the adventures of eight heroes of semi-canine birth, who typify the eight cardinal virtues.

The ancient Greeks had their popular tales, about which little is known. After the glory of their art had departed, there arose in the first centuries of the Christian Era a class of rhetoricians who composed long romances in prose. They belonged not to Greece proper, but

to Alexandria and the cities of Asia Minor. The basis of their romances is an erotic tale. According to the usual plot, boy and girl lovers are separated, and after countless perils on land and sea among pirates and thieves, they are finally united. There is no attempt at likeness to truth; all is governed by chance. Such are the loves of Theagenes and Chariclea, in the *Æthiopica* (fifth century ?), written by a certain Heliodorus. The *Æthiopica* is one of a group of romances to which belongs *The Marvellous Things Beyond Thule*, by Antonius Diogenes (second century), containing an account of a voyage to the North Pole, travels in the sun and moon, and of a descent into Hades; the *Babylonica*, by Jamblichus the Syrian (second century); the *Ephesiaca*, containing the germ of the story of Romeo and Juliet, by Xenophon of Ephesus (third century ?); *Apollonius of Tyre* (existing in a Latin version of the fifth century), the original of Shakespeare's *Pericles*; and *Clitophon and Leucippe*, by Achilles Tatius of Alexandria (fifth century), abounding in marvels and horrors duly explained, as in the romances of Ann Radcliffe. Standing by itself is the pastoral *Daphnis and Chloe* of unknown authorship, sweet, decadent, and sensuous. The extravagances of Eastern Greek romance, which must have been similar to those of Antonius Diogenes, were satirized by Lucian (born c.120 A.D.) in his *True History*. Lucian takes his hero into the belly of a whale, on to the morning star, and to the Elysian Fields. A more pronounced realistic aim is found in the *Golden Ass* of the African Apuleius (q.v.), written in Latin. Imbedded in its sensuality is the beautiful fairy tale of *Cupid and Psyche*. Ancient realistic fiction threw off all restraint in the *Satiricon* of Petronius Arbiter, which describes the debauchery of Roman society under the first emperors. To sum up, antiquity gave to the new nations of Western Europe a moralized prose tale, a romance constructed on the lines of the epic, an artificial pastoral, the burlesque, and the sketch of contemporary manners.

Through Arabic literature, as well as through other channels still obscure, Christian Europe became acquainted with Oriental fiction. The first finished Arabic stories were based on Persian models. Even during Mohammed's life-time, Nadr ibn Harith recounted at Mecca tales told by Persian merchants, and under the early Abbassides the poet al-Lahiqi rendered into Arabic verse the Iranian tradition of Ardeshir and Anosharvan. To the same period belong the lost translation of Bidpai by Rozbih (also called Ibn ab Mugaffa), an ancient version by al-Kisravi of the Sindbad story, which version has not been preserved, and ibn Babuya's rendering of the Buddhist legend of Barlaam and Josaphat (q.v.), which has come down to us. The native Arabic short story was not, however, altogether neglected, although the books of al-Jahiz (died 869), Abu Bekr ibn abi 'd-Dunya (died 894), and Muhsin al-Tanukhi (died 997) are of little importance for the history of the novel. The novelettes in Arabic were more remarkable for quantity than for quality, and the erotic poems and stories of al-Sarraji (died 1108) summed up this class of literature during the Ommyad and early Abbasside periods. Arabic fiction culminated in the thirteenth century in the collection of *The Thousand Nights and One Night*, usually called the

Arabian Nights (q.v.), and in the romance of *Antar* (q.v.).

THE MIDDLE AGES IN EUROPE. Among the new peoples after the fall of Rome, just as among the Greeks, the epic flourished long before romance. But by the end of the twelfth century the epic impulse which had created *Beowulf* and the *Chanson de Roland* had spent its force, and the age of romance had begun. Around characters and events, historical in truth or believed to be historical, the trouvères were weaving strange and marvelous incidents. Inexhaustible themes they found in Charlemagne, Arthur, Alexander, and the siege of Troy. Out of 'the Celtic matter' especially, they created permanent character types—Arthur, Lancelot, Percival, Guinevere, and Iseult. These verse tales began to yield in the thirteenth century to the romances of adventure, which frequently laid no claim to historical truth. The choicest extant specimen of them is the 'chantable' *Aucassin et Nicolette*, in prose and assonanced verse, meant to be sung. By the side of romance were cultivated the *fabliaux* (q.v.), which depicted the intrigues and the humorous side of life. The leading types of mediæval fiction received their highest finish from the hand of Chaucer. The *Canterbury Tales* and *Troilus and Criseyde* mark important steps from romance to the novel. There were already signs of the age of prose, soon to demand a printing press. The Arthurian romances were turned into prose in the thirteenth century. The *Gesta Romanorum*, a Latin collection of stories, first got into print in 1472, but these stories are doubtless of a much earlier origin. By 1353 Boccaccio had published the *Decameron*. About two centuries later the *Decameron* furnished the plan of the *Heptameron* of Margaret of Navarre. Through the Greeks in Southern Italy and the Crusaders, Greek fiction reached Western Europe in the twelfth century and earlier. The boy and girl separated by pirates or some chance, and brought together in a pretty recognition scene, became a common type in the romances of adventure. Eastern tales, coming likewise through Italy and also through the Moors in Spain, were mingled with native incident in the *Gesta Romanorum*, the French *fabliaux*, and the Italian *novelle*, and from these sources they spread still more widely.

MODERN TIMES, FROM CAXTON TO RICHARDSON IN ENGLAND. The invention of printing (fifteenth century) meant the end of the verse tale except as a survival. Of course, the transition from verse to prose was not sudden. A prose style suitable to orderly narrative had to be created, and the audience of the minstrel had to be taught to read. Both processes were slow. The first schoolmasters and the founders of English prose were Caxton and the learned printers who followed him. The first book printed in the English language was a collection of stories in which the divinities of ancient Greece are transformed into the lords and ladies of feudal society. It is known as the *Recuyell of the Histories of Troy*, and was printed by Caxton, probably in 1474, at the press of Mansion in Bruges. After Caxton had set up his own press in Westminster, he issued many romances, which were commonly prose expansions of mediæval tales and legends. Most significant of all is the *Morte Darthur* (1485), compiled from various sources by Sir Thomas Malory in 1469-70. The result was not

a well-constructed romance: the matter was too heterogeneous for that. But it was a fiction "pleasant to read" and "written for our doctrine." Of especial interest, too, are *Reynard the Fox* (1481), the *Four Sons of Aymon* (1489), and *Blanchardin and Eglantine* (1489). The great labors of Caxton in translating, editing, and printing were continued by his noble followers in the sixteenth century. Perhaps the finest work done by or for them was *Huon of Burdeux*, a half-fairy tale translated by Lord Berners out of the French. To this time belongs also the *Utopia* (c.1515), by Sir Thomas More. A full list of the romances issued by the English press before 1550 would be a revelation as to the spread of the taste for reading marvelous tales.

But the redactors employed by the printers in compiling bulky volumes lost sight of plot. The *Morte Darthur* is a series of biographies loosely connected with the career of King Arthur. Before there could be a novel, chaos had to be reduced to order. That service was performed after a fashion by Spain. *Amadis of Gaul* (q.v.), with its typical Greek story of the separation and the final union of the hero and heroine, thus becomes the first prose romance of chivalry. The pastoral, partly in verse and partly in prose, which had assumed a tenuous form in the Italian *Aracadia* (1504), by Jacopo Sannazaro, was developed by the Spaniard Montemayor in his *Diana* (1560). Still further, an unknown Spaniard transformed the tricks of mediæval tales into the short novel of manners. A merry scamp is put behind the scenes and permitted to relate what he sees there. The earliest of these so-called picaresque, or rogue, stories is *Lazarillo de Tormes* (1554). It was followed by a host of others, from which we rightly date the beginnings of the modern realistic novel. But the glory of Spain is *Don Quixote* (q.v.). To outward appearances merely a burlesque of the romances of chivalry, it also contains a careful delineation of manners and two character-types—Don Quixote and Sancho Panza—who, as has been said again and again, are a summary of human nature.

To the Elizabethans, everything of importance that had been done in fiction abroad was well known. And yet in this age of the drama there was no very marked advance in the art of fiction. Sidney's *Arcadia* (1590) is an attempt to unite the pastoral and the romance of chivalry, and to give them the structure of the *Æthiopica* of Heliodorus. The pastoral as written by Greene, Lodge, and many others, was the old romance of adventure reduced to prose and put in a new setting. What its possibilities were, had it been cultivated by a great literary artist, we may imagine from Shakespeare's *As You Like It*, founded on Lodge's *Rosalynde*. The most popular Elizabethan fiction was Lyly's *Euphues* (1579), a romance of high life. For the enchantments of the romance of chivalry, Lyly substituted a wondrous natural history, which he derived from beast-books or made up as he went along. As a realist great powers were displayed by Thomas Nash in his ill-constructed *Unfortunate Traveller*, or *Jack Wilton* (1594). Indeed, Nash anticipates the manner of Defoe.

Puritanism was a check to the imagination. From Elizabeth to the Restoration, the only notable fiction is the *Argenis*, by John Barclay,

composed in Latin (1621) and soon translated into French and English. Mainly a political romance framed to the Greek story of adventure, it is significant as an attempt also at history. It seems to be an important link between antiquity and the French *roman de longue haleine* cultivated by Gomberville, La Calprenède, and Mlle. Scudéry. Of this type the best examples are Scudéry's *Grand Cyrus* and *Clélie*, each in ten octavo volumes. The extravagances of Scudéry were turned to finer issues by Madame de la Fayette in the *Princesse de Clèves* (1678), often regarded, because of its sane analysis of passion, as the first French novel. To this period belongs also a famous pastoral, the *Astrée*, by Honoré d'Urfé (1610-27), which was burlesqued by Charles Sorel in the *Berger extravagant* (1627). There were, moreover, many realistic novels, as Sorel's *Francion* (1622), Scarron's *Roman comique* (1651-57), and Furetière's *Roman bourgeois* (1666). Akin to the Spanish picaresque novel, they all give a humorous description of middle and low-class life.

After the Restoration, novel-writing was resumed in England. French romance was imitated; and a long series of low adventures was put together by Richard Head under the title *The English Rogue* (first part 1665). Of more interest is *Oroonoko* (1696; written much earlier), by Mrs. Aphra Behn (q.v.). In this short novel, founded on real events, there is some attempt at local color. But of all writers of this time John Bunyan (q.v.) did most for fiction. Bunyan spoke from the heart. And, however impossible might be the tale he undertook to tell, he knew how to add the minute details that make fiction seem truth. Bunyan's successor was Daniel Defoe (q.v.). In narrative power Defoe was Homeric. His style is all movement; even description is turned into narrative. Because of its style, its interesting incidents so treated as to give the illusion of reality, and its ethical import, *Robinson Crusoe* (1719) is rightly regarded as the first worthy treatment of adventure. It has been asserted that Defoe was forestalled by Grimmelshausen's *Simplicissimus* (about 1669). This German story of adventure, however, belongs to the old order. In France, Lesage had already published the first part of *Gil Blas* (1715), in which the picaresque novel was used as a vehicle of large satire on contemporary manners. Defoe took advantage of the immediate popularity of *Robinson Crusoe*. The succeeding novels possess all the qualities of the first except interesting subject matter. In *Gulliver's Travels* (1726), Swift at once gave the satirical romance its perfect finish.

THE REALISTS. After Defoe and Lesage, the novel was in danger of becoming plotless. It was Richardson who made the novel dramatic. *Pamela* (1740) is an expansion of the current bourgeois comedy such as Steele wrote. *Clarissa Harlowe* (1747-48) is an expansion of bourgeois tragedy such as Otway wrote. *Sir Charles Grandison* (1753) is likewise a comedy with its scene shifted to high life. Richardson's drama is not thus merely formal. He creates character-types, and he develops them in act and conversation before the mind's eye. Fielding, with his experience as a playwright, was able to improve upon Richardson's clumsy epistolary method. *Joseph Andrews* (1742) contains the matter of

the comic romances, such as Cervantes and Scarron wrote, but is molded to the form of ancient comedy. His masterpiece, *Tom Jones* (1749), is a clever union of many types of comedy for many effects. *Amelia* (1751) is the pathetic drama of family life, then common in France and England. Fielding makes no use of letters (except for burlesque) or of journals and memoirs. His characters speak directly, and the narrative, though hampered at times by episodes, is mostly in the third person. All the essentials of the novel were thus worked out by Richardson and Fielding. Since their time the advance in structure has been only in details. The novel left their hands a well-ordered literary species. They both aimed, each in his own way, to depict the inner and the outward life as it is. They were realists. True, a good deal that was traditional in fiction found its way into their work. The dastardly scenes in Richardson, which now so shock readers, were survivals from Greek romance. And Fielding appropriated the old picaresque escapades. Later realists, having mostly rid themselves of all this material, depend rather upon their own experience and observation. And though few novelists have dared discard love altogether as a motive, it is now treated less in its physical aspects. In spite of all this, which is indicative of the later development of fiction, probably no novel takes to itself more of human life than *Tom Jones*. No characters stand in clearer outline than its hero and Squire Western.

Richardson's work ended with *Sir Charles Grandison*, and Fielding died in 1754. Tobias Smollett survived them. Much under the influence of the picaresque writers, he was careless in manner, and his imagination delighted in coarse and brutal scenes. He, however, created many caricature types at once professional and national—the Irishman, the Welshman, and the Scotchman. *Roderick Random* (1748) is the first novel of the sea from the pen of a seaman. *Humphrey Clinker* (1771) is, said Thackeray, "the most laughable story ever written." In distinction from the humor of Fielding, Smollett is comic. His formlessness and audacity became affectations with Laurence Sterne. *Tristram Shandy* (1759-67), beginning nowhere and ending nowhere, is hardly a novel, but it contains passages of the highest beauty, and a brotherhood of fools unequalled outside of Shakespeare. At this time Oliver Goldsmith wrote the *Vicar of Wakefield* (1766), the source of many idyls of village life.

The novel thus began at once to break up into several varieties. This process, owing to social conditions, went on apace. In the next generation there was a numerous class of writers who resorted to the novel for the purpose of popularizing theories of education and government. They were inspired by Rousseau and other French philosophers. Among them were Robert Bage, Charlotte Smith, Elizabeth Inchbald, Thomas Holcroft, and William Godwin. It may be claimed for them that they founded the didactic novel. Fielding had depicted his characters through *what* they said in dialogue. Except in the case of Squire Western, little stress was placed upon *how* they spoke. Here was another lesson to be learned from the drama or rather from the actor. And as soon as it was learned, we had the novel of manners. Frances Burney was the pioneer with her *Evelina* (1778) and

Cecilia (1782). In the Irish tales of Maria Edgeworth, as *Castle Rackrent* (1800) and *The Absentee* (1812), the interest centres wholly on the speech and appearance of the characters. They are the first dialect stories. The novel of manners reached its highest art in the work of Jane Austen, well represented by *Pride and Prejudice* (1813) and *Mansfield Park* (1814), admirable in structure, movement, and tone. Here first the drama and the epic became perfectly fused. The sentimental novel has perhaps had its greatest exponent in Goethe, whose *Leiden des jungen Werther* (1773-74) set half of Europe to pondering over suicide and other morbid themes. *Wilhelm Meister* (1795, begun some twenty years earlier), on the other hand, is an autobiographic and to some extent a didactic novel.

ROMANCE AND SIR WALTER SCOTT. The old romances never became quite dead. As late as 1752, Charlotte Lennox thought it worth while to ridicule them in the *Female Quixote*. Under the impulse of the romantic spirit which was pervading all literature, a short ghostly romance was published by Horace Walpole in 1764. His *Castle of Otranto* set the standard for many writers, among whom were Clara Reeve, Ann Radcliffe, William Beckford, M. G. Lewis, C. B. Brown, William Godwin, and Mary Shelley. Perhaps the most typical specimen of their work is Mrs. Radcliffe's *Mysteries of Udolpho* (1794), which definitely marks an interest in scenery for its own sake. Godwin's *Caleb Williams* (1794) is the first detective story. These romances of the eighteenth century are forerunners of the tales of terror and wonder by Poe and Hawthorne. But Poe gave them a new art in the *Fall of the House of Usher* (1840) and the *Masque of the Red Death* (1842). To Hawthorne they suggested a dress for psychological problems. Walpole and his school commonly placed their scenes in mediæval times; hence, their romances were known as 'Gothic,' and they are, in a manner, historical in setting. It was a natural step for an innovator to make history the main interest. Such a step was taken by Sophia Lee, whose *Recess* (1783-86) is an historical fiction of the time of Queen Elizabeth. Her example was followed by many others, among whom were James White, W. H. Ireland, and, most noteworthy of all, Jane Porter, author of *The Scottish Chiefs* (1810). Nothing could be more preposterous than the way in which these writers dealt with history. Characters and incidents of different periods they introduced into the same scene. But they rarely employed the historical allegory; and they made possible *Waverley* (1814). To the amazement of his contemporaries, Scott poured forth during the next sixteen years about thirty novels, covering English and Scotch history, with some gaps, from William Rufus to 1800. Among his English followers were Horace Smith, G. P. R. James, Harrison Ainsworth, and James Grant. He inspired Manzoni in Italy, Freytag in Germany, and Hugo and Dumas in France. His *Pirate* suggested to James Fenimore Cooper the brilliant tales of the sea beginning with the *Pilot* (1824); and for his Leather-Stocking Series, containing *The Last of the Mohicans*, *The Pathfinder*, and *The Deerslayer*, Cooper became known as the American Scott.

THE RETURN TO THE NOVEL OF CONTEMPORARY LIFE. Scott's influence on the novel is not summed

up by giving a list of his imitators or of those writers who discovered new romantic themes. He is in Thomas Hardy's woodland scenes as much as in Stevenson's *Master of Ballantrae*. He depicted the showy virtues, vices, and scenes in his outer plot, but beneath there was always careful observation of common life. Throw off the outer covering, and you have the realistic novel. This was done by several writers, as Susan Ferrier, John Galt, and D. M. Moir, who wrote capital sketches of Scotch manners. Throw out the historical setting, and you have once more the novel of contemporary manners. The transition is well marked by the work of Bulwer-Lytton. Likewise Charles Kingsley romanced the sea and ancient history (*Westward Ho!* and *Hypatia*) and dealt with the social conditions of his own time (*Yeast* and *Alton Locke*). But the immediate vogue of romance and history had already been checked. In France, Balzac was insisting, in theory and in practice, that the novel should be a document based upon experience and observation. Balzac's vast *Comédie humaine*, aiming to represent every phase of French life, worked mightily in England, and gave fiction everywhere an encyclopædic character. In England the novel returned to the humors of society with *Pickwick* (1836-37). In this novel of great scope (for it contains more than 350 characters) appear the London cockneys. Having discovered London, Dickens went on to illustrate it in all its phases, and to include in his canvas much from the provinces, until he had created caricature types running into the thousands. Thackeray wrote *Vanity Fair* (1847-48). Instead of a Little Nell, he took as heroine Becky Sharp, and made her adventures the medium for depicting the ways of the middle class. This novel was followed by *Pendennis*, *The Newcomes*, *Esmond*, *The Virginians*, and *The Adventures of Philip*. All possess exquisite humor and irony. In their somewhat loose structure they lean to the epic. But the method of procedure is dramatic. No other novelist has ever come near Thackeray in making his characters develop from page to page; witness both Becky Sharp and Rawdon Crawley.

At this time George Borrow was writing his eccentric gypsy novels, *Lavengro* (1851) and *Romany Rye* (1857), and Charles Reade was winning popularity. The way in which Reade and Dickens put together the novel of social satire was very displeasing to Anthony Trollope, who accused them of creating vices in the upper and middle classes merely to attack them. His ideal of a novel Trollope presented in the *Chronicles of Barsetshire* (1853-67), comprising *The Warden*, *Barchester Towers*, *Doctor Thorne*, *Framley Parsonage*, *The Small House at Allington*, and *The Last Chronicle of Barset*. In this imaginary shire, he describes the clergy and their friends with a pleasing humor, running now and then into farce. Trollope brings his characters directly before the reader and lets them play out the drama. No one ever forgets characters like Septimus Harding, Mrs. Proudie, and Archdeacon Grantley.

THE PSYCHOLOGICAL NOVEL. Corresponding with the sequence of incident there is a sequence of thought and emotion. Lay the stress on incident and you have the romance or the novel of manners; lay it on the inner life and you have the psychological novel. Since Defoe, the novel had to an extent swung between these two methods.

But the psychological novel hardly became aware of itself before the middle of the nineteenth century. Hawthorne comes to the fore. Alike in his longer and shorter tales, as *The Scarlet Letter* and *The Great Stone Face* (1850), he probes the conscience. Emily Brontë's *Wuthering Heights* (1848) is an intense lyric. Likewise in Charlotte Brontë's *Jane Eyre* (1847) and *Villette* (1853) what holds one spellbound is the spiritual life externalized in incident. Here, too, the work of Elizabeth Gaskell, best known as the author of *Cranford*, has significance. In her *Ruth* (1853) she employed for unifying the plot an ethical formula which may be styled the doctrine of the act and its consequences. But the memorable date in the history of the psychological novel is 1859. In that year appeared George Eliot's *Adam Bede* and George Meredith's *Ordeal of Richard Feverel*. In her first long story George Eliot kept in harmony the inner and the outer life; and each added to the interest of the other. Certainly after *The Mill on the Floss* (1860), incident was no longer able to sustain the philosophy. And yet *Romola* (1863) and *Middlemarch* (1871-72) are her most relentless studies in moral decay. All her novels are constructed on some variant of the doctrine of the deed and its consequences. George Meredith selects a small group of characters in a clearly defined situation—as in *The Egoist* (1879) and *Diana* (1885)—and then studies minutely their behavior. His view is less comprehensive than George Eliot's, but his analysis is more subtle.

RECENT PHASES. In 1903, for the time being, psychology seemed to have run its course in English fiction. True, some of the characteristics of Henry James connect him with Meredith; but James is master of several manners. The best contemporary work in psychology is represented by Paul Bourget, at the head of a French group. From the older psychology sprang the philosophic novel. The psychologists had their ethical formula, but it was not all-important. The philosophers thrust to the front determinism, an ethical theory whereby conduct is made to depend wholly upon heredity and environment; man is no longer a free moral agent. On this theory was planned the entire series of Emile Zola (q.v.), called *Les Rougon-Macquart* (1871-93). Thomas Hardy now stands for the very best type of the newer realism. The philosophical novel belongs rather to the past, and its place has been taken largely by the novel of a more distinct purpose, often called the problem novel, for it aims at the solution of some social problem. Such, for example, is Hardy's *Jude the Obscure* (1895). This kind of novel is in part an inheritance from Dickens and in part a natural development from George Eliot. It discusses, by turn, creeds, heredity, class distinctions, agrarian conditions, labor and capital, municipal government, tenement house reform, the enfranchisement of woman, the failure of marriage, the grounds for divorce, etc. The last three topics on the list have been favorites with many woman novelists. To this kind of fiction dignity has been given by three writers, artists as well as thinkers, each belonging to a different country and each possessing his own methods: Tolstoy in Russia, Björnson in Scandinavia, and Mrs. Humphry Ward in England.

Other novelists, though equipped with ideas, have depicted contemporary manners with a less

obvious purpose. Somewhat in line with Trollope were the many stories by Margaret Oliphant, as the *Chronicles of Carlingford*, including *The Doctor and Salem Chapel* (1863). Henry James and W. D. Howells, beginning as romancers, worked their way out to a delicate realism; the first under the influence of Turgenieff and Daudet; the latter under the influence of Tolstoy and of Spanish fiction as represented by Valdes and Galdós. James may fairly be said to have created the international novel. His field has been successfully invaded now and then, as by DuMaurier in *Tribby* (1894). In his later work James has studied the English drawing-room. Howells has confined himself to illustrating American types, as in *A Modern Instance* (1883) and *The Rise of Silas Lapham* (1885). From national types, the novel both in England and in the United States has run into provincial types, and consequently into dialect. J. M. Barrie and John Watson spread knowledge of the Scotch parish. Jane Barlow has described with much sympathy the Irish village. The tragic aspects of life in Devon, Somerset, and London have been presented with much force respectively by Zack (Gwendoline Keats), Walter Raymond, and George Gissing; some phases of South Africa by Olive Schreiner, and both picturesquely and psychologically by Joseph Conrad; and of Australia by Tasma (Madame Couvreur) and Ada Cambridge. Likewise various sections of the United States have been treated by novelists. To New England belong Elizabeth Stuart Phelps, Mary Wilkins, Sarah Orne Jewett, and many others; to the Mississippi Valley, Mark Twain; to the Far West belong Bret Harte, Owen Wister, and Hamlin Garland; to the South, Mary Murfree, G. W. Cable, Hopkinson Smith, and T. N. Page. The society novel holds its own. Two notable successes in the last decade were A. F. Benson's *Dodo* (1893) and Anthony Hope's *Dolly Dialogues* (1894).

Of wider amplitude is the work of Rudyard Kipling, who made known an India that had escaped the observation of other Europeans. Manners and customs he describes, and he has sketched a few types of character. But with him the energy goes mainly to telling a good story. That he has thus restored to fiction interesting incident is perhaps his great distinction.

These and other realists have greatly modified the outer form of the novel. Very generally the three-volume novel has been cut down to one volume. This has rendered necessary the excision of long descriptive passages and moral comments. The characters are now developed by what they do and say, as much as by what somebody else says about them. Indeed, it has been found possible to write a novel wholly in dialogue. The short story of a few pages has also found its readers. To this discovery France and the United States for a period contributed most, though the short story is far older than Boccaccio. In France the cultivation of the short story is encouraged by the literary character of the press. Of this genre, there is nothing superior to the work of Daudet and Maupassant. The short story had another master in Gottfried Keller (q.v.), and found an expert also in Paul Heyse (q.v.). In the United States the short story, which has existed by right since Poe and Hawthorne, is best adapted to the magazine. It has assumed various forms under the hand of many

writers. England has held rather to the serial. But in Kipling she has found an innovator, who has brought into vogue a tale of from twenty-five to fifty pages. In the nineteenth century many short stories, and sometimes even the long novel, were devoted to the portrayal of animals other than man. By Joel Chandler Harris, in his stories of *Uncle Remus* (1880), animal life is treated fantastically, but with a never absent consciousness that the adventures of Brer Rabbit, Sis Cow, Mr. Wolf, and their fellows are fantastic. Thus we get the humorous animal story based on folklore, as in the *Roman de Renard*. Kipling's *Jungle Books* (1894-95) gather Indian folklore about animals into short stories of great power. Herein the animals are again not wholly natural, but they act more naturally than in the stories of Uncle Remus. The tales of the Canadian C. G. D. Roberts range from the slightly fanciful to the wholly real. In *Bob, Son of Battle*, the Englishman Ollivant wrote an entertaining novel about the rivalry between two sheep-dogs, Bob and Wullie. W. Fraser, who wrote *Moose of the Boundaries*, is esteemed highly by naturalists and lay readers, for his imaginative yet truthful stories of wild life. Ernest Thompson Seton's earlier work portrays the life and death of wild animals with some accuracy. His stories distinctly belong to fiction and not to artistic zoology.

Since Scott, romance and adventure have never been absent from English fiction. Wilkie Collins became everywhere known by his *Woman in White* (1860), which was followed by many similar mystifications, as the *Moonstone* (1868). For the detective story he is the connecting link between Poe and Conan Doyle. In 1869 appeared *Lorna Doone*, the first of R. D. Blackmore's picturesque fictions, historical in setting and written in rhythmic prose. Then came the numerous romances of William Black, of which the type is *A Princess of Thule* (1873); the beautiful fancies of Richard Jefferies, as *Wood Magic* (1881) and *After London* (1885); and the tales of William Morris in verse and in prose. But the romance of most pronounced influence on the English novel was Robert Louis Stevenson. In *Treasure Island* (1883) he gave style and a new form to the tale of adventure. In *Dr. Jekyll and Mr. Hyde* (1886) he fashioned the old story of wonder to an ethical purpose. In *Kidnapped* (1886) and *The Master of Ballantrae* (1889) he revived after his own way the historical romance. In *Prince Otto* he wove a dream into the semblance of history. And in *Ebb Tide* (1894) adventure was carried to the South Seas. From Stevenson there are several lines of development. Among those who have followed him in history are Conan Doyle, S. R. Crockett, Stanley Weyman, S. Weir Mitchell, and Winston Churchill. In Great Britain and her colonies, as well as in the United States, historical fiction enjoyed great popularity and often considerable intelligent esteem throughout the nineteenth century. In France historical fiction has been waning almost since the time when the elder Dumas announced that he had raised history to the dignity of fiction. Stevenson's fanciful history was transformed into delightful extravagance by Anthony Hope Hawkins in *The Prisoner of Zenda* (1894) and its sequel, *Rupert of Hentzau* (1898). Further removed from Stevenson are the more extravagant fictions of H. G. Wells with his time

machines. Adventure wilder than Stevenson's is now represented by Joseph Conrad and the Australasian novelists Louis Becke and Guy Boothby.

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NOVELDA, nõ-vál'dá. A town of South-eastern Spain, in the Province of Alicante, 15 miles west of Alicante, on the railway between that city and Madrid (Map: Spain, E 3). The town has oil mills and brandy distilleries, and there are sulphur springs in the neighborhood. Population, in 1900, 11,442.

NOVELLÆ (Lat., novels, nom. pl. fem. of *novellus*, new, diminutive of *novus*, new). In Roman law, the ordinances issued by Justinian after the *Institutes*, *Pandects*, and *Codex*. They were written for the most part in Greek, although the Latin version alone has survived. No official compilation of them was made, but they were

preserved in several private collections of varying comprehensiveness. One of these, the *Authenticum*, or *Liber Authenticorum*, was later regarded as the authoritative text, and in the twelfth century was incorporated, together with the other Justinian codes, in the *Corpus Juris Civilis*. See CIVIL LAW; JUSTINIAN I.; PANDECTS.

NOVELETTE, nõv'el-ët' (diminutive of *novel*). In music, a term invented by R. Schumann to characterize certain compositions (op. 21) in free form. A novelette is of some length and characterized by a great number of short themes introduced without regular succession. Schumann chose the name because in those works he made use of entirely novel effects both rhythmically and harmonically. Since then the form has been imitated by many composers.

NOVELLINO, nõ'vél-lé'nó (It., the little novel), IL, or the CENTO NOVELLE ANTICHE. The oldest collection of tales in Italian, belonging to the thirteenth century. The subject matter comprises traditions of all kinds, biblical, classical, and chivalrous, stories based on historical fact or wholly fictitious. The tales seem to have been gathered from various sources; from oral tradition, from the books of chivalry, from the French *fabliaux*, and from other earlier collections in Latin. As might be expected at this early period, the prose is rather simple; it has, however, a remarkable spontaneity. Consult the first edition of the *Novellino* by Gualteruzzi (Bologna, 1525); that by Carbone (Florence, 1868); and that by Donin (Turin, 3d ed. 1890); A. d'Ancona, *Le fonti del Novellino*, in the *Studi di critica e storia letteraria*; Biagi, *Le Novelle Antiche* (Florence, 1880).

NOVELLO, VINCENT (1781-1861). An English musician and editor, born in London, of an Italian father and English mother. At the age of sixteen he was organist in the chapel of the Portuguese Embassy. He was one of the founders of the Philharmonic Society, and of the great music-publishing house in London, Novello & Co., established in 1811. His musical compositions, which are very numerous, and chiefly sacred, are considered to have contributed much to the improvement of cathedral music. As a painstaking editor of unpublished works of eminent musicians, he has accomplished much for musical literature. He died in Nice, France.

NOVEMBER. See CALENDAR; MONTH.

NOVERRE, nõ'vâr', JEAN GEORGES (1727-1810). A French dancer and reformer of the ballet, born at Saint-Germain-en-Laye. He was a pupil of the ballet master Dupré, and began as a dancer in the Royal Theatre. His ballets gave him such a reputation that Frederick II. invited him to Berlin. He then went to London on the invitation of Garrick, as master of the ballet in the Drury Lane Theatre (1755-57). Afterwards, he was equally successful at Stuttgart, Vienna, and other European cities. He was made ballet master at the Academy of Music in Paris in 1775, and there had the fullest opportunity to introduce those reforms which make him the real inventor of the modern ballet. His theory of the dance was that dress, music, and action must interpret one another. These ballets were often elaborated pantomimes of classical subjects treated in a serious manner. He also prepared the ballets in operas, notably that in

Gluck's *Iphigenia in Aulis*. His *Lettres sur les arts imitateurs en général et sur la danse en particulier* (1807) remain the authority on his art.

NOVGOROD, nôv'gô-rôd. A government of Russia, bounded by the governments of Olonetz, Vologda, Yaroslav, Tver, Pskov, and Saint Petersburg (Map: Russia, D 3). Area, about 47,300 square miles. The southern part belongs to the Valdai plateau and is mostly hilly. In the northeast are found a large number of lakes and immense impassable marshes—the beds of former lakes—covered with thin forests. The north-western part slopes toward Lake Ladoga and is thickly wooded. The district is watered by numerous rivers, which connect it with the Baltic, the Caspian, and the White Sea. The chief of them are the Volkhov (connecting the lakes Ilmen and Ladoga), the Sheksna and the Mologa, tributaries of the Volga, the Syas, flowing into Lake Ladoga, and the Msta, belonging to Lake Ilmen. Among the larger lakes may be mentioned the Byeloe and the Vozhe in the northeast. Many of the rivers are navigable and connected with each other and the lakes by an extensive system of canals.

The climate is severe, the yearly temperature at Novgorod averaging only 39° F. Farming is the leading industry, although its returns are so small as to oblige a large proportion of the population to engage in some other occupation, such as lumbering, or to emigrate for a part of the year to Saint Petersburg, where artisans from Novgorod are very numerous. The house industry is only slightly developed, the chief item of production being nails of an inferior kind. Wood, live animals, and hay are the chief exports, and there is a considerable traffic on the rivers and canals. Population, in 1897, 1,392,933, chiefly Russians belonging to the Greek Church. There are also a number of Non-Conformists. For history, see the article on Novgorod, the capital.

NOVGOROD, or **NOVGOROD-VELIKI**, vâ-lî'kê (Great Novgorod). One of the oldest and most celebrated cities of Russia, capital of the government of the same name, situated on both banks of the Volkhov, about two miles from Lake Ilmen and 120 miles south of Saint Petersburg (Map: Russia, D 3). It is divided by the Volkhov into two parts, of which that on the left bank, with the Kremlin, is known as Saint Sophia, while that on the opposite bank is called the commercial side. There is very little in the insignificant and somnolent town to remind one of the ancient Great Novgorod, with its vast wealth, great foreign trade, and highly developed republican institutions. The Kremlin is surrounded by a stone wall dating from the fourteenth century and occupies a considerable area. Within the walls are situated the eleventh-century Cathedral of Saint Sophia, with a treasury of valuable relics, the twelfth-century Church of Saint Nicholas, and the Yaroslav Tower.

The churches of Novgorod are of the usual Russian style of architecture (see Moscow), having numerous round cupolas and dark and profusely embellished interiors. In 1862 a fine, massive monument was erected at Novgorod to commemorate the one thousandth anniversary of the foundation of the Russian monarchy. There are two gymnasia, a theological seminary, a *Realschule*, and two museums of antiquities. Econom-

ically, Novgorod is insignificant. There is some manufacturing of paper, flour, glass, trimmed lumber, etc., and agricultural products are exported to Saint Petersburg. A railway line, 45 miles long, connects with Tchudovo on the Moscow-Saint Petersburg line. Population, in 1897, 26,095.

HISTORY. The origin of Novgorod is usually connected with the story of the first appearance of the Varangians in Russia, and the town is supposed to have been the residence of Rurik (862) (q.v.) and his successor Oleg. With the rise of Kiev (q.v.), Novgorod became to some extent its dependency, and these relations continued until the end of the tenth century. In the eleventh century Novgorod was completely independent, electing its own princes. In the zenith of its prosperity the dominions of Novgorod the Great comprised the northern part of the present Russia above latitude 57° N., excluding Finland and the Baltic region. In its political institutions Novgorod then presented a striking contrast to the other principalities of Russia. Without an hereditary line of princes, and geographically isolated from the rest of the country, it was guided in the selection of its rulers chiefly by its economic interests. The supreme authority was the vyetche, or popular assembly, which was participated in by all freemen. This assembly elected the prince and the posadnik (mayor), as well as the commander of the army. At the height of its prosperity the city contained probably not fewer than 100,000 inhabitants, some authorities placing the number as high as 400,000. The Church of Novgorod was essentially a native church. The archbishop was elected by the vyetche, and there was the closest intimacy between the State and the Church. Commerce was the chief occupation and was carried on by corporations so as to embrace a very large part of the population. The advantageous location of the city rendered it well adapted for the trade with the Scandinavian and Hanseatic cities. Novgorod joined the Hanseatic League about the middle of the fourteenth century. It contained many foreign merchants, or 'guests,' who were accorded special privileges. Hungarian and English coins circulated freely.

In the middle of the thirteenth century Novgorod was under the rule of the national hero Alexander Nevski (q.v.). It held out the longest of Russian States against the tide of Mongol conquest, but was finally compelled to submit at the end of the thirteenth century. After the weakening of the Mongol power, Novgorod, although politically independent, was often compelled, for economic reasons, to take its princes from the House of Suzdal (Vladimir). With the rise of the principalities of Moscow and Lithuania, Novgorod became too weak to struggle against their encroachments, and was soon reduced to the necessity of paying tribute in order to retain its independence and republican institutions. In 1478 it succumbed to the arms of the Muscovite ruler, Ivan III., and was deprived of its liberties. Many of the prominent families were transferred to Moscow and replaced by families from the capital. The inhabitants having excited the wrath of Czar Ivan the Terrible, that monarch in 1570 wreaked a fiendish vengeance upon the city, putting thousands to the sword. This completed the downfall of Novgorod.

NOVGOROD-SEVERSK, syá'vërsk. An historic town of Russia, situated in the Government of Tchernigov, on the Desna, 148 miles northeast of Tchernigov (Map: Russia, D 4). It has an old monastery and a gymnasium. At the end of the eleventh century it became the capital of an independent principality and subsequently was annexed to Lithuania. Population, in 1897, 9185.

NOVI, nŏ'vê, or **NOVI LIGURE**. A town in the Province of Alessandria, Italy, 33 miles north-northwest of Genoa, by rail (Map: Italy, C 3). It has several churches, a lyceum, museum, and public library. The town carries on manufactures of silk and woolen goods, and is the centre of a considerable trade. Novi was the scene, August 15, 1799, of a battle in which the Austrians and Russians defeated the French, the French General Joubert being slain. Population (commune), in 1881, 13,783; in 1901, 17,588.

NOVIBAZAR, nŏ'vê-bâ-zâr', or **NOVIPAZAR**. (Turk. *Yenibazar*). The capital of a sanjak of the same name, in the Vilayet of Kossovo, Turkey, on the Rashka, an affluent of the Ibar, 120 miles southeast of Bosna-Seari (Map: Austria-Hungary, G 5). The town, situated in a fertile district, has important fairs and an active agricultural trade. There are remains of an ancient citadel and in the vicinity rises the Church of Saints Peter and Paul, the scene in 1143 of Stephen Nemanya's conversion from the Roman to the Greek Church. Novibazar is an important strategic point between Servia and Montenegro, and, under the Treaty of Berlin, is garrisoned by Austria. The district about the town is the Rassia of the Byzantine historians. Population, about 12,000, chiefly Slavs.

NOVIE DUBOSSARY, nŏ'vyâ dŏv'bŏs-sâ'rê. A town of Russia. See DUBOSSARY.

NOVIKOFF, nŏ'vê-kôf, **NIKOLAI IVANOVITCH** (1744-1818). A Russian journalist and philanthropist, born at Avdotyino, Government of Moscow. He entered the civil service at eighteen, and was conspicuous in Catharine II's Reform Commission (1767), but retired in 1768 to devote himself to literature. In his satirical magazines, *The Drone* (1769-70) and *The Painter* (1772-73), he ridiculed Gallomania and combated serfdom and other evils of social and private life. A controversy with Catharine's satirical journals brought him into disfavor, and his periodicals were stopped. He retired to Moscow, where he leased the *Moscow Gazette* with its printing plant for ten years (1779-89) and endeavored to spread a love for literature by printing cheap books. His devotion to Freemasonry and his very extensive philanthropic work brought him into trouble, but not until the French Revolution did Catharine take any severe measures. In 1792 he was arrested on his estate and imprisoned in Schlüsselburg. All his property was confiscated, and the hospitals, schools, libraries, book-stores, etc., opened by him, were closed. Released by Paul I., he was confined to Avdotyino until his death. He published, in 1772, *An Attempt at a Lexicon of Russian Authors*, and in 1773-75 a collection of historical materials called *The Old Russian Library* (2d ed., 1788-89, republished by Myshkin, 1894). Consult a monograph by Nezelénoff (Saint Petersburg, 1875), and Luginoff, *Novikoff and the Moscow Martinists* (Moscow, 1867).

NOVIKOFF, **OLGA** (1840-). A Russian journalist and political agent, who lived long in England. She was born in Moscow of noble parents named Kireyeff, and married General Novikoff at the age of nineteen. Under her maiden initials, 'O. K.,' she wrote much in the newspapers of the two nations, hoping to promote an alliance between them, and she made warm friends among British statesmen and historians, notably Gladstone, Froude, Kinglake, and Carlyle. Gladstone reviewed her *Russia and England* (1880) in the *Nineteenth Century*. She published, also: *Is Russia Wrong?* (1877); *Friends or Foes* (1878); and *Skobelev and the Slavonic Cause* (1884). After her husband's death, Madame Novikoff spent more of her time on her son's estates near Tambov, Russia.

NOVI LIGURE, nŏ'vê lŏ'gŭŏ-râ. A town in Italy. See **NOVI**.

NOVOCHERKASK, nŏ'vŏ-chêr-kâsk'. A city of Russia. See **NOVO-TCHERKASK**.

NOVOGEORGIEVSK, nŏ'vŏ-gâ-ŏr'gê-yêfsk. A town in the Government of Kherson, Russia, on a tributary of the Dnieper, 250 miles north of the city of Kherson (Map: Russia, D 5). Milling, tallow-boiling, and brewing constitute the chief industries. In the vicinity of the town are granite and limestone quarries. Population, in 1897, 11,200.

NOVOGEORGIEVSK, nŏ'vŏ-gyŏr'gyêfsk. A strong fortress of Russian Poland, situated in the Government of Warsaw, at the confluence of the Bug with the Vistula, nine miles north-west of Warsaw. The principal fortifications, on the right bank of the Vistula, consist of a citadel and barracks surrounded by strong walls. The left bank of the Vistula and the banks of the Bug are also fortified. The place was originally fortified by Charles XII. of Sweden, and the fortifications were extended by Napoleon. The Russians captured it in 1813, and it was occupied by the Poles during the insurrection of 1830. The site of the fortress was formerly occupied by the town of Modlin, and the fortress is still known to the Poles under that name.

NOVOGRAD-VOLHYNSKI, nŏ'vŏ-grâd-vŏ-lin'skê. A town in the Government of Volhynia, Russia, situated on the Slutch, 55 miles north-west of Zhitomir (Map: Russia, C 4). It manufactures leather, soap, and brick. Population, in 1897, 16,900, about one-half Jewish.

NOVOMOSKOVSK, nŏ'vŏ-mŏs-kôfsk'. A town in the Government of Ekaterinoslav, Russia, situated on the Samara, 19 miles northeast of Ekaterinoslav (Map: Russia, E 5). It is known for its horse fairs, and manufactures leather. Population, in 1897, 12,862.

NOVOROSSIYSK, nŏ'vŏ-rŏs-sêsk'. A sea-port town in the District of Tchernomorsk, Caucasus, on the Black Sea (Map: Russia, E 6). It lies on an extensive bay protected by a large mole. There is a considerable traffic in grain and naphtha. Population, 16,208.

NOVOSYBKOV, nŏ'vŏ-slŏp'kôf. A town in the Government of Tchernigov, Russia, situated 101 miles north of Tchernigov (Map: Russia, D 4). It lies in a marshy region and is unhealthy. It has numerous tanneries, slaughter houses, and tallow-melting establishments. Population, in 1897, 15,480.

NOVO-TCHERKASK, tchër-käsk', or **NOVO-CHERKASK**. The capital of the territory of the Don Cossacks, South Russia, situated near the right bank of the Don, 20 miles by rail north-east of Rostov-on-the-Don (Map: Russia, F 5). The educational institutions include two gymnasias, a *Realschule*, a cadet corps, a theological seminary, a seminary for teachers, and a technical school. There are two theatres, a museum containing the archives, and many antiquities found in the vicinity, and a public library. Distilling is the principal industry, and here are held two annual fairs of considerable importance. About 19 miles north of the town are the Grushev mines, producing one of the best kinds of anthracite in the world. Novo-Tcherkask is the seat of the ataman of the Don Cossacks as well as of the central administration of the territory. Population, in 1897, 52,000.

NOVO-UZENSK, -zënsk'. A town in the Government of Samara, Russia, situated on the river Uzen, 242 miles south-southwest of Samara (Map: Russia, G 4). Its annual fairs are of considerable importance in the trade with the Kirghiz Steppe. Population, in 1897, 13,475.

NOVOYE VREMIA, nó'voi-á vrá'myá (Russ., new time). The largest political daily in Russia, founded in 1868 and published at Saint Petersburg. After several years of precarious existence it was acquired by the prominent publicist A. S. Suvorin in 1876, and for a time counted among its contributors Nekrasoff, Shtchedrin, and Sophia Kovalevskaya. It took a leading part in the Pan-Slavic movement of the seventies, and gradually lost its liberalism, so that at present it is moderate-conservative in tendency.

NO'VUM OR'GANUM (Lat., new instrument). The name of Francis Bacon's great work which led the way to the development of modern inductive logic. See BACON, FRANCIS.

NOWANAGAR, no-wá'nū-gūr', **NAWANAGAR**, or **NOWANUGGUR**. A seaport and capital of a native State of the same name, in the peninsula of Kathiawar, Gujarat, India, at the mouth of the Nagna, a small river on the south shore of the Gulf of Cutch, 160 miles southwest of Ahmedabad (Map: India, B 4). It is the terminal of a branch railway line from Rajkot, 54 miles to the east. The town is encircled by a fortified wall, four miles in length, and the buildings generally are of stone. It has pearl fisheries, manufactures of cloth and silk, and enjoys a considerable coastwise and inland trade. Population, in 1891, 48,530; in 1901, 53,844.

NOWELL, nó'él, INCREASE (1590-1655). An American colonist, born in England. He was one of the patentees of the Massachusetts Bay Company, was chosen an assistant, and accompanied John Winthrop to America in 1630. He became one of the leading spirits of the little colony, was the most important man among the thirteen who founded Charlestown, and was chosen ruling elder of their church. He was at various times secretary of the colony, treasurer of Harvard College, town clerk, and chaplain to the forces employed against the Narraganset Indians. Consult Budington, *History of the First Church, Charlestown* (Boston, 1845).

NOX (Lat., night). The personification of the Night, conceived as a still, dark figure, covering the world with her huge wings, and in her

kindness bringing rest to men. In Hesiod's *Theogony* she and Erebus are the offspring of Chaos, and from their union spring Æther (air) and Hemera (day). Of herself she produces Sleep and Death, and a multitudinous progeny, some friendly like the Hesperidæ, others grievous to men, as the Moiræ, or Fates, Ker, the goddess of violent death, Nemesis, the dreams, Momos, the faultfinder and mocker, while in Æschylus the Furies hail her as mother. The vagueness of the personification and the transparency of the name prevented Nox from becoming prominent in the cult, and for the same reason the type in art is not distinct, though the figure is found on some vases and sarcophagi.

NOYA, nó'yá. A town of Northwestern Spain, in the Province of Coruña. It is situated at the head of a fiord-like inlet surrounded by wooded mountains, 45 miles southwest of Coruña (Map: Spain, A 1). It is a second-class port of entry, and has some local trade. The town has two secondary schools and a bull-ring, and manufactures paper, leather, soap, cosmetics, and pottery. Population, in 1900, 10,321.

NOYADES, nwá'yád' (Fr., drownings). A name applied to the atrocities practiced at Nantes during the French Revolution (1793-94), by Carrier, the Deputy of the Convention, who put to death over 800 persons by penning them in scows and scuttling the vessels in the Loire. This mode of execution was also known as 'vertical deportation.' See CARRIER.

NOYAU, nwá'yô' (Fr., kernel), or **CRÈME DE NOYAU**. A liqueur commonly made from white brandy, flavored with bitter almonds, or the stones of the cherry, peach, or apricot. In Dominica it is flavored with the bark of the noyau tree (*Cernus occidentalis*), and in France sometimes with the leaves of a small convolvulus-like tropical plant, called *Ipomœa dissecta*. It is colored white and pink. See LIQUEUR.

NOYES, noiz, ARTHUR AMOS (1866-). An American chemist, born at Newburyport, Mass. He received his education at the Massachusetts Institute of Technology, and went to the University of Leipzig in 1888. In Germany he devoted himself, under the direction of Wilhelm Ostwald, to research in physical chemistry. In 1890 he was made instructor in chemistry at the Massachusetts Institute of Technology; in 1893 he was appointed assistant professor there, and in 1899 received the full professorship of organic and theoretical chemistry. He became known as a lecturer of uncommon ability, full of sincere enthusiasm for his subject. He contributed the results of his researches mostly to the *Zeitschrift für physikalische Chemie*, his papers dealing mainly with the application of the law of mass action (see REACTION) to the solubility of mixtures of salts. Practically all our knowledge on this important subject of physical chemistry is due to the researches of Dr. Noyes. Several of his papers deal with synthetic problems in the chemistry of the compounds of carbon. His book-form publications include the following: *A Detailed Course of Qualitative Chemical Analysis of Inorganic Substances* (1895); *Laboratory Experiments on the Class Reactions and Identification of Organic Substances* (jointly with Dr. Mulliken, 1899); *General Principles of Physical Science* (1902).

NOYES, HENRY DRURY (1832—). An American ophthalmologist. He was born in New York City; graduated from New York University in 1851, and from the College of Physicians and Surgeons in 1859; and in 1866 became professor of otology and ophthalmology in the Bellevue Hospital Medical College. Dr. Noyes was one of the founders of the American Ophthalmological Society. He introduced into the United States the use of cocaine as a local anæsthetic. Among his works are *A Treatise on Diseases of the Eye* (1881) and *A Text-Book on Diseases of the Eye* (1890, and after).

NOYES, JOHN HUMPHREY (1811-86). The founder of Oneida Community (q.v.). He was born September 6, 1811, at Brattleboro, Vt.; studied theology at Andover and Yale, and became a Congregational minister. In 1834 he founded the sect known as Perfectionists or Bible Communists at his parents' home, Putney, Vt. He married one of his converts, and thus secured the means to establish a community in which all things were held in common. Religious rites were given up and 'complex marriage' supplanted monogamy. Noyes sought to introduce what he believed to be the communism of the early Church. Internal dissensions and external opposition dissolved the community, but about 150 of the members soon assembled again at Oneida, N. Y. Noyes remained the leader of the society until the latter part of the seventies, when he was obliged to flee to Canada to escape prosecution because of his marriage system. He died in Canada, April 13, 1886. He wrote: *The Berean* (1847); *Bible Communism* (1848); *History of American Socialism* (1870).

NOYES, WILLIAM ALBERT (1857—). An American chemist, born near Independence, Iowa. He received his education at Iowa College, and then studied chemistry at the Johns Hopkins University in Baltimore. From 1883 to 1886 he was professor of chemistry at the University of Tennessee, and in 1886 was appointed to a similar post at the Rose Polytechnic Institute, at Terre Haute, Ind. He wrote *Organic Chemistry for the Laboratory* (1897) and *Qualitative Analysis* (1898), and carried out a number of researches in organic chemistry, the most important of which have served to throw much light on the constitution of camphor and allied compounds.

NOYES, WILLIAM CURTIS (1805-64). An American lawyer, born at Schodack, Rensselaer County, N. Y. He began to practice law in 1827, in Oneida County, where he quickly took high rank. He removed to New York in 1838, immediately took a place among the eminent lawyers, and in 1857 was appointed, with A. W. Bradford and David Dudley Field, to codify the laws of the State. In politics he was at first an anti-slavery Whig, and afterwards joined the Republican Party. In 1861 he was a member of the Peace Conference. He bequeathed a valuable law library to Hamilton College.

NOYON, nwā'yōn'. A town in the Department of Oise, France, on the Verse, 67 miles by rail northeast of Paris (Map: France, J 2). Its cathedral, founded by Pepin the Short and rebuilt in 1150, is interesting for its transitional phases from Romanesque to Gothic. The principal industries are sugar refining and the manufacture of cloth, laces, leather, and chemicals. Population, in 1901, 7443. Noyon, ancient Noviodunum

Veromanduorum, was prominent in Merovingian and Carolingian times. John Calvin was born at Noyon.

NOZZE ALDOBRANDINI, nō'tsā āl'dō-brān-dē'nē (It., Aldobrandini Marriage). One of the finest ancient pictures extant, preserved in the Vatican Library. It is a mural painting, copied from a fine Greek original, and was found in 1606 near the Arch of Gallienus. It was first owned by Cardinal Aldobrandini, after whom it is named. The painting represents the preparations for a wedding, and is soft and harmonious in coloring, though of only average technical execution.

NOZZE DI FIGARO, dē fē'gā-rō, LE (It., Marriage of Figaro). An opera, the music by Mozart (1786), and words adapted by Da Ponte from Beaumarchais's *Mariage de Figaro*.

NŪ, nōō, or **NUU**, nōō (later form NŪN). An Egyptian deity personifying the primeval waters whence the sun-god Rē emerged to govern the world. Nū was regarded as the father of all the gods and the ultimate source of all created things. In a later phase of Egyptian theology, he was considered to represent, along with his spouse Nūt, the waters of the Nile. This Nūt, whose name is merely the feminine of Nū, must not be confounded with Nūt (q.v.), the goddess of the sky. Consult: Wiedemann, *Religion of the Ancient Egyptians* (New York, 1897); Lepsius, *Ueber die Götter der vier Elemente* (Berlin, 1856); Brugsch, *Religion und Mythologie der alten Aegypten* (Leipzig, 1888-90).

NUANCES, nu'āns' (Fr., shades). In music, the various shadings and means of expression in the interpretation of a composition. The term includes everything that enters into the finished rendering of a composition, such as acceleration or retarding of tempo, the degree of loudness of different tones, the execution of embellishments, rhythmic accentuation, phrasing, etc. It is these nuances that constitute the individuality of the style of various interpreters.

NUBA, nōō'bā. A term brought into prominence in ethnology by Friedrich Müller in association with Fulah in his Nuba-Fulah linguistic family. The Nubas are true negroes, having their home in Kordofan, Eastern Sudan, whence they spread into Darfur and Wadai. They are classified as: (1) Nubas proper (*Nuba, Kargo, Kulfan, Kolaji, Tumali*), living in Central and Southern Kordofan, Dar-Nuba (Arab. *dar*, land, and *Nuba*), and (2) Nilotic Nubas, forming an important ingredient in the people of Nubia (q.v.). See Stanford, *Africa*, vol. i. (London, 1895); Müller, *Allgemeine Ethnographie* (Wien, 1879).

NUBAR PASHA, nōō'bār pá-shā' (1825-99). An Egyptian statesman, born in Smyrna and brought up as a Christian. He was educated in Europe, and, beginning with his early entry into the public service, constantly sought to introduce European culture and administrative methods into his native land. After having been sent on frequent diplomatic missions, he was appointed in 1854 Ambassador at Vienna. The first Egyptian railway was built under his direction, and he concluded with the Powers negotiations for the construction of the Suez Canal (1864). He was Minister of Foreign Affairs in 1867-74 and again from 1875 to 1876, and Premier in

1878-79, 1884-88, and 1894-95. As Minister of Foreign Affairs he organized mixed courts for the adjudication of causes between Europeans and Egyptians.

NU'BIA. An extensive region in Northeastern Africa, lying between Egypt proper and Kordofan. Its boundaries are now without political significance; the portion lying north of the 22d parallel of latitude has recently been incorporated with Egypt, while the remainder belongs to Egyptian Sudan (q.v.). Its limits have always been indefinite, and it may be roughly described as lying between the parallel of Khartum and that of the First Cataract and extending from the Red Sea to the Libyan Desert (Map: Africa, H 3). Vegetation is confined to a few scattered oases and to the very narrow valley of the Nile, which traverses the region in an extremely tortuous course, receiving the Bahr-el-Azrek, or Blue Nile, in the south, and, farther down, the Atbara. The remainder of the country consists of the sandy and rocky wastes known as the Nubian Desert, which toward the south begins to be covered with euphorbias and aloes as it merges into the tropical savanna-lands. The chief products of the oases are dates and gums, the latter derived chiefly from the acacias. The population consists partly of Hamitic and Arabian elements, partly of Nubians. The chief towns of the region are Omdurman, Khartum, Berber, and El-Ordeh on the Nile, and the port of Suakin on the Red Sea.

HISTORY. Nubia was a part of the ancient Ethiopia. The name seems to have been derived from the Egyptian and Coptic *noub*, gold, a name still retained in Wady Nouba. The dominion of the Pharaohs, when most extended, reached to the isle of Argo, the last place where the monuments of the Egyptians have been found. Under these monarchs Nubia was governed by a royal scribe, entitled Prince of Cush or Ethiopia, till the Twentieth Dynasty, when it appears to have been recovered by a series of native rulers, who ultimately conquered Egypt; and although driven back finally extended their rule from Meroë to Syene (Assuan), the most southern city held by the Egyptian monarchs and the Romans. Diocletian removed a negro tribe, called Nobatæ, to the district above Syene, to oppose the Blemmyes, who inhabited the western desert, now held by the Ababde and Bisharin Arabs. The Nobatæ and the Blemmyes intermingled, forming a negroid race which about the middle of the sixth century was converted to Christianity, and under Silko a powerful Christian State was established with Dongola as its capital. The Arabs made little headway against the rulers of the Christian kingdom until the fourteenth century, when Dongola fell, and the country was divided into a number of petty States. It was subdued by Mehemet Ali of Egypt in 1820-22 and remained under Egyptian control until it fell into the hands of the Mahdists in 1884-85. (See MAHDI.) The victories of the Anglo-Egyptian army under Lord Kitchener (1896-98) reestablished the authority of the Egyptian Government over Nubia. See EGYPT; SUDAN.

NUBIAN GOAT. An African breed of domestic goats (q.v.).

NUBLE, *nō'blā*. One of the best populated provinces of Chile. It is bounded by Linares on the north, Concepción on the west and south,

and Argentina on the east (Map: Chile, C 11). Its area is 3556 square miles. The eastern part belongs to the slope of the Andes, but the western section is generally level, flat, and very fertile. The climate is healthful and favorable for the cultivation of grain. Nuble is one of the chief wheat-producing provinces of Chile. It affords good pasturage for cattle. The western part is traversed by a railway line. Population, in 1895, 152,935. Capital, Chillan (q.v.).

NUCELLUS (Neo-Lat., from Lat. *nucella*, diminutive of *nux*, nut). The body of the ovule of seed-plants, which is invested by one or two integuments. The nucellus is the essential part of the ovule (q.v.), as it contains the spore (megaspore, later the embryo sac) in which the embryo is developed.

NUCLEOLUS (Lat., little nut). A small body, usually spherical in form, lying within the nucleus (q.v.). See CELL.

NUCLEUS (Lat., little nut, kernel). A small body, usually spheroidal or ellipsoidal in form, which stains deeply and lies within the cytoplasm of the cell. It is generally regarded as a controlling centre of cell activity, and hence as a primary factor in growth, development, and the transmission of specific qualities from cell to cell, and so from one generation to another. In its improperly called 'resting place' the nucleus is globular and surrounded by a membrane. Within it there is an irregular network. The nucleus of certain tissue cells and of some unicellular organisms has been observed to undergo amoeboid movements. In ciliate Infusoria, a large macronucleus and one or more micronuclei may be present in one and the same cell. Besides (1) a nuclear membrane, (2) a network or reticulum, (3) more or less rounded and irregular bodies, the nucleoli, exist in the nucleus, and (4) a clear nuclear sap, or 'karyolymph.' See CELL; EMBRYOLOGY; MITOSIS.

NUDIBRANCHIATA, *nū'dī-brāp'ki-ā'tā* (Neo-Lat. nom. pl., from Lat. *nudus*, naked + *branchia*, from Gk. *βράχια*, *branchia*, gills). A suborder of opisthobranch gastropods (q.v.), hermaphroditic, destitute of shell, the primary gills completely aborted, and the secondary gills on the back of the body. Jaws and a well-developed radula are almost always present. The nudibranchs are often called 'sea-slugs' (q.v.). One (*Æolis pilate*) is common on the New England coast just below low-water mark. All the sea-slugs lay their eggs in jelly-like masses coiled up on stones and sea-weeds. Though the adults are shell-less, the embryos at first have a shell, indicating that the nudibranchs have descended from shelled gastropods. See Colored Plate of SLUGS on opposite page.

NUECES, *nwā'sēs*. A river of southern Texas (Map: Texas, F 5). It rises in Edwards County in a range of low mountains, and flows southeastward for nearly 400 miles through an undulating prairie country, emptying into the Gulf of Mexico through the Bay of Corpus Christi. Under the Mexican régime it was the legal western boundary of the Province of Texas.

NUEVA CACERES, *nwā'vā kă'thā-rās*. The capital of the Province of Camarines, in southern Luzon, Philippines. It is situated at the foot of Mount Isarog, 10 miles south of the Bay of San Miguel, and at the head of navigation for

SEA SLUGS



1 AGLID - HERMEA BIFIDA.

2 AGLID - AGLIS CORONATA.

3 DENDRONOTID - DENDRONOTUS ARBORESCENS.

4 DORID - IDALIA ELEGANS.

5 DORID - DOTO CORONATA.

6 TRITONID - TRITONIA HOMBERGII.

7 DORID - ANCULA CRISTATA.

steamers of 200 tons on the Bicol River (Map: Philippine Islands, H 6). It is an important road centre, a port of entry and telegraph station, and has a cathedral, a bishop's palace, a seminary, and a normal school. Population, in 1896, 11,550. Nueva Cáceres was founded in 1578, and was at first called Naga. It was at one time the chief bishop's see for the whole archipelago.

NUEVA ÉCIJA, a'thé-há. A province of central Luzon, Philippine Islands. It has an ocean frontage of 23 miles on the east coast of Luzon, and extends westward to the centre of the island, its southwestern corner being 30 miles north of Manila Bay (Map: Philippine Islands, E 4). Its area is 3840 square miles. The numerous river valleys are covered with a rich alluvial soil. The population of the province is essentially agricultural. The chief products are rice, corn, tobacco, and palay. There is a large boat traffic on the rivers, and a network of roads covers the greater part of the province. The population, in 1901, was estimated at 156,610, mostly Tagálogs. The capital is San Isidro (q.v.).

NUEVA ESPAR'TA. A State of Venezuela, which until 1901 formed a section of the State of Guzman Blanco. It consists of a group of islands, of which the principal is Margarita (q.v.).

NUEVA SAN SALVADOR, nwá'vá sán sál'-vá-dór'. A town of Salvador. See SANTA TECLA.

NUEVA VIZCAYA, vèth-ká'yá. An inland province of northern Luzon, Philippine Islands (Map: Philippine Islands, F 3). It has an area of 1075 square miles. Almost the whole of the province is broken by the forest-covered foothills of the Sierra Madre on the east and the Cordillera Central on the west, between which runs the Magat River, a tributary of the Rio Grande de Cagayán. There are practically no manufactures or trade, even agriculture yielding scarcely enough for home consumption. The greater part of the province is inaccessible, and is inhabited by savage tribes, among whom the Igorrotes are prominent. The population in 1901 was estimated at 60,600. The capital is Bayombong (q.v.).

NUEVITAS, nwá-vé'tás. A town of the Province of Puerto Principe, Cuba, on the coast, 39 miles east of Puerto Principe, with which it is connected by rail (Map: Cuba, H 5). It is the most important port of the province, with a population, in 1899, of 4228.

NUEVO LAREDO, nwá'vó lá-rá'dó. A frontier town of Mexico, situated on the south bank of the Rio Grande, opposite Laredo, Texas. The town is the crossing point between Mexico and the United States of the Mexican National Railroad. Population, 2000.

NUEVO LEON, lá'ón', or NEW LEON. An inland State of Mexico, bounded by the State of Coahuila on the north and west, San Luis Potosí on the southwest, and Tamaulipas on the east and northeast (Map: Mexico, J 5). Area, 23,592 square miles. The State belongs partly to the Mexican plateau and is partly traversed by the Eastern Sierra Madre. In the north and northeast the country is low and slopes toward the Rio Grande. The rivers are numerous, but none of them suitable for navigation. The cli-

mate is not unhealthful, but the rainfall is irregular and droughts occur frequently. The soil is fertile. The chief products are sugar-cane and cereals. Stock-raising is also carried on to some extent. The State has good railway facilities and a considerable trade with the United States and the other Mexican States. Population, in 1900, 326,940. The capital is Monterey (q.v.).

NUISANCE (OF. *nuisance*, *noicence*, Fr. *nuisance*, from ML. *nocentia*, injury, from Lat. *nocere*, to harm). In common speech, anything which causes unusual and culpable annoyance, disturbance, or offense. As a legal term it is narrower, although scarcely more exact in signification. No definition has been offered which meets with general approval. Perhaps the best brief definition is that of Sir Frederick Pollock: "The wrong done to a man by unlawfully disturbing him in the enjoyment of his property, or, in some cases, in the exercise of a common right." It will be noticed that the gist of nuisance is the unlawful disturbance, annoyance, or discomfort which it produces. Accordingly, the same act may constitute a nuisance and another form of tort, such as trespass; in which case the injured party may seek redress for either of the two wrongs. This distinction has been recognized by English law from a very early period. Glanville, writing late in the twelfth century, and Bracton, writing in the next century, make it clear to us that the 'assize of nuisance,' or trial by jury in an action for nuisance, was distinct from the 'assize of novel disseisin,' as, later, it was distinct from the action of trespass.

PUBLIC NUISANCE. Both of these ancient writers distinguish, as does modern law, between public and private nuisances. The former are offenses against the public at large, such as obstructing highways, polluting or diverting public waters, carrying on a business which is dangerous to the public health or offensive to the public, maintaining disorderly houses, or indecent or disgusting exhibition in a public place. Modern statutes have greatly extended the scope of public nuisances, but this legislation professes to observe the common-law test, viz. the tendency of the prohibited act, thing, or conduct to debase public morals, to endanger the health of persons generally, or to interfere unlawfully with their convenience. A public nuisance is a criminal offense and punishable as such by the State. If a legal proceeding is instituted for its abatement, this, too, must be brought and prosecuted by the public authorities. An individual will not be allowed to bring an action in his own name, either for damages or for abatement of a public nuisance, unless he can show three things: first, a particular injury to himself beyond that which is suffered by the rest of the public; second, that such injury is direct and not consequential; third, that it is substantial, not fleeting or evanescent. To illustrate: An unlawful obstruction in a highway constitutes a public nuisance, whether it does actual harm or not; but it will not support a private action by one owning property on the highway unless the latter can show that it has caused him special, direct, and substantial damage, such as diverting customers from his store, or preventing his passing to and from his premises.

PRIVATE NUISANCE. An act or omission constituting a private nuisance is not generally a

criminal offense. It may be, on the contrary, highly beneficial to the community. The tanning of leather, or the manufacture of illuminating gas, or the raising of pigs, is a lawful business and may be quite necessary, but if it is conducted in such proximity to any dwelling as to render the occupancy of it uncomfortable, it amounts to a private nuisance. It is no answer to the owner of such a business that its continuance will benefit thousands of people while harming but one. That one is entitled to the law's protection. Nor is it an answer that his business was established and conducted before I erected my dwelling. If it were, the owner of an offensive (though lawful) business could limit the growth of a city in his direction, or greatly depreciate the value of surrounding property. Still, a particular business will not be accounted a nuisance in one locality which will be considered such in another. A person who erects a dwelling in a locality given up to manufacturing or mining purposes must be deemed to assent to the sights, sounds, and odors of the locality.

Even when the discomfort or annoyance complained of is not a well-established incident of the plaintiff's surroundings, whether it is sufficient in kind or amount to constitute a nuisance is often a difficult question. It is clear that trifling and temporary discomforts must be put up with. The smoke that may, in certain conditions of the atmosphere, descend from a neighbor's chimney, the odors that may be wafted at times from his kitchen, though offensive and disagreeable, are not a nuisance. Between them and the dense smoke and fumes from a kiln or factory that render breathing difficult and produce nauseating sensations there is debatable ground, on which it is difficult to fix the exact point at which smoke and odors and noises become a nuisance in the eye of the law. On the one hand, it is not necessary to prove that they are such as to cause sickness. On the other, it is essential to show that they are of a character to damage property sensibly, or to render ordinary persons actually uncomfortable. Offense to an æsthetic taste or a peculiarly sensitive organism is not enough. The discomfort or annoyance must be that of the average person in the particular situation.

The right to maintain a nuisance cannot be acquired by prescription (q.v.) as against the public; but it may be gained as against individuals. Even in such cases the right is not easily acquired. The one asserting it must show that for twenty years he has continued the very nuisance under a claim of right adverse to that of the person now complaining of it (or of his predecessors in title) with the knowledge and acquiescence of the latter.

In some cases the maintenance of a nuisance may be legalized by statute. The power of the British Parliament in this direction is unlimited. In the United States Congress and the State legislatures are limited by constitutional provisions. A nuisance which amounts to the taking of private property cannot be constitutionally legalized unless due compensation is made to the victim of the nuisance. Even when the nuisance falls short of a taking of property, a statute purporting to legalize it is construed with much strictness. One who justifies under such a statute is bound

to show a clear and unmistakable legislative sanction.

The remedies available to the victim of a private nuisance are three: abatement; a suit for damages; and an injunction. The first he may enforce with or without process of law. For example, he may cut off the boughs of overhanging trees, or pull down a ruinous structure that threatens to fall upon his property. One who thus takes the law into his hands needs to act with great care, for if he does more than is actually necessary to relieve himself of the nuisance, he becomes a wrongdoer himself. If he brings a suit for damages, he is entitled to nominal damages upon proving the nuisance; and in case he shows he has sustained actual damages, he is entitled to those. If the defendant has acted maliciously, he may be compelled to pay punitive damages. (See DAMAGES.) The most efficient remedy, however, is that of injunction (q.v.). Consult: Wood, *Law of Nuisances* (San Francisco, 1893); Garrett, *Law of Nuisances* (London, 1897); Pollock, *The Law of Torts* (ib., 1902).

NUKHA, *nōō-kā'*. A town in the Government of Yelizavetpol, Transcaucasia, situated about 150 miles northwest of Baku (Map: Russia, G 6). It is the centre of a silk-producing district. The town is Oriental in appearance. It was formerly the capital of a khanate, and retains the ruins of an ancient palace. Population, in 1897, 24,811, chiefly native Tatars and Armenians.

NÜLL, *nul*, EDUARD VAN DER (1812-68). An Austrian architect, born in Vienna. He studied at the Academy, and with his fellow student, August von Siccardsburg, aimed at the promotion of the Renaissance style. Their sojourn in Italy was supplemented by a study trip to France, England, and Germany, and on their return to Vienna Nüll was appointed professor at the Academy. Henceforth associated in the construction of various noteworthy edifices, their joint activity reached its brilliant climax in the erection of the splendid Vienna opera house (1861-68). Before its completion Nüll took his life in a fit of melancholia.

NULLIFICATION (Lat. *nullificatio*, contempt, making as nothing, from *nullificare*, to despise, make as nothing, from *nullus*, none + *facere*, to do, make). In American history, the formal suspension by a State within its territorial jurisdiction of a law of the United States. The right was first asserted in the famous Virginia and Kentucky Resolutions (q.v.) of 1798 and 1799. Jefferson and Madison were the spokesmen of Kentucky and Virginia respectively. In the Kentucky Resolutions of 1798 which were adopted by the Legislature, it was declared that the Union was a 'compact' and, as in other cases of compact, each party had a right to judge for itself of infractions and of the mode of redress. The resolutions of 1799 went even further, and declared that a nullification by the State sovereignties of all unauthorized acts done under cover of the Constitution was the rightful remedy in cases of infraction. The Virginia Resolutions did not go so far, but characterized the Union as a 'compact' and called upon the other States to join her in declaring the Alien and Sedition Laws null and void. No further action was taken for the time by these or other States to put into execution the methods of 're-

dress' here enunciated. After this there were occasional attempts to defeat the execution of legislative acts or judicial mandates of the United States courts, but with only partial success. Thus in 1809 the Government of Pennsylvania ordered out the militia to resist a mandate of the Federal court. Again, after the enactment of the Embargo Act the governments of several of the New England States, whose commerce and trade had been nearly destroyed, resorted to various means either of judicial construction or evasion to nullify the operation of the United States statute. The second war with Great Britain, which was vigorously opposed in New England, increased the nullification spirit in that section. In several States the operation of Federal enlistment statutes was defeated by the refusal of the State governments to comply with their requirements, and the opposition to the war policy increased to such an extent that a convention was called at Hartford with a view, it was believed, of taking steps toward separation from the Union. (See **HARTFORD CONVENTION**.) A somewhat successful nullification of the Federal will occurred in Georgia in 1825-29 through the assertion by the State Government of jurisdiction over the lands occupied by the Cherokee Indians. In none of these cases was the constitutional right to suspend a law of the United States made the basis of the violation. The first open assertion of nullification as a constitutional right of each individual State appeared in a paper prepared by John C. Calhoun in 1828 for the use of the South Carolina Legislature, and entitled *The South Carolina Exposition*. In this paper Calhoun argued that the States were sovereign, that the Federal Government was their agent, and that whenever a sovereign State became satisfied that the agent was misusing the powers delegated to it it was the right of such State to interpose and suspend the operation of the power thus being abused. According to this view the State had only to decide that a given statute of Congress was unconstitutional or oppressive, and then, acting through a convention (for Calhoun did not recognize the right of the Legislature in the premises), formally to suspend its further operation within the territory of the State until three-fourths of the States in national convention should declare the suspended act of Congress a valid and reasonable law. In 1830, after the publication of the *South Carolina Exposition*, Senator Robert Y. Hayne (q.v.), from South Carolina, in the celebrated debate with Daniel Webster (on the Foote resolution), made a brilliant defense of the nullification doctrine, and insisted, unlike Calhoun, that the formal act of suspension could be made by the Legislature. The immediate occasion for the assertion of the right of nullification by the two Carolinas was the rapid growth of the system of protective tariffs which, it was claimed, acted injuriously upon South Carolina and the Southern States generally, where manufacturing industries had not gained a foothold. The Tariff Act of 1824, itself containing high protective features, had been followed by the so-called 'tariff of abominations' of 1828, and a tariff act but little less favorable of 1832. The time had now arrived for the trial of the new theory, and accordingly the Governor of South Carolina called the Legislature together for such action as it might deem proper. The Legislature

summoned a convention representing the 'sovereignty' of the State, and on November 24, 1832, this body passed an ordinance declaring the tariff acts of 1828 and 1832 null and void, prohibited the payment of duties after February 1, 1833, forbade appeals, on the questions involved, to the Supreme Court of the United States, and declared that if the Government of the United States attempted to interfere South Carolina would no longer consider herself a member of the Union. The new Legislature, which met in December, put the State on a war footing and passed a series of acts to enable the State officers to carry out the policy of nullification. Meantime President Jackson took measures to enforce the collection of the duties at Charleston, and on December 11th issued his celebrated proclamation warning the people of South Carolina that they were being misled by designing men, whose object was disunion and treason, and that he had no discretionary duty, but must enforce the laws of the Union. Congress came to his aid and passed the so-called 'Force Bill' in March, 1833, but in the meantime a compromise tariff measure had been agreed upon and made further resort to the Force Bill unnecessary. On March 6th the South Carolina convention met and repealed the ordinance of nullification. The conflict was thus postponed, and whether Union or nullification triumphed in this controversy is still a debatable question. Consult: Johnston, in Lalor, *Cyclopædia of Political Science* (New York, 1893); Houston, *A Critical Study of Nullification* (ib., 1896); and Powell, *Nullification and Secession* (ib., 1897).

NULLIPORE (from Lat. *nullus*, none + *porus*, passage, pore). A general name for the more massive coral-like calcareous algae that grow on the outside of coral reefs and thus afford some protection to the more delicate corals growing inside. They belong to the Rhodophyceæ. The most important genus is *Lithothamnium*. See **CORALLINÆ**.

NUMANTIA, nû-măn'shî-á. The chief town of the Celtiberian people called Arevaci in ancient Spain. It was situated on the Douro (Durius), in the neighborhood of the present Soria in Old Castile. The site is probably marked by the present Puente de Garra. Numantia is celebrated for the heroic resistance which it made to the Romans, from B.C. 153, when its citizens first met a Roman army in battle, to B.C. 133, when it was taken and destroyed by Scipio the Younger, after a siege of fifteen months, in the course of which famine and the sword had left alive very few of its 8000 brave defenders. See **HISPANIA**; **SCIPIO**.

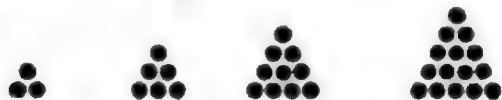
NUMA POMPILIUS. In the mythic history of Rome, the successor of Romulus. He was a native of Cures in the Sabine country, and was universally revered for his wisdom and piety. Unanimously elected King by the Roman people, he soon justified by his conduct the wisdom of their choice. After dividing the lands which Romulus had conquered, he proceeded, with the assistance of the sacred nymph Egeria, to draw up religious institutions for his subjects, and thus stands out in the primitive legend as the author of the Roman ceremonial law. His reign lasted for thirty-nine years, and was a golden age of peace and happiness. The only feature in the myth of Numa Pompilius which we

can regard as probably historical is that which indicates the infusion of a Sabine religious element into Roman history at some remote period.

NUMA ROUMESTAN, nu'mà rōō'mēs'tān'. A romance by Alphonse Daudet (1881), and the name of its chief figure, a typical Provençal who has been identified as Gambetta. The thread of the story is the opposition of the northern and southern temperaments, as shown in the light-hearted and irresponsible Numa and his Parisian wife, Rosalie, and is the antithesis in development of the author's happy relations with his northern wife.

NUMBER (OF., Fr. *nombre*, from Lat. *numerus*, number; connected with Gk. *ἀριθμῶ*, *nemein*, to distribute, and ultimately with Goth. *niman*, OHG. *neman*, Ger. *nehmen*, obsolete Eng. *nim*, to take). Number is the result of counting or of the comparison of a magnitude with a standard unit. This is more precisely expressed by Newton's definition—the abstract ratio of one quantity to another of the same kind. If a name is attached to the abstract number to indicate the nature of the quantity measured, the resulting number is said to be concrete. Thus, the ratio of the length of a room to one yard may be the abstract number 5; but 5 yards, the measure of the length of the room, is a concrete number. In the evolution of number through the application of the fundamental operations to positive integers, there have arisen the fraction, the irrational number, the negative number, and the complex number. All these kinds of number may be found described in special articles.

Various classifications of numbers, some of which have become obsolete, date from the time of Pythagoras. Among those extant are *odd* and *even*, *prime* and *composite* (q.v.), *rational* and *irrational* (q.v.), and *figurate* numbers. The last classification grew out of the Greek tendency to associate numbers with geometric ideas. This notion may be illustrated by arranging groups of dots corresponding to the numbers 3, 6, 10, 15, as shown in the figures.



These forms, being triangular, suggest the propriety of calling the numbers 3, 6, 10, 15, *triangular* numbers. In the same way the numbers 4, 9, 16, 25, came to be called *square* numbers. Since other series of numbers can be made to correspond to pentagons, and still others to various other polygons, the general term *polygonal* numbers was applied to all numbers of this class. An arithmetic definition of polygonal numbers as old as Hypsicles reads, "If as many numbers as you please are set out at equal intervals from 1, and the interval is 1, their sum is a triangular number; if the interval is 2, a square; if 3, a pentagonal; and generally the number of angles is greater by 2 than the interval." Spherical shot piled in the form of triangular pyramids, or square pyramids, or held in cubical boxes suggest numbers which were called *pyramidal* and *cubical*. For example, 4, 10, 20 are pyramidal numbers, and 8, 27, 64 are cubical numbers. The fact that some of these numbers correspond to figures of two dimensions and others to those of three dimensions also gave rise to the classifications *plane* and *solid*. The

numbers in each of these groups belong to a series having special properties and which is usually discussed in works on higher algebra under the title *Figurate or Polygonal Numbers*. Among the obsolete classifications are *amicable* (q.v.), *perfect*, *defective*, *redundant*, and *heteromecic* numbers. A perfect number is one equal to the sum of its aliquot parts; e.g. $6 = 1 + 2 + 3$. If the sum of the aliquot parts exceeds the number, it is called redundant; if it is less, defective. A heteromecic number is a number of the form $m(m+1)$.

THEORY OF NUMBERS. This is one of the most intricate and extensive branches of mathematics. It treats principally of the forms and properties of numbers. Thus, many indeterminate problems of the Diophantine type (see **DIOPHANTINE ANALYSIS**) belong to this subject; e.g. to find two numbers the sum of whose squares shall be a square number is a condition satisfied by 5 and 12, 8 and 15, 9 and 40. . . . To find three square numbers in arithmetical progression is a condition satisfied by 1, 25, and 49, or by 4, 100, and 196. Various algebraic formulas serve to express all integers by assigning proper values to the letters involved. Thus by giving to m the successive values 0, 1, 2, 3, . . . $2m$ any of the following groups of formulas: $2m$, $2m+1$; $3m$, $3m+1$, $3m+2$; $4m$, $4m+1$, $4m+2$, $4m+3$, the natural series of numbers results. This is evident since there is one number between every two consecutive even numbers, there are two numbers between every two consecutive multiples of three, three between every two consecutive multiples of four, and so on. By means of such formulas, many properties of numbers may easily be exhibited. E.g. the product of two consecutive numbers is divisible by 2. Let $2m$ be one of the numbers; then the other is either $2m+1$ or $2m-1$; the product, $2m(2m+1)$, contains 2 as a factor, and hence is divisible by 2. The product of three consecutive numbers is divisible by 6. For, let $3m$ be one of the numbers (as in every triad of consecutive numbers one must be a multiple of 3), then the others are $3m-2$ and $3m-1$, or $3m-1$ and $3m+1$, or $3m+1$ and $3m+2$. Each of the three possible products, $3m(3m-2)(3m-1)$, or $3m(3m-1)(3m+1)$, or $3m(3m+1)(3m+2)$, is obviously divisible by 3; and as, besides, at least one of each pair of factors by which $3m$ is multiplied is an even number, the product must also be divisible by 2; but being divisible by 3 and by 2, it is divisible by 6. It may similarly be shown that, in general, the product of n consecutive integers is divisible by $1 \cdot 2 \cdot 3 \cdot \dots \cdot n$, called factorial n . These propositions form the basis of proof for many properties of numbers, such as: the difference of the squares of any two odd numbers is divisible by 8; the difference between a number and its cube is the product of three consecutive numbers, and is consequently always divisible by 6; any prime number which, when divided by 4, leaves a remainder unity, is the sum of two square numbers (thus, $41 = 25 + 16 = 5^2 + 4^2$, $233 = 169 + 64 = 13^2 + 8^2$, etc.). Besides these there are a great many interesting properties of numbers which do not come under any of the common classifications. Thus, the sum of the first n odd numbers equals n^2 ; e.g. $1 + 3 + 5 = 3^2$; $1 + 3 + 5 + 7 = 4^2$, etc.

HISTORY. No essential advance was made in the theory of numbers beyond the knowledge of

the Greeks until the time of Vieta and Bachet (1612). The latter gave a satisfactory treatment of indeterminate equations (q.v.) of the first degree in his *Problèmes plaisants et délectables* (1612; 5th ed. 1884). Fermat (works published posthumously, 1670, 1679) enlarged the theory of primes and proved some of the most elegant properties of numbers. Legendre (1798), in his valuable *Essai sur la théorie des nombres*, epitomized all the results that had been published up to his time, and contributed original and brilliant investigations, especially on the law of quadratic reciprocity. Gauss (1801) called this law the *Theorema Fundamentale in Doctrina de Residuis Quadratis*. It relates to the following property of two odd and unequal prime

numbers: Let $\left(\frac{m}{n}\right)$ be the remainder which is left after dividing $m^{\frac{n-1}{2}}$ by n , and let $\left(\frac{n}{m}\right)$ be the remainder left after dividing $n^{\frac{m-1}{2}}$ by m . These remainders are always +1 or -1. Whatever the prime numbers m and n may be, we always obtain $\left(\frac{n}{m}\right) = \left(\frac{m}{n}\right)$ in case the numbers

are not both of the form $4x+3$. But if both are of the form $4x+3$, then we have $\left(\frac{n}{m}\right) = -\left(\frac{m}{n}\right)$. These two cases are comprised in the formula $\left(\frac{n}{m}\right) = (-1)^{\frac{m-1}{2} \cdot \frac{n-1}{2}} \left(\frac{m}{n}\right)$. Propositions

embodying this law occupied the attention of Cauchy, Jacobi, Eisenstein, and Kummer. Up to 1890, twenty-five distinct demonstrations of the law of quadratic reciprocity had been published, making use of induction and reduction, of the partition of the perigon (see POLYGON), of the theory of functions, and of the theory of forms.

The theory of primes has attracted many investigators during the nineteenth century, but the results have been detailed rather than general. Tchebisheff (1850) was the first to reach any valuable conclusions in the way of ascertaining the number of primes between two given limits. Riemann (1859) also gave a well-known formula for the limit of the number of primes not exceeding a given number.

To Kummer is due the treatment of *ideal numbers*, a part of the general theory of complex numbers. They are defined as factors of prime numbers, and possess the property that there is always a power of these ideal numbers which gives a real number. E.g. there exist for the prime number p no rational factors such that $p^3 = A \cdot B$, where A is different from p and p^2 ; but in the theory of numbers formed from the twenty-third roots of unity, there are prime numbers p which satisfy the condition named above. In this case, p is the product of two ideal numbers, of which the third powers are the real numbers A and B , so that $p^3 = A \cdot B$.

The theory of congruences may be said to start with Gauss's *Disquisitiones*. He introduced the symbolism $a \equiv b \pmod{c}$, and explored most of the field. Tchebisheff published in 1847 a work upon the subject in Russian, and Serret did much toward making the theory known in France.

The theory of forms (see FORMS) has been developed by Gauss, Cauchy, Poinset (1845), Lebesgues (1859, 1868), and notably Hermite. In

the theory of ternary form Eisenstein has been a leader, and to him and H. J. S. Smith (q.v.) is also due a noteworthy advance in the theory of forms in general. Smith gave a complete classification of ternary quadratic forms, and extended Gauss's researches concerning real quadratic forms to complex forms. The investigations concerning the representation of numbers by the sum of 4, 5, 6, 7, 8 squares were advanced by Eisenstein, and the theory was completed by Smith.

The theory of irrational numbers (see IRRATIONAL NUMBER), practically untouched since the time of Euclid, received new treatment at the hands of Weierstrass, Heine, G. Cantor, and Dedekind (1872). Méray had taken in 1869 the same point of departure as Heine, but the theory is generally referred to the year 1872. Weierstrass's method has been completely set forth by Pincherle (1880), and Dedekind's has received additional prominence through the author's later work (1888), the recent indorsement by Tannery (1894), and, in America, the recent (1901) translation of his work. Weierstrass, Cantor, and Heine base their theories on infinite series, while Dedekind founds his on the idea of a cut (*Schnitt*) in the system of real numbers, separating all rational numbers into two groups having certain characteristic properties. The subject has received later contributions at the hands of Weierstrass, Kronecker, and Méray.

The theory of continued fractions (due to Cataldi, 1613) was brought into prominence by Lagrange and further developed by Druckenmüller (1837), Kunze (1857), Lemke (1870), and Günther (1872). Ramus (1855) first connected the subject with determinants, to which phase Heine, Möbius, and Günther also contributed. Dirichlet also added to the general theory, as have numerous contributors to the applications of the subject.

Transcendental numbers were first distinguished from algebraic irrationals by Kronecker. Lambert proved (1761) that π (see CIRCLE) cannot be rational, and that e^n (e being the base of hyperbolic logarithms and n being rational) is irrational. Legendre (1794) showed that π is not the square root of a rational number. Liouville (1840) showed that neither e nor e^n can be a root of an integral quadratic equation. But the existence of transcendental numbers was first established by Liouville (1844, 1851), the proof being subsequently displaced by G. Cantor's (1873). Hermite (1873) first proved e to be transcendental, and Lindemann (1882), starting from Hermite's conclusions, showed the same for π . Lindemann's proof was much simplified by Weierstrass (1885), still further by Hilbert (1893), and has finally been made elementary by Hurwitz and Gordon.

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TIONAL NUMBER; NEGATIVE QUANTITY; COMPLEX NUMBER; QUATERNIONS.

NUMBERS (Lat. *Numeri*, Gk. *Ἀριθμοί*, *Arithmoi*, Heb. *Bēmīd̄bār*, in the wilderness, the fourth word of the book), **BOOK OF**. The fourth book of the Pentateuch. It consists of thirty-six chapters, and receives its common name 'Numbers' from the repeated references to the 'numbering' of the people which it contains. It is not a separate work, but constitutes a division of the group of six books—Pentateuch and Joshua—now designated by scholars as the *Hexateuch* (q.v.). The sources in the book are precisely the same that are found in the other divisions of the Pentateuch, viz. (a) the historical compilation designated as JE (see **ELOHIST AND YAHWIST**); (b) the Priestly narrative, including portions of the Priestly Code (see **LEVITICUS**; **HEXATEUCH**); together with (c) the usual additions and editorial insertions of the group of writers who welded these constituent elements into a consistent whole. The book in its present form falls naturally into three main sections: (a) i.-x. 10; (b) x. 11-xix.; (c) xx.-xxxvi. The first section embraces: (1) the census of the people (i.-ii.); (2) series of ordinances for the Priests and Levites (iii.-iv.), including general and specific duties, positions among the tribes, and census of Levites; (3) various laws—leper, marital jealousy, nazirite (v.-vi.); (4) dedication of altar (vii.); (5) miscellaneous ordinances with illustrative cases (viii.-x. 10). The second section contains: (1) the wanderings (x. 11-28); (2) revolts against Moses by the people, Aaron, and Miriam (xi.-xii.); (3) spies sent to Canaan (xiii.-xiv.); (4) various ordinances (xv.); (5) rebellion of Korah with story of Aaron's selection (xvi.-xvii.); (6) ordinances for priests and people (xviii.-xix.). The third section embraces: (1) continuation of narrative of traditional history in the wilderness (xx.-xxi.); (2) story of Balaam (xxii.-xxiv.); (3) story of cult of Baal-peor (xxv.); (4) second census (xxvi.); (5) groups of ordinances with historical setting and illustrative cases (xxvii.-xxxvi.).

The Book of Numbers thus furnishes an admirable illustration of the method pursued by the Hebrew compilers in combining various historical sources and in using the Priestly Code (from which all the legal portions of the book are taken) as historical material to illustrate and confirm the religious point of view of the later editors and the theory upon which they base their historical narrative, which carries the complete religious organization of Israel back to the days of Moses. See **HEXATEUCH**.

BIBLIOGRAPHY. Besides the commentaries of Dillmann, Strack, Bennett, and the forthcoming ones of Baentsch and Gray, and the introductions to the Old Testament by Driver, Cornill, Wildeboer, Kuenen, and Kautzsch, consult Addis, *Documents of the Hexateuch* (London, 1898); Carpenter and Battersley, *The Hexateuch* (London, 1900).

NUMB-FISH. A torpedo-ray. See **TORPEDO**.

NUMERALS (Lat. *numeralis*, relating to number, from *numerus*, number). A system of figures or symbols to represent numbers; more particularly the Hindu or Arabic system, which employs the characters 0, 1, 2, 9, of which all, or sometimes the last nine, are called 'digits.'

Thus we speak of writing the numeral for 'five' meaning '5.' The word, however, is applied to other systems, as in speaking of the Roman numerals or the Greek numerals. Our common numerals come from old Sanskrit alphabetic forms. They appear in the tenth century in the form:

1 ८ ३ ४ ५ ६ ७ ८ ९ ०

being attributed to Boëthius (q.v.), but are probably due to some later writer. In substantially this form, they are found in the time of Gerbert (see **SYLVESTER II.**), written upon counters for use upon one kind of the abacus (q.v.), and bearing the name 'apices.' This form is essentially that of the *Gobar* or *Gubar* (dust) numerals, possibly so called because they were written on the sanded board used in the Orient. These numerals appear among the Western Arabs of that period in the following form written from right to left:

0 2 6 6 8 5 7 8 2 1

These numerals changed slowly from the time of their introduction into Europe, notably by Gerbert and Leonardo of Pisa (see **FIBONACCI**), until they had assumed, at the close of the fifteenth century, a form approximately like those known to us. Printed arithmetics then began to appear, and they acted as an obstacle to further changes. These numerals, inherited from the Arabs, have commonly been designated as Arabic, although in their origin they might more properly be called Hindu. Since, however, they were not particularly usable until the introduction of the zero made possible a place value, and since the zero was introduced, so far as we know, by Arab writers, the credit may well be given to the latter. The common numerals are well adapted to the decimal system, having exactly ten symbols. The Roman numerals, on the contrary, while used with a decimal system of counting, were not well adapted to it, and allowed for no simple place value. See **NOTATION**; **NUMERATION**.

NUMERATION (Lat. *numeratio*, a counting, from *numerare*, to count, from *numerus*, number). The oral as opposed to the written expression of numbers. Numeration implies the naming of numerals (q.v.) and groups of numerals expressing numbers, the nomenclature thus employed having much to do with the efficiency of the system. Thus, if to every number there corresponded an independent name, a lifetime would not be sufficient in which to learn the numbers from one to a million. The common or decimal system proceeds by using independent names for a few of the smaller numbers and certain groups, and then repeats these names to express various numbers of groups. In this system the fundamental group is ten, independent names are given to the numbers represented by 1, 2, 9, 10, 100, 1000, 1,000,000, and all intervening numbers are expressed by combining these names. In the evolution of language the names of a few numbers have lost their suggestiveness, but they are probably not exceptions to the regular system of formation; e.g. the etymologies of eleven and twelve suggest their original meaning to have been *one plus ten* and *two plus ten*.

In reading numbers it is convenient to separate the digits, beginning at the decimal point, into groups of three each. The groups of integers are then expressed by units, thousands,

millions, billions, trillions, etc. Each group of integers includes three orders, viz.: (1) the order of the group itself; (2) the tens of that order; and (3) the hundreds of that order. Similarly, in each group of decimals the three orders are: (1) the order of the group itself; (2) the hundreds of the order of the preceding group; and (3) the tenths of the order of the preceding group. Thus, for example, the number 9,321.34567 is expressed:

Thousands	Units			Thousandths	Millionths		
	hundreds	tens	units	tenths	hundredths	thousandths	
9 thousands	3	2	1	3	4	5	
							6 ten-thous. 7 hundred-thous. 0 millionths

Usage has not fully determined the names to be employed beyond hundred millions. The French and Americans call 1000 millions a billion; the English and Germans use the word billion to designate a million million, and so on in groups of six figures.

NUMERICAL NOTATION. In modern music, a system used in theoretical works on music, of indicating single tones or entire chords by means of numerals. Every tone of a musical instrument can be denoted by a numerical sign indicating accurately its pitch. Middle C (the first note of the treble-clef requiring a ledger-line *below*, or the first note of the bass-clef requiring a ledger-line *above*) is denoted by the small letter *c* with the number 1 placed on the right side above, *c*¹. The tones of the octave below this middle C are indicated by the *small* letters of the alphabet *without* any numbers, *c, d, e, f, g, a, b*; the next lower octave by the *capital* letters, *C, D, E, F, G, A, B*; the octave below this by capitals with the number 1 (either on the right side above, or, better, on the left side below), *1C, 1D, 1E, or C¹, D¹, E¹*, etc. The octave beginning with middle C adds the number 1 to the *small* letters, *c¹, d¹, e¹*, etc.; the next octave adds 2, *c², d², e²*, etc.; the next 3, *c³, d³, e³*, etc. This system of notation is especially used in indicating the range of various instruments. The range, therefore, of the piano can briefly be indicated as from *1A—c⁴*. The pitch of the different strings of the violin is accurately indicated by *g, d¹, a¹, e²*; of the cello by *C, G, d, a*.

Arabic figures are also used to indicate the fingering in compositions. For finger-marking on the violin only four numbers are used, as the thumb is not used in playing that instrument. 1 refers to the index, 2 to the middle finger, etc. In marking the fingering of piano compositions the thumb is indicated by 1, the index by 2, middle finger by 3, etc. The older system of marking the thumb by *x*, and the other fingers as in violin-music, has fallen into complete disuse. For use of figures in figured bass notation, see FIGURED BASS.

In violin music the Roman numerals I, II, III, IV represent the strings *e, a, d, g*, respectively, but ordinarily Roman figures are employed to indicate chords. A large figure indicates a major, a small a minor triad. The name of the key is placed before the figure, a capital letter to denote a major, a small letter to

denote a minor key. Thus A IV means the subdominant of A major (a major chord on the fourth degree of A); C III, the minor triad on the third degree of C major; a V, the dominant of A minor (a major triad on the fifth degree). A diminished triad is marked by a small figure with a 0 on the upper right side; an augmented triad, by a prime ('). Thus Dvii° means the diminished triad on the seventh degree of D major (*c[♯], e, g*); fill', the augmented triad on the third degree of F minor (*a^b, c, e*). Chords of the seventh are indicated as the triads with an Arabic 7 on the lower right side; GV, means the chord of the dominant seventh in G (*d, f[♯], a, c*); bvii[°], the chord of the diminished seventh in B minor (*a[♯], c[♯], e, g*). This system was introduced by the eminent theorist G. Weber.

NUMIDIA (Lat., from *Numida*, Numidian, nomad, from Gk. *nomas*, nomad, from *nomos*, *nemein*, to pasture, to distribute). Originally the Roman name for that part of Northern Africa lying between the provinces of Africa Propria and Mauretania, corresponding very nearly to the modern Algeria. It was bounded on the west by the river Mulucha (now Muluya), which separated it from Mauretania, and on the east by the river Tusca (now Wadi-el-Berber). On the south it reached to the chains of Mount Atlas and the Lacus Tritonis, which separated it from the land of the Gætulians and Libya. The inhabitants of Numidia, as of Mauretania, belonged to the race from which the modern Berbers are descended. They were a warlike race and excelled as horsemen, but were faithless and unscrupulous. Of their tribes, the *Massyli* in the east and the *Massasyli* in the west were the most powerful. In the great struggle between the Carthaginians and the Romans they at first fought on the side of the former, but subsequently the King of the eastern Numidians, Masinissa (q.v.), joined the Romans, and rendered them effective service in the war with Hannibal. Favored by the conquerors, he united all Numidia under his sway. Of his successors in this kingdom, Jugurtha and Juba I. are the most famous. After the victory of Cæsar over Juba in the African war, Numidia became a Roman province (B.C. 46) under the name of Africa Nova, but Augustus afterwards gave the western part—from the river Ampsaga, now Wadi-el-Kebir—with Mauretania to Juba II., and the eastern part was united with Africa Vetus to form the new Province of Africa. The Emperor Septimius Severus erected Numidia once more into a province. It was conquered successively by the Vandals, the Byzantines, and the Arabs. Before the invasion of the Vandals, Numidia was a stronghold of African Christianity, and the jealousy between the Numidian bishops and the clergy of Carthage was one of the causes that brought about the Donatist Schism. See DONATISTS.

NUMIDIAN CRANE. See CRANE.

NUMISMATIC AND ARCHÆOLOGICAL SOCIETY, THE AMERICAN. An association organized in 1858 and incorporated in 1865. Its objects are the collection of coins and medals, the investigation of matters connected therewith, and the spreading of the science of numismatology. The society has a membership of three hundred, and its headquarters are in New

York City, where it possesses a valuable collection and a good library of books on numismatics, archaeology, and kindred topics.

NUMISMATICS (from Lat. *numisma*, *nomisma*, from Gk. νόμισμα, coin, legal tender, from νομίζω, *nomizein*, to use customarily, from νόμος, *nomos*, law, custom). The science which has for its object the study of coins and medals in their historical, artistic, iconographic, and economic aspects. In so far as it concerns ancient coins, numismatics is a branch of archaeology; but as, in its broadest scope, it includes the coins of all times and peoples, it is a distinct science, wider in its field than any of those branches of investigation which it serves so well to elucidate and expand.

MATERIAL OF THE STUDY. NOMENCLATURE. The material of the study is the *coin* (a word derived through the French *coin*, 'a die,' from the Latin *cuneus*, 'wedge'), which is, strictly speaking, a piece of metal stamped with a legal impress for public circulation. Isidorus (*Origines*, xvi. 17) well expresses this definition: "There are three essentials of a coin: metal, legal type, and weight. In the absence of any of these essentials, it will not be a coin." In its strict application, then, numismatics should confine itself to the legal metallic currency of government, to the exclusion of all else. But there are many objects that bear so close a resemblance in form or in usage to actual coins, that they are naturally and inevitably included in the study. Such are *medals*, struck in commemoration of an event or a person, and not for circulation as money (see *MEDAL*); the ancient *contorniates*, the use of which is not yet fully understood, though they may well have served as checkers in the games; the obscene *spintriae*; the so-called *tesserae* of ivory, bone, or lead; and in modern times, siege-pieces; jetons; hard times, tradesmen's, bank tokens, and paper currency, not to speak of such primitive mediums of exchange as the cowry-shells of India and the wampum of the American Indians.

Numismatics has an exact terminology peculiar to its own needs. That side of the coin on which the face or main device is struck is called the *obverse* (Ger. *Hauptseite*, Fr. *droit* or *avers*, It. *dritto*), while the other side is known as the *reverse* (Ger. *Rückseite* or *Kehrseite*, Fr. *revers*, It. *rovescio*). The characteristic device on either side, whether portrait, figure, or scene, is called the *type*. In describing the type, the terms 'to right,' 'to left' refer to the right and left of the spectator. Besides the 'type' there is often a small figure, or adjunct (especially in ancient coins), as a mint-mark, or the like, which serves to identify the coin more closely. This is called a *symbol*. The principal inscription of either side, which may be circular, following the line of the rim, or in one or more lines across the surface, is called the *legend*. That part of either surface left unoccupied by *type* and *legend* is known as the *field*, and is often occupied by symbols, letters, or monograms. The lower portion of the field, separated from the rest by a horizontal line, is the *exergue*. The term *flan* is applied to the disk, or blank, of metal, ready to be coined, and hence to the coin itself regarded as a metallic disk. Thus a coin is said to be struck on a broad or narrow *flan*. The diameter of the *flan* determines the

module, or measurement, of the coin. Three systems are in vogue for measuring coins: (a) the so-called 'Mionnet's scale,' a purely arbitrary method based on circles of varying diameter, used mostly in the older works, and now obsolete; (b) by fractions of the inch; this is the recognized usage in England; (c) by millimeters. The last is the most scientific method, and is in use on the Continent of Europe and largely in this country as well. The weight of coins is often a very important consideration, especially in determining the place of ancient coins. In England the weight is registered in troy grains. On the Continent, however, and largely in America, it is given in grams. One gram is equal to about fifteen grains. *Patina* is a technical term of ancient numismatics. Copper coins that have long lain in the ground, in connection with certain salts there existing, acquire a delicate surface-oxidation, generally green, which is called *patina*, and adds much to the beauty of the coin. Coins so oxidized are said to be *patinated*. There are two ways of making coins: (a) by *casting* in molds, the more primitive method, afterwards mostly confined to counterfeits; (b) by *striking* with dies. Even in the case of *struck* coins, the *flan* is often prepared by casting.

The various *metals* used for coinage deserve a word of elucidation. (A) *Gold* was the standard metal of Asia Minor in the earliest times. It was rarely coined in Greece proper, but was largely minted by Alexander the Great and his immediate successors, by the Egyptian Ptolemies, in the Græco-Bactrian Empire, and at certain West Hellenic cities, as Syracuse in Sicily and Tarentum in Italy. The Romans first coined gold for the payment of their troops engaged in war against Hannibal in Southern Italy (B.C. 216-202). During the Republican period gold was coined only at irregular intervals and in limited quantities. But with Augustus and his successor there were enormous issues of gold currency, until the third century, when it became rare, until again renewed by Constantine and the later Roman and Byzantine emperors. Again, during the Dark Ages, in Europe gold fell into disuse as money, to be revived in modern times. It is now the standard in most civilized countries. (B) *Electrum*, a natural alloy of gold and silver in the proportion, roughly speaking, of 73 parts gold to 27 silver, found in the river-beds of ancient Lydia in Asia Minor, was largely coined by the kings of that country and by the Grecian cities along the neighboring coast, especially Cyzicus and Phocæa. An artificially made electrum was used for coins at Carthage, at Syracuse, and by some of the Gallic chiefs. Electrum has the color of very pale gold, whence it was sometimes called 'white gold' (λευκὸς χρυσός) by the Greeks. (C) *Platinum* was coined extensively instead of gold in Russia from 1828 to 1846.

(D) *Silver* was the earliest, and always remained the standard, coinage of Greece. It was introduced into Rome B.C. 268, and was universal in ancient, as it is in modern, times. During the Middle Ages it was the standard currency, but is now replaced as such by gold in most countries, being used only for subsidiary coinage. (E) *Billon* is a name applied to certain base coins of ancient times, having silver for a basis with a very heavy alloy of copper, tin, or lead. Such were the *denarii* and *antoniniani* substituted for silver at Rome from Caracalla (A.D.

211) to Diocletian (c.300 A.D.), and the base tetradrachms struck during the Roman Empire at Alexandria in Egypt, Antioch, and Cæsarea in Cappadocia. The latter are sometimes described as of *potin*, but see below. (F) *Copper* was the original standard of value in Italy, and remained the only coinage in Rome until the introduction of silver in B.C. 268, when it tended more and more to become a purely subsidiary coinage. In Greece the standard was, and always remained, silver, though here, as in the East, copper was earlier used for the smaller values. The Greeks derived their copper largely from Cyprus, whence its name, *χαλκὸς κύπριος*, *as cyprium*, or simply *cyprium* or *cuprum*, from which our word 'copper' is derived. The ancient coined copper had a strong alloy of tin; in other words, was really bronze. See also below, under *Brass*. Copper has since always been in common use for 'small change.' (G) *Potin*, or 'pot-metal,' bears the same relation in numismatics to copper as 'billon' to silver. It is technically a mixture of bronze (i.e. copper + tin) and brass (i.e. copper + zinc), with slight traces, sometimes, of lead or of silver, and was used for money by the Gallic Sequani in the first century B.C., and by the mint of Alexandria in Egypt under the Roman Empire until A.D. 296. Modern numismatic works often erroneously describe the base tetradrachms of Alexandria, Antioch, and Cæsarea as being of *potin* instead of billon.

(H) *Brass*, a mixture of copper and zinc, was found in nature and used for coinage under the early Roman Empire and in Asia Minor. It was regarded as more valuable than bronze, and was called *orichalcum* (i.e. *ὀρεχαλκόν*, 'mountain copper'), often corrupted into *aurichalcum*, 'gold-copper;' or *χαλκὸς λευκός*, 'white copper.' In China, brass has always been the ordinary medium of exchange. (I) *Lead*, from its nature, was never well adapted to coinage, yet it was so used occasionally in ancient Gaul and Egypt. It has been a favorite material for counterfeiters at all times, and anciently even the official mints sometimes defrauded commerce by emissions of silver-plated lead coins instead of real silver. The majority, also, of ancient *tesneræ* are of lead. In modern times it is used only for trial pieces and for the cheaper class of medals. (J) *Tin* has only occasionally been used for money, as by the kings of Numidia in the second century B.C., and, according to Aristotle, by Dionysius, Tyrant of Syracuse. In modern times it is found as money among the Chinese, Malays, and Senegambians. (K) *Iron* as money was even rarer than tin in ancient times. We hear of iron coins among the early Lacedæmonians, in Byzantium, in Argos, and elsewhere. (L) *Nickel* was coined in Northern India already in the third century B.C. Otherwise it was never used for money until modern times. Switzerland began to strike nickel pieces about 1850, and since then it has been coined in many countries. (M) *Aluminum* has never served as money, but has frequently been used for medals.

HISTORY OF NUMISMATIC STUDIES. There is no direct evidence that the ancients were collectors of coins as objects of art and curiosity; yet there can be no doubt that many such collections were made. We know that works of art of all kinds found eager collectors in classical

times. We cannot but believe, therefore, that coins also were preserved for their antiquity and their beauty, the more so when we consider the wonderful artistic charm that so many, especially of the Greek series, possess. (See Friedländer, "Ueber Münzsammlungen bei den Römern," in *Zeitschrift für Numismatik*, III. p. 167.) The fall of the Western Empire brought this, as all other manifestations of higher culture, to an abrupt termination.

The revival of classical studies led naturally to an interest in coins. Petrarch, who died in 1374, is said to have been the first modern collector, and sent his objects of art, including coins, as a present to the Emperor Charles IV. Many of the earliest commentators on the classical writers illustrated their notes with figures of coins. Here the knowledge of Roman coins naturally preceded that of the Greek. The first important works on coins did not appear until the sixteenth century. The Italian Andrea Fulvio published in 1517 his *Illustrium Imagines*, with portraits of famous men of ancient times taken from coins and gems. Such collections of coin-portraits became very frequent in the next hundred years. Far more pretentious was the *Fasti Magistratum et Triumphatorum Romanorum* of Hubert Goltz (or Goltzius) of Antwerp—a large folio published at Bruges in 1566; and this he followed at intervals with other works, as histories of Julius Cæsar and Augustus, illustrated by coins. Goltz was a man of learning, but without a high critical faculty, and of so little scientific morality that he did not hesitate to invent at will coins that never existed; and in completing his *Fasti* he created consuls, generals, and private individuals who never lived.

Shortly after the appearance of Goltz's book, Fulvio Orsini (Fulvius Ursinus), a member of the noble Italian family of that name, a man of profound learning, and a great collector of antiquities and coins, published at Rome in 1577 a series of Roman silver coins from his collection of the class commonly known as 'consular' or 'family' coins. This work was highly prized by Scaliger, Ezechiel Spanheim, and Eckhel, who called it 'golden' and 'divine.' Orsini was more careful than Goltz, but many false or wrongly described coins crept into his work without his knowledge. The book was reëdited in 1663 by the French numismatist Patin. A surfeit of other numismatic books followed, of which, however, it is hardly worth while to cite the names, as almost all are unreliable and useless in the extreme. One alone deserves mention, for it was later worked over into a book of value: the *Numismata Imperatorum Romanorum* of Adolph Occo, published at Antwerp in 1579. Goltz and Orsini had given their greatest attention to the coins of Republican Rome. Occo, on the contrary, devoted his work to those of the Empire. The book was scholarly for the period, and collected a vast amount of material. It was reëdited twice at Vienna, in 1601 and 1625; then in 1683 it was entirely done over and published at Milan by Mezzabarba (Mediobarbus); and finally in 1730 a new revision was brought out by Argelati, forming an immense folio, in which the coins are described chronologically reign by reign and year by year. This was the first great attempt at a *corpus* of Roman Imperial coins.

During the seventeenth century we have no

very notable additions to numismatic studies beyond the revisions of earlier works already mentioned. The real labor of this period lay in the gathering into collections of the material for future studies. The works of the French *savant* Jean Tristan, viz. two separate books known as *Commentaires historiques*, published in several editions from 1635 to 1659, deserve mention; as well as the *De Re Nummaria* of Scaliger (1616), the *De Præstantia et Usu Numismatum Antiquorum* of Spanheim (1664), and a series of books on Roman and Greek coins by the explorer and collector Jean Vaillant. One important work belongs to the early eighteenth century, the *Thesaurus Morellianus*, published in 1734 from the manuscript of Andreas Morell by Sigebert Haverkamp, which remained for a long time a chief source of information regarding the Roman 'consular' coins. This century saw the immense growth of the great national collections of Europe which have made possible the scientific study of coins. It was, in fact, the curator of the Vienna cabinet, J. H. Eckhel, who may with justice be called the 'Father of Numismatics,' since his marvelous *Doctrina Numorum Veterum* (8 vols., Vienna, 1792-98) placed the study of ancient coins on a thoroughly scientific basis. He was a man of such phenomenal erudition, accuracy, and judgment that even now, more than a century after his death, his *Doctrina* is in every numismatic library and may be consulted with great profit, if also with discretion. Eckhel's method served as a model for future studies, and his material as a starting-point in the classification of ancient coins. With him begins the modern period, the important works of which will be cited below. The real study of mediæval and modern coins is a development of the eighteenth century. For an account of the growth of numismatic studies, see Babelon, *Traité des monnaies grecques et romaines*, I. 66-325 (Paris, 1901).

ANCIENT COINS — ORIGIN — CLASSIFICATION. Among the most primitive peoples some kind of trade or barter is known; and the precious metals were incontestably used as its medium for centuries before the invention of coinage. Excavations in Chaldaea, Babylonia, and Assyria have brought to light very abundant texts in which gold and silver are named as measures of value. In Genesis (xiii. 2 and xxiv. 35) we are told that Abraham was "very rich in cattle, in silver, and in gold," and again (xxiii. 16) that he paid for the cave of Machpelah "four hundred shekels of silver current with the merchant." In all transactions of this early period the metal was weighed, not counted in bars; an operation that appears not infrequently in the pictures on Egyptian tombs.

It was from the Babylonians that the weight systems passed by various trade routes to all the shores of the Mediterranean, and, with the invention of coinage, were subdivided and adapted to the commercial needs of the Hellenic and Hellenized peoples. The Babylonians used a sexagesimal system; thus, in measuring time, 60 seconds = 1 minute, 60 minutes = 1 hour; so in measuring value, 60 shekels = 1 manah, 60 manahs = 1 kikkar. In the course of transmission from east to west this became slightly modified, so that in Greece we find sums reckoned: 50 στατήρες (or, locally, σίγλοι, = shekels) = 1 μνᾶ (i.e. manah), 60 μνᾶι = 1 τάλαντον

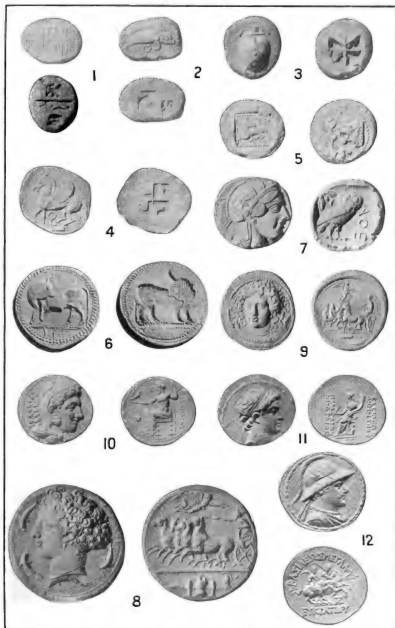
(corresponding to the kikkar). For fractions of the στατήρ (or unit) the Greeks developed a duodecimal system, which became the basis of the Greek coinage and so passed to the early Romans, who, however, superposed upon it their own decimal notation. For a concise account of the transmission of ancient measures from Asia to Greece, consult Head, *Historia Numorum*, introduction (Oxford, 1887).

The first coins in the classical world were struck about B.C. 700. Ancient writers differ as to the place that should hold the honor of the invention, but it may be regarded as certain, however, that gold was first coined in Lydia, and silver in Ægina; and specimens of each of these primitive coinages are fairly common. From these early centres coinage spread with great rapidity to the Ionian coast-cities and the islands in the Ægean Sea, as well as to all Greece and the Greek colonies in Sicily, Italy, and elsewhere. For a thorough examination of the origin of money, consult Babelon, *Les origines de la monnaie* (Paris, 1897).

Ancient coins are classified in general according to the system laid out by Eckhel in his immortal *Doctrina*. The whole mass of material is divided into two general classes, Greek coins and Roman coins. (A) The Greek series (or more properly non-Roman, since it includes also Bactrian, Jewish, Carthaginian, Ibero-Spanish, and Gaulish coins, etc.) is classified in geographical order about the basin of the Mediterranean as follows: (1) Spain, (2) Gaul, (3) Italy, (4) Sicily, (5) Macedon, Thrace, etc., (6) Greece, (7) Asia Minor, (8) the East, (9) Egypt, (10) the coast of Africa. Under these various heads the subdivision is alphabetical for cities and chronological for kingdoms. The coins of each mint are then treated in detail, chronologically. By another division, Greek coins are classed as (a) autonomous, or struck by the city-republics, (b) regal, (c) Greek Imperial, that is, the Greek money of those towns which, under the Roman Empire, still retained the right of coinage for local circulation. Here, too, are generally added the Roman colonial coins, or coins with Latin inscriptions struck in a number of towns outside of Italy and Sicily, such as Corinth, Laodicea, and Antioch, in the East, and numerous colonies in Spain and Gaul. But the coins of the late Empire, from the Latin mints of Constantinople, Antioch, Alexandria, etc., are classified with the Roman series.

Roman coins are divided into two general classes: those of the Republic and those of the Empire. The former include the *as grave*, or earliest heavy bronze coins, and the so-called 'consular' or 'family' coins, with initials or names of magistrates. Properly, these coins, too, should be classed chronologically; but as the dates of most are very uncertain, they are usually arranged alphabetically by families, as *Aburia*, *Accoleia*, *Acilia*, etc., and subdivided under the various names in order of supposed age. The Imperial series, from Augustus to Romulus Augustulus, is classed by reigns, under each of which the coins are arranged either chronologically or by the alphabetical order of the legend on the reverse. The same is true of the Byzantine series. On ancient coins in general, consult: Babelon, *Traité des monnaies grecques et romaines* (Paris, 1901); Hill, *Handbook of Greek and Roman Coins* (London, 1899); Lenor-

NUMISMATICS I.



1. LYDIA, - PRIMITIVE GOLD STATER
2. PHOCÆA, - GOLD STATER
3. AEGINA, - SILVER DIDRACHM
4. CORINTH, - SILVER DIDRACHM
5. CYRENE, - SILVER TETRACHM
6. SYBARIS, - SILVER STATER (incuse)

7. ATHENS, - - - SILVER TETRACHM
8. SYRACUSE, - - - SILVER DECACHM
9. SYRACUSE, - - - SILVER TETRACHM
10. ALEXANDER THE GREAT, SILVER TETRACHM
11. DEMETRIUS THE GREAT, SILVER TETRACHM
12. BACTRIA, EUCRATIDES, - SILVER TETRACHM

(Numbers 10, 11, and 12 are reduced in size!)

nant, *La monnaie dans l'antiquité* (Paris, 1878-79); Eckhel, *Doctrina Numorum Veterum* (8 vols., Vienna, 1792-98); Mionnet, *Description de médailles antiques grecques et romaines* (16 vols., with supplements, Paris, 1806-37); Grasse, *Handbuch der alten Numismatik* (Leipzig, 1853-54); De Barthélemy, *Nouveau manuel de numismatique ancienne*, vol. i. text, vol. ii. atlas (Paris, 1890).

GREEK COINS—GENERAL CHARACTERISTICS—HISTORY. The coins of the ancient Greeks deservedly occupy the first place in numismatic studies for their artistic excellence, which has never been surpassed, their enormous variety, and the light they throw on every phase of ancient Greek life. In the Hellenic world each town was a more or less independent State, and each proclaimed its autonomy by establishing a mint and issuing coins, generally for circulation within its own domains. The types chosen were extremely various, but generally bore some relation to the local cult. It will readily be seen, therefore, how much we are indebted to coins for our exact knowledge of the religion, mythology, art, and monuments of the ancient Greeks. This will be illustrated briefly in the following section, in which the history of Greek coins will be explained with reference to their *types*. A short preliminary account of the various *denominations*, considered purely as *money*, will not be without value. In the early gold and electrum coinage of Asia Minor the unit was the *στατήρ*, *stater*, or 'standard,' with its divisions, the half-stater (*ἡμιστάτηρ*, *hemistater*), third (*τρίτη*, *tritē*), sixth (*ἑκτη*, *hectē*); and its multiple, the double stater, *διστάτηρον*, or double stater. From their place of emission or from the name of the reigning king they received such names as *Κυζικηνοί*, *Λαμψακηνοί*, *Φοκαῖοι* (staters of Cyzicus, Lampsacus, Phocæa), *Κροίσιοι στατήρ* (stater of Croesus), *Δαρεϊκὸς στατήρ* or *Δαρεϊκός* ('daric' of King Darius), etc. The Persian silver coin was called *σίγλος* (*siglos*, silver daric), which is the Greek form of the Hebrew *sheqel*, shekel, which was a unit of count in Palestine until actually coined by Simon Maccabæus. In Greece the unit of count was the silver *δραχμή*, *drachmē*, which in its origin was probably the value in silver of the grain that could be placed (a 'handful,' *δράξ*) upon one of the scales of the balance. Consequently the two equipoised handfuls, or *δραχμαί*, formed a new 'standard,' or unit of count, a *στατήρ* corresponding to the double drachme (*δίδραχμον*, or silver stater). The Greek subdivision was duodecimal, as follows: the *στατήρ* or silver didrachm was divided into twelve *ὀβολοί* or obols; and for small change the obol itself was divided into 'portions' known as *τριητάρτημύριον* ('three-fourths portion,' contracted to *τριτμήριον*, *tritēmōrion*), *τριημιτάρτημύριον* ('three-eighths portion'), *τεταρτημύριον* ('fourth portion,' contracted to *ταρτημύριον*, *tartēmōrion*), and *ἡμιτάρτημύριον* ('half-fourth portion,' or one-eighth obol). These names, with those of multiples of the drachme, were applied in different States to coins of interchangeable value in gold, silver, and copper, of which the following are the more important: (A) Multiples of the drachme. *Δωδεκάδραχμον*, *dōdekadrachmon*, a silver piece of twelve drachms, coined by the Ptolemies in Egypt and at Carthage. *Δεκάδραχμον*, *dekadrachmon*, of ten drachms, in gold and silver at Athens, at Car-

thage, and in Egypt. The so-called silver 'medallions' of Syracuse are *pentekontalitræ* (see below), equivalent to Attic dekadrachms. *Ὀκτώδραχμον*, *oktōdrachmon*, of eight drachms, coined in gold and in silver by the Ptolemies, in gold by the Seleucidæ, and in silver in Thrace and Carthage. *Ἑξάδραχμον*, *hexadrachmon*, of six drachms, coined perhaps in gold by the Seleucidæ, certainly in silver at Carthage. *Πεντάδραχμον*, *pentadrachmon*, of five drachms, of the Ptolemies in gold, and of the kings of Macedon in silver. *Τετράδραχμον*, *tetradrachmon*, in English *tetradrachm*, of four drachms, a silver coin of universal usage. *Τρίδραχμον*, *tridrachmon*, of three drachms, in silver, at Ephesus, Carthage, Cyme, Alabanda, and elsewhere. *Δίδραχμον*, *didrachmon*, in English 'didrachm,' the silver stater, in universal circulation, like the drachm itself. (B) Divisions of the drachme. *Ἑπτῶβολον*, *heptōbolon*, of seven obols (1 1/8 drachms), the large copper coin of Egypt, struck under Ptolemy Philadelphus. *Ἑξῶβολον*, *hexōbolon*, copper of the second size of Ptolemy Philadelphus. *Πεντῶβολον*, *pentōbolon*, of five obols (5/8 drachm), struck in silver in Athens in the time of Aristophanes the comedian, and in copper of the third size in Egypt. *Τετρῶβολον*, *tetrōbolon*, of four obols, a silver coin at Athens in the fifth century B.C. *Τριῶβολον*, *triōbolon*, of three obols, as a gold coin in Egypt and Carthage; as a silver coin = the *ἡμιδραχμον*, *hemidrachm*, found everywhere. *Διῶβολον*, *diōbolon*, of two obols, in silver everywhere, in bronze in Egypt. *Τριημιῶβολον*, *tri-hēmīōbolon* (i.e. 1 1/2 obols or 1/4 drachm), in silver at Athens, Corinth, Leucas, Tegea, etc. *Ὀβολός*, *obolos*, the small unit, very common as a silver coin; in bronze in Egypt, at Chios, Metapontum, etc. *Ἡμιῶβδιον*, *hēmīōbōdion* (1/2 drachm, 1/2 obol), also very common in silver. The smaller divisions are rarer. The *tritēmōrion* (3/4 obol) is found in silver at Athens, Delphi, etc.; the *tartēmōrion* (1/4 obol) at Athens and under Alexander the Great in silver, at Metapontum in copper; the *hemitartēmōrion* (1/8 obol) also at Athens in silver, at Metapontum in copper. In the Greek cities of Sicily and Italy the name *νόμος* or *νομμος* was given to a silver coin of frequent mintage, similar to the Grecian didrachm or stater. But the Greeks of the West adopted also the native Sikel unit of the *λίτρα*, *litra*, equivalent to the ancient 'pound' of copper, divided into twelve *οὔγκιαι*, *oungkiai*, or ounces, whence the Romans derived their earliest system of the *as grave*. (See below.) On the litral system, a number of fine silver coins were issued, as the splendid 'medallions' of Syracuse, the most artistic coins ever struck, which are *πεντηκοντά-λίτρα*, or pieces of fifty *λίτραι*, and the famous *Δημαρτήτεια* of Queen Demarete; also *δεκάλιτρα* in Sicily, *πεντάλιτρα* at Agrigentum, and *δολιτρα* at Rhegium.

To give an adequate description, even in general terms, of Greek coins as works of art and as historic documents would require a volume; the reader is referred for fuller information to the bibliography appended to this section. For convenience of classification and study, the whole series is arranged in seven historic periods, as follows:

- I. c.700-480 B.C. (*Period of Archaic Art*).
- II. c.480-415 B.C. (*Period of Transitional Art*).
- III. c.415-336 B.C. (*Period of Finest Art*).
- IV. c.336-280 B.C. (*Period of Later Fine Art*).

V. c.280-146 B.C. (*Period of the Decline of Art*).

VI. c.146-27 B.C. (*Period of Later Decline*).

VII. c.27 B.C.-268 A.D. (*Imperial Period*).

FIRST PERIOD—Archaic Art. This embraces all the coins struck from the beginning until the Persian War. Here belong the early gold and electrum coins of Asia Minor, of which the most primitive of all is the electrum stater of Lydia, attributed to the period of Gyges and Ardys (B.C. 700-637), which is without figures, the obverse having merely a series of sunken parallel lines, or striations, and the reverse a rough triple punch-mark. From this beginning we find a gradual development in style and technique. The punch-mark is long retained for the reverse, but it is gradually embellished, first by being divided geometrically, then by the addition of a small figure in relief within the sunken space. The types are generally animal figures or heads. Where the human head appears (for a divinity), the eye is shown in full, though the face be in profile, and the hair is represented by dots. The whole appearance of the figure is apt to be stiff and angular. In Magna Græcia (Southern Italy) the punch-mark is not found; instead, the same type appears on both sides of the coin, in relief on the obverse, concave (or, as it is technically called, *incuse*, i.e. 'struck in') on the reverse. Inscriptions are either wholly lacking or limited to the first letters of a name.

SECOND PERIOD—Transitional Art. This extends roughly from the Persian War to the Athenian expedition against Syracuse (B.C. 415). The coins show a decided advance in style over those of the preceding period. The *incuse* square, or punch-mark, is still often retained, but is much more regular, and more frequently has a device in relief within. The figures are more accurate and varied, with greater attention to anatomical detail. Inscriptions are the rule instead of the exception, but are generally abbreviated, though sometimes names and even titles are written in full. The types are of infinite variety and often quite complex, but almost invariably drawn from the local mythology.

THIRD PERIOD—Finest Art, to the accession of Alexander the Great (B.C. 336). The coins of this period, the finest that the world has yet produced, reflect the art of the greatest Greek sculptors. In fact, the die-engravers often signed their names to their works of art, notably at Syracuse. The type, whether head, figure, or group, is in perfect proportion and exquisitely adapted to the limited space. The subjects are still drawn almost universally from mythology, though the splendid *biga* and *quadrigæ* of certain cities bear allusion often to victories in the national games.

FOURTH PERIOD—Later Fine Art, extending to the death of Lysimachus, King of Thrace (c.280 B.C.). This period, corresponding to the art of Lysippus, illustrates the rise and perfection of portraiture. Alexander the Great himself hesitated to offend the religious susceptibilities of his subjects by substituting his own likeness for that of a divinity on his coins, which bear regularly the head of Zeus Ammon or Herakles or some other god. But his successors little by little introduced their own portraits; and we thus have in the succeeding periods a splendid series of wonderful likenesses of the rulers of the Greek world in the last three centuries be-

fore Christ, notably the Syrian Seleucidæ, the Ptolemies of Egypt, and the Macedonian and Bactrian monarchs.

FIFTH PERIOD—Decline of Art, to B.C. 146, the fall of Corinth and capture of Greece by the Romans. An age of magnificent portraiture; but as regards fabric the coins are broad and flat, with long inscriptions that mar the symmetry of the reverse type, which, too, displays always greater carelessness of details. Coins can now be more accurately dated; in fact, many bear the date and place of mintage in letters or monograms.

SIXTH PERIOD—Later Decline of Art, to the foundation of the Roman Empire (B.C. 27.) This period signalizes the end of the distinctly Greek coinages. It is characterized by base silver coins, often with fine portraits still, but crude in workmanship. The names of local magistrates are extremely common and of great historical value. The inartistic *ciastophori* are in general circulation in Asia Minor. In the farther East the Bactrian money loses its Greek character and becomes Oriental.

SEVENTH PERIOD—The Greek World Under Roman Sway. The Romans partitioned the Greek world into provinces, which were governed by agents sent out from Rome. But while the general management of the provinces was controlled from Rome, the greatest possible degree of home rule was left to the thousands of Greek towns scattered over the old Hellenic world from Parthia to Egypt. Each one of these towns was allowed to retain its local mint and issue bronze coins; while the special privilege of issuing base silver ('billon') tetradrachms was limited to Antioch in Syria, Cesarea in Cappadocia, and Alexandria in Egypt. These coins generally bear the head of the Roman Emperor, and a reverse type of local significance, in a very degraded style of art. The local mints were all closed under Gallienus (c.268 A.D.), with the exception of Alexandria alone, which retained its privilege until A.D. 296.

The standard work of reference on Greek coins is Head, *Historia Numorum* (Oxford, 1887). See also: Head, *Guide to the Principal Gold and Silver Coins of the Ancients* (London, 1881); Gardner, *Types of Greek Coins* (Cambridge, 1883); British Museum, *Catalogue of Greek Coins*, in many volumes by different editors; Bibliothèque Nationale, *Catalogue des monnaies grecques*, by various editors; Macdonald, *Greek Coins in the Hunterian Collection, University of Glasgow* (Glasgow, 1899-1901); Imhoof-Blumer, *Monnaies grecques* (Paris, 1883); Ward, *Greek Coins and Their Parent Cities* (London, 1902).

ROMAN COINS—History and Characteristics. The Italic peoples of Central Italy were a pastoral race, and their earliest medium of exchange was cattle (*pecus*); the Latin words *pecunia*, 'money,' *peculium*, 'property,' and *peculatus*, 'stealing,' are evidence of this. Bronze was the only metal that they possessed in quantity and used for implements, weapons, and ornaments; it thus furnished a convenient substitute for cattle in barter, and in fact for some centuries after the founding of Rome, *æs rude*, or shapeless pieces of bronze, to be weighed with each transaction, were the only 'money.' Thousands of these have been found, notably in sacred springs and in tombs, where they were thrown as votive offerings or deposited out of respect for the dead.

NUMISMATICS II.



1. ROME, - EARLIEST LIBRAL AS
2. ROME, BRUTUS, - SILVER DENARIUS ('Ides of March')
3. ROME, NERO, - BRONZE SESTERTIUS
4. ROME, DOMITIAN, - SILVER DENARIUS
5. ROME, CONSTANTINE THE GREAT, - GOLD SOLIDUS
6. BYZANTINE, HONORIUS

7. ANGLO-SAXON, OFFA, KING OF MERCA
8. FRANCE, DAGOBERT
9. POPE HADRIAN I,
10. CONRAD III., - BRACTEATE
11. AUSTRIA, SIGISMUND, - THALER
12. ENGLAND, ELIZABETH, - SIXPENCE

The real coined money of the Romans began with the *Æs GRAVE*, or heavy bronze, which seems to have begun about B.C. 350, though some have wished to place its origin as far back as the decemviral legislation (B.C. 450). The duodecimal system of the *æs grave* was adopted from the Greeks of Southern Italy and Sicily, whose 'pound of copper,' or *λίτρα*, of twelve 'ounces' (*ούγκλαι*) became the Roman *libra* of twelve *unciae*. The *libra* thus became the unit of count (*as*), and as such was coined, a large and bulky copper (bronze) piece, which, however, seldom exceeds ten ounces, and is generally less. The earliest *as* and its divisions bear no letters whatever, but the value is marked by dots. The reverse type is always the prow of a ship. The obverse types of the various denominations differ as follows: *As*, double head of Janus with 1 (unit); *semis* ($\frac{1}{2}$ *as* = 6 *unciae*), head of Jupiter with S; *triens* ($\frac{1}{3}$ *as* = 4 *unciae*), head of Roma with four dots; *quadrans* ($\frac{1}{4}$ *as* = 3 *unciae*), head of Hercules with three dots; *sextans* ($\frac{1}{6}$ *as* = 2 *unciae*), head of Mercury with two dots; *uncia* ($\frac{1}{12}$ *as*), head of Roma with one dot. These remained the fixed types of Roman bronze money during the whole Republic. All these coins are cast (not struck), and are of rude fabric. There is also an enormous series of *æs grave*, coined on the Roman system, but of even greater size, with the most diverse types, by the many Italic tribes of Central and Northern Italy.

But while the Romans at home were content to use their cumbersome bronze coins, their generals operating in Campania and Apulia struck coins on Greek systems, in silver as well as copper, and far finer in technique. These bear at first the name *Romano*, afterwards *Roma*, and are known as *Romano-Campanian* coins. They were not intended for circulation in Rome. A great reorganization of Roman coinage took place in B.C. 269-268, after the successes over the Samnites, Pyrrhus, and the Tarentines. The bronze *as* and all of its divisions were reduced to one-third of their former weight and size (so that the *as* now contained only as much metal as the earlier *triens*), and at the same time multiples of the *as* were coined in silver; the silver coins along with the smaller divisions in bronze (*sextans* and *uncia*) being struck, the others still cast. The silver coins were the *denarius* ($\frac{1}{72}$ of a pound of silver; equivalent to ten reduced *asses*), *quinarius* (of five *asses*), and *sestertius* (of $2\frac{1}{2}$ *asses*). The silver coins have all the same types: obverse, head of Roma, with winged helmet, and sign X (= ten), V (= five), IIS (= $2\frac{1}{2}$), respectively; reverse, the Dioscuri galloping to the right, with the name *Roma*. Shortly afterwards other reverse types were introduced, as Victory or Diana in a chariot. There was also a very slight emission of bronze multiples of the *as*, namely, the *decussis* (ten *asses*), *tripondius* (three *asses*), *dupondius* (two *asses*). But even now the bronze coinage, which was still the backbone of the Roman monetary system, tended gradually to diminish in weight. The *as* was reduced to the weight of the original *quadrans*, then to the *sextans*; and finally, in B.C. 217, under the pressure of the crisis produced by the invasion of Hannibal, the *Lex Flaminia* ordained a new reorganization of Roman finances. The *as* was reduced to the size of the original *uncia*, and the *denarius* was coined at 84 to the *libra*

of silver, instead of 72. This changed the relation of silver and copper coins, and the *denarius* equaled 16 *asses* instead of 10. From henceforth all coins are struck.

The right of coinage, which at first was vested in the consuls and other magistrates, was now confined to a special board of *triumviri monetales* (though at first the board of moneyers was not limited to three), and these early began to place their initials, monograms, or names upon their coins. We thus have a long series of coins (the so-called 'family' or 'consular' series) bearing the most noble names in Roman history from the third century B.C. to Julius Caesar, Pompey, Brutus, Cassius, and M. Antonius. About B.C. 150 the types begin to be very various on the silver coins, each moneyer following his own whim in recording family traditions, religious cults, or historical events. In B.C. 91 the great uprising broke out which is known as the Social War. Many tribes of Central Italy declared themselves independent of Rome, and formed an offensive and defensive alliance against Rome, striking coins with the name of their leader, Q. Pompeius Silo, with the type of the bull of Italy crushing the serpent of Rome, and with the name of their new republic, Italia, in Oscan or Latin letters. It required years for Rome to subdue this powerful union, and in B.C. 89 a financial crisis was again averted by the expedient of reducing the coinage. The silver was not changed, but the *as* was made equal to the *semuncia* ($\frac{1}{2}$ *uncia*). This is called the *semuncial* system. This was the last change under the Republic. Gold had not heretofore been coined in Rome (though gold pieces of 20, 40, and 60 sesterces, with Roma, had been struck after B.C. 217 in the Romano-Campanian series): in the last century of the Republic, however, there were numerous emissions of *denarii aurei* (or simply *aurei*), which, like the silver coins, bear the names of magistrates and generals, as Sulla, Pompey, and Caesar. It was Julius Caesar who first placed his portrait on a Roman coin.

The standard work on coins of Republican Rome is Babelon, *Description historique et chronologique des monnaies de la république romaine* (2 vols., Paris, 1885). With this compare Bahrfeldt, *Nachträge und Berichtigungen zur Münzkunde der römischen Republik* (Vienna, 1897, with supplementary volume, 1900). Consult, also, Garucci, *Le monete dell' Italia antica* (Rome, 1885).

With Augustus Caesar begins the coinage of the Empire, a long and important series with an infinite number of varieties in gold, silver, and bronze. Augustus took under his personal charge the coinage of gold and silver, leaving the bronze to the Senate; wherefore bronze coins from now till the third century bear the letters S. C. (*senatus consulto*, 'by order of the senate'). The obverse of Imperial coins generally bears the ruler's head, with his name and titles; the reverse has a varying type (deity, personification, group, monument, or the like), with explanatory inscription or continuation of Imperial titles. The denominations are: in gold, *denarius aureus* (or simply *aureus*), equal to 25 silver *denarii*, and its half, the *quinarius aureus*; in silver, the *denarius*, equal to four *sestertii*, and the *quinarius*, of two *sestertii*; in bronze, the *sestertius* (so-called 'large-bronze'), of four *asses*, *dupondius*, of two *asses* ('middle bronze'), *as* ('middle

bronze'), *semis* (half-*as*, so-called 'small bronze'), and *quadrans* (quarter-*as*, also so-called 'small bronze'). The *sestertius* and *dupondius* are of yellow bronze (orichalcum), the *as* of red bronze. Further, the *dupondius* and *as*, which are almost of a size, are generally distinguished by the fact that the former has the Imperial head with radiate or spiked crown—the latter with laurel wreath. Down through the Antonine period we have a splendid series both artistically and technically, but from the reign of Commodus (180-192) coins begin to be debased both in quality and fabric. The *denarius* especially began to be small and of base metal, so that Caracalla introduced a new silver coin, the *antoninianus*, or double *denarius*, distinguished by the radiate crown for emperors, and a crescent at the neck for empresses. From this time all coins (except gold, which is rare) were more and more debased. Billon superseded silver, or the *denarius* became a copper coin washed with silver. The larger bronze coins, *sestertius*, *dupondius*, *as*, disappeared for ever. Under the later Empire mints were opened in all parts of the Roman world, and the sign of the mint appears on the coin, as *PLON* (*pecunia Londinensis*, mint of London), *SMANT* (*sacra moneta Antiochensis*, mint of Antioch) etc. Constantine (A.D. 312) fixed the gold unit at 1/72 of a pound, and named it *solidus*, with divisions, the *semissis* or half, and *triens* or third. He reestablished silver coins, notably the *miliarense* and the *siliqua*; and coined in bronze the *maiorina* and *centenionalis*. These coins endured till the fall of the Western Empire. The art of the Roman coins is best expressed by their portraiture. During the first two centuries the portraits are masterpieces; in the third century they are either gross or brutal; and in the fourth and fifth they are unnatural and absurd.

The reference work on Imperial coins is Cohen, *Description historique des monnaies frappées sous l'empire romain* (2d ed., Paris, 1880-90). Consult also: Stevenson, *Dictionary of Roman Coins* (London, 1889); Gneecchi, *Monete romane* (Milan, 1896); Blanchet, *Les monnaies romaines* (Paris, 1896).

MEDIAEVAL AND MODERN COINS. There is no sharp line of demarcation between ancient and modern coins, but the Byzantine series, which continues the mintages of the Eastern Roman Empire, is a natural link. Byzantine coins are: in gold, the *solidus*, with its half and third; in silver, the *siliqua*, with its half and quarter; in copper, the small unit, without sign of value, the *nomisma* (marked ϵ = 5), *centenionalis* (marked ι = 10), *denarius* (marked K = 20), and the *folles* (marked M = 40). The workmanship is generally crude. After the tenth century the portrait of the Emperor is supported by some patron saint. The reverse has such types as Victory with a cross, afterwards a representation of the Saviour or the Virgin. Latin is gradually superseded by Greek in the inscriptions, and wholly disappears by the time of Alexius I. (1081-1118). The series continues until the overthrow of Constantine XIV. Palaeologus by the Turks in 1453.

Consult Sabatier, *Monnaies byzantines* (2 vols., Paris, 1862).

In the West the coins of the barbarian States founded on the ruins of the Roman Empire retained the form and style of the late Roman

coins, though becoming always more degraded in art and fabric. Latin is the universal language. The principal coins in circulation in the early middle ages were the silver *denarius* and its half, the *obol*. It will be possible here to treat the development of coinage in modern times only in a very summary way. With the rise of barbarian kingdoms in Italy, Spain, and Africa, we have coins in silver and copper (rarely gold) of the Ostrogoths, Visigoths, and Vandals. The Visigothic coinage in Spain extends from Leovigildus (573-586) to the overthrow of Roderic by the Arabs in 711. A Moorish coinage now begins in Spain, with the peculiarity of Arabic on one side and Latin on the other, and bearing dates both according to the Hegira and according to the old Roman indictional system. These coins are numerous in the eighth century. Consult Codera y Zaidin, *Tratado de numismatica arabigo-española*.

In England the Anglo-Saxon coinage begins in the seventh century, and though also a development of the late Roman coins, it shows little resemblance to them. The two chief coins are the silver *skeatta* and the copper *styca*. The little gold coin of Padda, or Peada, King of Mercia (655-656), is notable as having runic letters along with the Latin. The coins of Offa, King of Mercia (757-796), and of Alfred the Great (871-901) are especially characteristic. The Merovingian kings in Gaul begin to strike coins under Theodebert I. (534-538). There are gold *solidi* and *trientes*. A fine gold piece of Dagobert (622-638) is perhaps the best of the series. The Carolingian coins begin with Pepin (752-768), and are most common in the gold *triens* and silver *denarius*. Of Charlemagne (768-814) the coins are numerous, and often have a good likeness. On Merovingian coins consult: De Belfort, *Description générale des monnaies mérovingiennes* (Paris, 1892). On Carolingian coins: Gariel, *Les monnaies royales de France sous la race carolingienne* (Strassburg, 1883-85). In Italy the coinage of the Lombards begins during the Merovingian period in France, with numerous issues in Milan, Benevento, and Salerno, always with the flat flans and crude fabric of the period. For the coins of the early Middle Ages in Europe, consult: Engel et Serure, *Traité de numismatique*, vol. i., Paris, 1892. Papal coins, a long and interesting series, begin with Hadrian I. (772-785) and extend to Pius IX. Consult: Cinagli, *Le monete dei Papi* (Ferraro, 1848). The coins of the German rulers of this period often have on the reverse the name and emblems of a bishop. To the tenth century belongs the earliest coin with a German inscription, a *denarius* struck at Gittelde, near Brunswick, reading "*hir steid te biscop*" (*heir steht der Bischoff*), with bishop's portrait, and "*lclithis pening*" (*Pfennig of Gittelde*). The word *pening* was now the general name in Germanic countries for *denarius*, whence English $d.$ = *penny*. On mediæval German coins, consult: Cappe, *Die Münzen der deutschen Kaiser und Könige des Mittelalters* (Dresden, 1848-57). In Norway and Sweden in the eleventh century we have *denarii* or *pennies*, with inscriptions in runic or Latin letters, and in Swedish or Latin, or both together. The coins of the Danish kings in England, Cnut for instance, have purely English legends, as do also those of contemporary Irish princes, as Sitric III., King of Dublin (989-

1029). On the Continent, in the twelfth and thirteenth centuries, the *denarii* were struck on a broad flan, so thin that even with low relief it was impossible to stamp them on both sides. Such coins are known as *bracteates*, from Latin *bractea*, a thin, flat piece of metal, and were commonly struck by the German princes, of whom the first was Conrad III. (1138-52). Those of Frederick Barbarossa are very numerous and often beautiful of their kind. Polish coinage begins with the introduction of Christianity under Miecislav I. (c.965-992). The style and fabric is like the German coins of the same epoch, but the inscription is often in Russian letters. Russian coins begin under Vladimir, who died in 1015. Consult: Tolstoy, *La numismatique russe avant Pierre le Grand* (Saint Petersburg, 1884). The coinages of the thirteenth century are notable for the large number of gold pieces. Here begins the splendid series of gold *florins* of Florence and *sequins* (or *ducats*) of Venice, which show an advance in style that rapidly spread to other parts of Europe. The doges' coins extend with little change from Giovanni Dandolo (1279-89) to Ludovico Manin (1797). For Italian coins, consult: Promis, *Tavoli sinottiche delle monete battute in Italia* (Turin, 1869). In the fourteenth century the coinage in gold and silver is vastly improved, the broad, flat pieces being very rich in ornamentation, especially the French silver *tournois* and gold *mouton*, the German silver *groshen*, and the English gold *noble*, or *rose-noble*. The fifteenth century continues the *gulden*, *florins*, and *ducats* of the previous epoch. The *bracteates* are still found, but small and poor. A new type of money is now introduced at Joachimsthal in Bohemia, a broad, flat silver coin, which quickly spread over all Germany and received from its first place of mintage the name *Joachimsthaler*, soon abbreviated to *thaler* (the origin of our American name *dollar*). The earliest dated *thaler* is that of Duke Sigismund of Tyrol, 1484. The broad *thalers* of the fifteenth and sixteenth centuries are real medallions of art, and this is true also of many of the contemporary coins of Italy, which are the work of artists of the first rank, as Francesco Francia of Bologna and Benvenuto Cellini. With the dating of coins the really modern period now begins; portraits are especially fine, and values are placed on the various pieces. The types are limited in variety and the historic value of coins is largely transferred to medals. Oriental coins have an origin quite independent of the European series. In China, some kind of coinage is said to have existed in the third millennium B.C. The earliest coins known are of brass, and have the form of 'trousers,' 'razors,' or squares. A peculiarity of later Chinese brass coins ('cash') is the square hole in the centre, for ease in carrying on strings. Consult: Terrien de Lacouperie and Poole, *Catalogue of Chinese Coins* (British Museum) (London, 1892). In Japan, in the seventeenth century, there were the oval gold *koban* with mint-stamps, the oblong gold and silver *itzebu*, and the oval brass *tempo*, the latter having the square hole for stringing, like the Chinese 'cash.'

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1884); Poole, *British Museum, Catalogue of English Coins* (ib., 1887); Hawkins, *Silver Coins of England* (ib., 1876); Kenyon, *Gold Coins of England* (ib., 1884); Batty, *Descriptive Catalogue of the Copper Coinage of Great Britain and Colonies* (Manchester, 1876). For Scotland, Cochran, *Records of the Coinage of Scotland* (Edinburgh, 1876); Robertson, *Handbook of the Coinage of Scotland* (London, 1878). For Germany, Schult-hess-Rechberg, *Thaler-Kabinett* (Vienna, 1840); Schwalbach, *Die neuesten deutschen Münzen unter Thalergrösse vor Einführung des Reichsgeldes* (Leipzig, 1879). For France, Berry, *Etudes et recherches historiques sur les monnaies de France* (Paris, 1852-53); Hoffmann, *Les monnaies royales de France* (ib., 1878). For Italy, Bazzi e Santoni, *Vademecum del raccoglitore di monete italiane* (Camerino, 1886). For Portugal, Teixeira de Aragao, *Description des monnaies et médailles de l'histoire portugaise* (Paris, 1867). For Switzerland, Coraggioni, *Münzgeschichte der Schweiz* (Geneva, 1896). Among the excellent manuals are Lenormant, *Monnaies et médailles* (Paris, 1883); Von Sallet, *Münzen und Medaillen* (Berlin, 1898); Ambrosoli, *Manuale di numismatica* (Milan, 1895); Stückelberg, *Der Münzsammler* (Zurich, 1899). Collectors may find interest in Humphrey, *Coin Collector's Manual* (London, 1853); Prime, *Coins, Medals, and Seals* (New York, 1861); Mathews, *Coinages of the World* (ib., 1876); Hazlitt, *Coinages of the European Continent* (London, 1893); Dye, *Coin Encyclopedia* (Philadelphia, 1883).

NUMMITOR. See ROMULUS.

NUMMULITES, nūm'mā-lī'tēz (Neo-Lat. *nummulus*, diminutive of *nummus*, coin). A genus of vitreo-calcareous foraminifera that secrete a lenticular shell composed of many whorls coiled in a flat spiral. At the present time Nummulites is represented by only a few species that live in the shallow water of warm seas, but during ancient geological times, especially during the Tertiary, it was of great importance, for its shells formed limestone formations often hundreds of feet in thickness. These massive nummulite limestones are prominent features in some parts of the Alps, and they occur also in the north of Africa, in Asia Minor, Persia, India, China, and Central America. An allied genus, *Orbitoides*, is common in the Eocene beds of the Southern United States. See FORAMINIFERA; TERTIARY.

NUN. See MONASTICISM; SISTERHOODS.

NUN-BIRD. (1) A puff-bird (q.v.). (2) Any of several species of titmouse. (3) A variety of domestic pigeon. In each case the colors of the plumage suggest the name.

NUNC DIMITTIS (Lat., now lettest thou depart). The name given, from its opening words in the Latin version, to the canticle of Simeon (Luke ii., 29-32), which forms part of the compline office of the Roman breviary, and in the evening service of the Anglican Church follows the second lesson.

NUNCIO, nūn'shī-ō. See LEGATE.

NUNEATON (nūn'ā-ton) **AND CHILVERS COTON.** A manufacturing and market town in Warwickshire, England, on a tributary of the Anker, 8½ miles northeast of Coventry (Map: England, E 4). The town has the interesting Gothic Church of Saint Nicholas, the new Church

of Saint Mary embodying the remains of a twelfth-century priory of nuns, two endowed schools, a free library, and a literary institute. It owns water-works and electric lighting plants. It has noted ribbon manufactures, worsted, cotton, and elastic weaving industries, iron works, and tanneries. Coal is mined in the vicinity. During the nineties Nuneaton and Chilvers Coton amalgamated under one municipal council. Population, in 1891, 15,300; in 1901, 25,000.

NUÑEZ, nū'nyās, RAFAEL (1825-94). A South American statesman, President of Colombia. He was born in Cartagena; entered politics as a member of Congress in 1851; was twice (1855-57 and 1861-62) Secretary of the Treasury; and was a prominent journalist and editor, being director for two years of *El Continental*, a Spanish newspaper published in New York City. Nuñez was consul at Havre and Liverpool for some time. He was President from 1880 to 1882; was reelected in 1883; and, after the Revolution in 1885 and the reform of the Constitution, was inaugurated for a term of six years in 1886, and again in 1892. He died in office.

NUÑEZ CABEÇA DE VACA, nū'nyāth kā-rā'thā dā vā'kā, ALVAR (c.1490-c.1560). A Spanish adventurer in North and South America. He was born in Jerez de la Frontera and was living in Seville when Narvaez (q.v.) was raising his forces for the colonization of Florida. He received an appointment as royal treasurer and high sheriff to the expedition. He shared in all the misfortunes of the undertaking, and was chiefly instrumental in extricating the party from the interior and getting it back to the Gulf coast. In the final wreck of the boats of the Narvaez expedition Nuñez was cast ashore with a few others on one of the islands outside Matagorda Bay, November 6, 1528. The Indians took charge of the survivors, and for some time the Spaniards lived on the islands and adjoining mainland in a state of semi-servitude. Alvar Nuñez secured freedom, and for several years wandered about the country in what is now Texas and Arkansas, trading among the different tribes and acting as physician or medicine man. Eventually, with three others, the only survivors of the Narvaez expedition, Estévan Dorantes, Alonso del Castillo, and a Moorish negro named Estevanico, he started to find the route back to civilization. Making their way from tribe to tribe, across Texas to the Rio Grande, then through Sonora and so on westward, they finally came upon a party of Spanish soldiers in Sinaloa, not far from the Gulf of California. They were sent on to the City of Mexico, where the Viceroy welcomed them on July 24, 1536. Cabeza de Vaca went back to Spain, where he arrived in August, 1537. He claimed some compensation for his years of suffering, asking for the Governorship of Florida. Instead he was granted authority to conquer the territory of the Paraguay Indians along the Rio de la Plata. He expended all his means in equipping an expedition, which sailed in 1540. He soon became involved in difficulties with his subordinates, who eventually put him under arrest and sent him back to Spain. The Council for the Indies after six years sentenced him to banishment in Africa. This sentence was probably not enforced, however, for he is said to have

settled in Seville, where he was living some twenty years later. Cabeza de Vaca's own account of his various adventures, first published in 1542 and 1555, has been translated by Buckingham Smith (New York, 1871) and by Dominquez in the Hakluyt Society volume for 1891.

NUÑEZ DE ARCE, dā ār'thā, GASPÁR (1834—). A Spanish playwright and lyric poet, born at Valladolid. Before he was twenty he was associated with the editorial staff of the Madrid journal *El Observador*. He soon gained considerable repute by his contributions to the periodical *La Iberia*, as correspondent for which he went through the African campaign (1859-60). He entered the Cortes in 1865, and after the troubles of 1868 he became Civil Governor of Barcelona. In 1882 he became Minister of Colonial Affairs under Sagasta. Nuñez de Arce is of decided merit, both as a dramatist and as a lyric poet, and his verse enjoys widespread popularity in Spanish America as well as in Spain. In 1875 he published a collection of lyrics under the title of *Gritos del combate*, a title indicative of the passion and patriotic energy of most of them. Since it appeared, he has produced other poems of some length, that have likewise won popular favor; the *Idilio*; the *Elegia*, written, like the *Idilio*, in 1878; the *Ultima lamentación de Lord Byron* (1878); the *Vértigo* (1879, one of the most famed of his works and one which has provoked much imitation, creating a school of his followers in the legend), a graphic description of the crime and remorse of a modern Cain; the *Visión de Fray Martin* (1880), a psychological study of Luther; *La pesca* (1884), a charming idyll; and *Maruja*. As a dramatist, he has written both alone and in collaboration with Antonio Hurtado. His individual works are the comedies, *Deudas de la honra*, *Quien debe paga*, and *Justicia providencial*, in all of which he cultivates the drama of manners, already made successful by Tamayo y Baus and Ayala, and the *Haz de leña*, a tragedy both historical and psychological in its tendencies. This last piece deals with the story of Philip II. and his son, Don Carlos. The editions of his lyrics are legion. That of *Gritos del combate* (Madrid, 1891) contains also his prose *Discurso sobre la poesía*. His chief plays are to be found in the *Obras dramáticas escogidas* (Madrid, 1879). Consult also the study of him by Menéndez y Pelayo, in volume ii. of *Novo y Colson's Autores dramáticos contemporáneos*, reprinted in the critic's *Estudios de crítica literaria* (1884).

NUÑEZ DE VILLAVICENCIO, vil'lā-vā-thān'thē-ō, PEDRO (1635-1700). A Spanish historical, portrait, and genre painter, born in Seville. He first studied under Murillo in Seville, and then, as he was a knight of the Order of Saint John, went to Malta, where he was the pupil of Matteo Preti, called Il Calabrese. Upon his return to Seville, he again studied with Murillo and continued to live with him. He assisted his master in founding the Academy of Seville, and was his testamentary executor. His subjects were similar to those Murillo chose, and the works of the two men sometimes are confused. His "Children Playing with Dice" (in the Prado Museum, Madrid) shows considerable native talent.

NUNIVAK, nū'ni-vāk. An island in Bering Sea, situated in latitude 60° N., 50 miles from the mainland of Alaska, and 140 miles southwest

of the mouth of the Yukon (Map: Alaska, B 3). It is 55 miles long, 45 miles wide, and has an area of about 1200 square miles. It is but little known, and inhabited only by Eskimos, who trade in skins and ivory.

NUN OF KENT. See BARTON, ELIZABETH.

NUN'S PRIEST'S TALE, THE. One of Chaucer's *Canterbury Tales*. The source of the tale is a short fable by Marie de France, enlarged later into the old French "Roman de Renart," and a similar story is found in *Æsop's Fables*. Chanticleer, being carried off by a fox, escapes by inducing the latter to open his mouth to berate his pursuers. This slender narrative is amplified by many instances of significant dreams.

NURAGHE, nūr-ā'gā, or **NURHAG**, nūr-hāg'. The name of ancient towers, in the shape of truncated cones, three thousand of which in greater or less state of preservation are scattered about the island of Sardinia. They are built of granite, limestone, basalt, porphyry, sandstone, and schist. Some of the stones in the lower courses are of great size; they have been roughly hewn and were laid up without cement. The entrances are small and low and the interiors are divided into two or three stories each with a dome-shaped ceiling. The upper chambers are reached by means of spiral staircases and are lighted through loopholes, and there is supposed to have been a terrace on the summit. They are to be compared with the tal-yots of Majorca and Minorca, the 'burgs' or 'duns' in the north of Scotland, and in the Shetland Islands; and with the round towers of Ireland, both as to structure and function. Skeletons and deposits made with the dead have been found in them, but their original authors and purpose are not known. Consult: Petit Radet, *Nuraghes* (Paris, 1826-28); Spano, *Nuraghi di Sardegna* (1867); Ferguson, *History of Rude Stone Monuments* (London, 1872); Lambert, *Handbook to the Mediterranean* (ib., 1882).

NUR-ED-DIN EL-BETRUJI, nūr-ēd-dēn' ēl-be-trū'jē. An Arabian astronomer of the twelfth century, born in Morocco, and also known by the name Alpetragius. He is mostly known for his opposition to the epicycle theory of Ptolemy, although he did not substitute anything better. Consult *Alpetragii Arabis Planet Theoriæ Phys. Rationibus Probata* (Venice, 1531).

NUREDDIN-MAHMUD, nūr-rēd-dēn' mā-mūd', MALEK-AL-ADEL (1116-74). A Mohammedan ruler of Syria, born at Damascus. His father, Omad-ed-din Zengi, originally Governor of Mosul and Diarbekr on behalf of the Seljuk sultans, had established his independence, and extended his authority over Northern Syria, including Homs, Edessa, and Aleppo. Nureddin succeeded him about 1145 and changed the seat of government from Mosul to Aleppo. The feudal Latin States had been established in Syria as a result of the First Crusade, and Count Jocelyn, Prince of Edessa, tried to regain the territories which he had previously lost, but was signally defeated under the walls of Edessa. This was one of the chief occasions of the Second Crusade. Nureddin defeated the Crusaders before Damascus, and finally compelled them to abandon the enterprise. He next conquered Tripolis and Antioch, the prince of the

latter territory being defeated and slain in a bloody conflict near Rugia (June 20, 1149), and before 1151 all the Christian strongholds in Syria were in his possession. An illness, which prostrated him in 1159, enabled the Christians to recover some of their lost territories, and Nureddin, in attempting their resubjection, was totally defeated near the Lake of Gennesaret by Baldwin III., King of Jerusalem; but he resumed the offensive, defeated the Christian princes of Tripolis and Antioch, making prisoners of both, and again invaded Palestine. Meanwhile, he had obtained the sanction of the Caliph of Bagdad to his project to seize Egypt from the effeminate Fatimites and a large army under his lieutenant, Shirkoh, speedily overran Egypt. Shirkoh was succeeded by his nephew, the celebrated Saladin (q.v.), who completed the conquest of the country. Nureddin, becoming jealous of Saladin, was preparing to march into Egypt in person, when he died at Damascus, May 15, 1174.

NUREMBERG, nū'rem-bērg (Ger. *Nürnberg*, nūrn'bērk). The second city of Bavaria, Germany, situated on the Pegnitz, about 95 miles north-northwest of Munich (Map: Germany, D 4). It consists of the inner town (still partly walled, and divided by the river into the two parts *Sebalderseite* and *Lorenzenseite*, named after its two principal churches) and a number of suburbs where the chief industrial establishments of the city are found. The inner town, with its red-roofed houses and gables facing the street, its numerous churches, and its architectural monuments, is of unusual interest. Nuremberg being the only large city in Germany which has preserved its mediæval appearance to such a remarkable degree. Its fine samples of domestic architecture date mostly from the fifteenth and sixteenth centuries, the period of its fullest political and artistic development, when Dürer, Kraft, Vischer, Stoss, and others made it the centre of German art.

The Church of Saint Lawrence, the finest in the city, was originally built in the thirteenth century, and was restored in the nineteenth century. It is Gothic in style, with beautiful stained glass windows, and has a remarkable stone Ciborium with figures supposed to be those of Adam Kraft and his two pupils. Saint Sebaldus is considered one of the finest Gothic churches of Germany. It was built in the fourteenth and fifteenth centuries and was recently restored. It contains some of the best samples of the work of Nuremberg artists, notably the tomb of Saint Sebaldus by Peter Vischer, the Schreyer Monument by Adam Kraft, and the Last Judgment over the southern entrance, by the same artist. Worthy of mention are also the Marienkirche, with its fine portal, paintings by Wolgemuth, and its curious clock, and the Gothic Church of Saint John.

Among the examples of secular architecture, the Kaiserburg deserves to be considered first, as the nucleus of the city. It was probably founded by Henry II. It was enlarged by Frederick Barbarossa, and is now used in its restored form as a royal residence. It is situated on a rock at the northern end of the old town and contains many objects of art. At the foot of the castle hill stands the town hall, built in Italian Renaissance in 1616-22 and restored in 1884-89. Its chambers are decorated with frescoes and paintings by

Nuremberg artists, and in the court stands a fine fountain dating from the sixteenth century.

Among the numerous old private houses of Nuremberg may be mentioned the Nassauer Haus, a Gothic building of the fourteenth century, the houses of Dürer and Hans Sachs, and the Rupprecht House. The chief modern buildings are the theatre, the law courts, and the chamber of commerce. Many of the squares of Nuremberg are adorned with beautiful fountains and statues, of which the most noteworthy are the Schöne Brunnen, a Gothic pyramid (fourteenth century) covered with numerous statues, the statue of Dürer by Rauch, the fountain in the goose market, the Tugendbrunnen (1589), near the Church of Saint Lawrence, the statue of the poet Konrad Gröbel, and the Kraft stations near Saint John's Cemetery, consisting of a number of pillars adorned with reliefs by Kraft.

The National Germanic Museum, for the purpose of preserving the monuments and promoting the knowledge of German art and culture in prehistoric and historic times, was founded at a congress of German antiquaries in 1852. The plan was approved by the Bavarian and other German governments, and found enthusiastic support among the general public.

In 1857 the museum was definitely located in its present site at Nuremberg, a former Carthusian monastery being purchased to house its collections. The neighboring priory of the Augustines has been recently restored and made a part of the museum, which now forms a picturesque feature in the mediæval quarter of the city. Valuable private art collections, like those of the city of Nuremberg, have been placed in custody of the museum.

The collections are concerned with Germanic antiquities, and are divided into over thirty groups, most of which are accessible to the general public. Among the most important are the collection of Christian and early mediæval antiquities; the gallery of paintings, especially rich in the early German school; the collection of sculptures, including the famous "Nuremberg Madonna," by Peter Vischer the Younger; the cabinet of engravings, containing over 200,000 specimens; collections of stained glass, seals, medals, etc. The museum is especially rich in plaster casts, showing the development of architectural ornament, sculpture, and sepulchral monuments. The library contains over 200,000 volumes; the archives possess a large collection of documents and autographs. The museum has issued many important illustrated publications treating Germanic antiquities, and has a quarterly journal, *Anzeiger des germanischen Nationalmuseums*.

The educational institutions comprise the old gymnasium, whose foundation is ascribed to Melancthon, the new gymnasium, a number of special schools, the valuable library of about 80,000 volumes, the Bavarian Industrial Museum, with valuable collections, and the interesting municipal archives.

The industrial fame of Nuremberg is of long standing. Its wares, comprising chiefly toys, lead pencils, small articles of gold, silver, and ivory, gold leaf, watches, hardware, haberdashery, etc., are still the main products of the city, but there are also extensive machine works, chemical works, manufactures of ultramarine and other paints, railway cars, electrical sup-

plies, lithographs, chromos, etc. The bronze foundry of Professor Lenz is noted for its artistic castings.

The trade of Nuremberg, although of less relative importance than formerly, is still extensive. Besides trading in local manufactures, the city exports large quantities of hops and the small products of the house industry embraced in 'Nuremberg wares,' and it imports groceries, grain, flour, etc. The trade is facilitated by strong financial institutions and good communication facilities.

The municipal affairs are administered by a first and a second burgomaster, a board of magistrates of 27, and a municipal council of 51 members. The municipality owns and operates a gas and an electric plant, the water-works, and an abattoir. The city is equipped with electric railways. Like most large cities in Europe and the United States, Nuremberg has annexed latterly a large number of adjacent communities, with the result that its population has increased from 99,519 in 1880 to 142,500 in 1890, and 261,081 in 1900. The inhabitants are mostly Protestants.

HISTORY. Nuremberg is mentioned for the first time in 1050. Henry III. conferred upon it the privileges of a mint, a market, and a custom-house, and Emperor Lothair granted it to Henry the Proud of Bavaria. Conrad III. annexed it to the Empire and Frederick II. raised it in 1219 to the rank of a free city of the Empire. Its importance increased with its political freedom, and it was the seat of the Diet at which the Golden Bull of Charles IV. was promulgated in 1356. The burgraves of Nuremberg (the counts of Zollre or Zollern since 1191; see *HOHEN-ZOLLERN*) interfered but little with the affairs of the city.

Nuremberg became a very important factor in the trade between Italy and Northern Europe, and its material prosperity found expression in that splendor which characterizes its private dwellings so well preserved to our day. In 1427 the city acquired the castle from the burgraves of Nuremberg, who had become margraves of Brandenburg. The foremost centre of German art and one of the wealthiest cities of the Empire, Nuremberg also played a prominent part in the religious struggles in the period after the Reformation, which the city accepted in 1524. It was at Nuremberg that peace was for the first time concluded between Charles V. and the Protestants in 1532, and it was also here that Charles V. entered into a union with the Catholics against the Protestants in 1538. The commercial importance of the city, however, had already been dealt a serious blow by the discovery of the sea route to India in 1497.

The Thirty Years' War, during which Nuremberg was occupied by Gustavus Adolphus, who made vain efforts to dislodge Wallenstein from his intrenched position before the city (1632), and finally the wars of the French Revolution, completely exhausted the resources of the city republic, so that it offered itself to the King of Prussia in 1796 in order to be relieved of its enormous debt—an offer which was declined. The city was annexed to Bavaria in 1806. Nuremberg is noted for the many important inventions credited to its inhabitants, such as the watch, which was originally called the 'Nuremberg egg,' the air gun, the gun-lock, the terrestrial and celestial globes, etc.

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NURSE-FROG. A term applied to various frogs which take care of their young or eggs, or both, especially the midwife frog (q.v.). Some curious examples are to be found in the genera *Phyllobates*, *Arthroleptis*, *Rhacophorus*, and among the tree-frogs.

NURSERY (from nurse, OF. *norice*, *nourice*, Fr. *nourrice*, nurse, from Lat. *nutrix*, nurse, from *nutrire*, to nourish; connected with Goth. *naups*, OHG. *nōt*, Ger. *Not*, AS. *nēad*, *nyd*, Eng. *need*, OPruss. *nauti*, necessity). In horticultural parlance, a place where plants are propagated. In the New World the term is usually restricted to those establishments devoting themselves exclusively to the rearing of woody plants, while the rearing of herbaceous plants is classed as a department of floriculture. This division has been the natural result of the enormous demand for plants of both classes, and as one class requires a very different equipment from the other, the tendency toward specialization soon separated the two departments. A further differentiation is being made, a division along the line of fruit-bearing trees and plants and the ornamental or decorative trees and plants.

During the last decade the nursery business has changed in its method most markedly. The nurseryman who grows his own stock, other than peach stock, is the exception rather than the rule. Nearly all the pear and cherry stocks used in America are grown in France; while a great bulk of the apple stocks used in the United States are raised on the deep soils of the prairie by specialists in this line. Since the work of the modern fruit-tree nursery is to produce as large and straight a stock in as short a space of time as possible, and since the prevailing belief is that more than one crop of nursery stock cannot be successfully grown on any given piece of land, new soils are chosen for each crop of nursery stock. A nursery is, therefore, a transient affair, and the plants are usually grown on lands leased for short periods. Since the propagation of forest and ornamental trees seems to be less subject to the objection, viz. impoverishment of soil, urged against fruit trees, most of the nurseries engaged in this work are more permanent in their location. Comparatively few plants of this character are budded and grafted; most of the skill of the propagator is demanded in perpetuating species from seeds and cuttings.

The history of the nursery business began with the colonization of America. As early as 1768 Thomas Young of New York was awarded a prize of £10 for the largest number of apple trees, the number being 27,123. The great nursery interests of the country have from the first been located in western New York. The growth of the enterprise has kept pace with the demands made by the rapidly increasing com-

mercial orchard and vineyard development. Statistics of the census of 1900 show that there were in the United States 4500 nurseries, covering an acreage of over 172,800 acres, representing an investment of \$52,500,000. In these nurseries 45,600 men, 2279 women, and 14,200 animals were employed, and 3,400,000,000 plants were grown. Of these, 518,000,000 were fruit trees, and 685,600,000 grape vines and small fruits. The greatest number of plants of a single species was represented by the apple, of which there were 240,500,000, or more than twice as many trees as were then standing in the orchards of the country.

The influence of the leading nurseries on the horticulture of the country has been very marked. Previous to the development of the experiment stations their office was quite as much to test the merits as to propagate and disseminate a variety. The aim of all leading nurserymen has been to stimulate trade and maintain a high reputation through honest dealing and the dissemination of stock true to name. The sale of spurious stock has worked great injury by retarding development in localities naturally well suited to orcharding. These evils do not exist in developed orchard areas. New fruits introduced from abroad brought with them their natural enemies, the spread of which to other plants has led to the enactment of inspection laws in all States in which either the orchard or nursery business has attained an important place. These laws require the inspection of the orchards and nurseries for certain insect pests and fungous diseases, and prohibit the sale of infested stock, which must be destroyed. If the stock is free from the specified pests the nurseryman is granted a certificate to that effect, and it is taken as a passport in shipping from State to State.

NURSERY LORE. The folk-lore of children. The material may be separated into two classes, according as it consists of traditional sayings and usages which have been handed down by mothers and nurses, or of customs maintained and transmitted by the children themselves. To the former class belong those nursery rhymes and jingles which are ascribed to Mother Goose, a name adapted from the French. In 1697 Charles Perrault issued a few tales, popular in origin but of literary ornamentation, which he called *Contes de ma mère Poye*. This designation was not invented by Perrault, for the goose had long had a popular reputé as a story-teller. About 1760 J. Newbery, the first publisher of books for children, produced a little collection of rhymes to which he gave the name of *Mother Goose's Melody*. In 1810 J. Ritson brought out *Gammer Gurton's Garland, or the Nursery Parnassus*, in which he included some rhymes not given by Newbery. Between 1824 and 1827 Munroe and Francis, Boston, Mass., issued an expanded edition under the title of *Mother Goose's Quarto, or Melodies Complete*, reprinted in 1833 as *Mother Goose's Melodies*, and the popularity of this publication may have something to do with the widespread acceptance of the name. Up to this time nursery rhymes were not learned from books, but repeated by word of mouth; it seems likely that the traditional stock was similar to that which has found a place in print.

More curious, from the point of view of folklore, are the games played by children, often to the accompaniment of rhymed formulas. These are for the most part of ancient origin, and although at the present time extinct or moribund, have been traditionally current for centuries. Allowing for minor variations, American game-rhymes are very similar to those of Great Britain, France, and Germany. Such correspondence, formerly interpreted to signify a remote common descent, is now known to be the result of intercommunication. The games, and the formulas used in playing them, were not originally the property of children, but indifferently employed by both old and young. These customs did not owe their origin to peasants; on the contrary, they were introduced and supported by the higher strata of society. Of the games, some have a religious character, or at least were formerly interpreted as possessing religious significance; for example, a sport called 'Weighing,' in which a player is carried by two others, each of whom grasps with right hand the left hand of his fellow, constitutes an imitation of the Last Judgment, in which the soul is to be weighed to determine its destination for heaven or hell. The game of 'London Bridge,' in which the line of participants is made to pass under an arch formed by the lifted hands of two keepers, has been supposed to have had its source in imitation of foundation sacrifices, in which a human being was interred under the bridge in order to insure its stability. A drama enacted by girls, called 'Old Witch,' sets forth the robbery of children by a limping cannibal demon, the devouring of the victims, and their resuscitation by the mother; the witch who figures in this amusement is of the same class as the destroyer of children known to the ancient Greeks as Lamia or Empusa. The well-known childish dance in which is imitated the sowing of oats, etc., may go back to a rite intended to insure the ripening of the crops. Guessing games, in which the object is to win the counters of the adversary, seem analogous to those played in the time of Xenophon, while that in which the opponent is required to guess the number of fingers which may be held up is similar to one depicted on Egyptian pyramids.

BIBLIOGRAPHY. Consult: Bolton, *The Counting-out Rhymes of Children* (London, 1888); Whitmore, *The Original Mother Goose's Melody*, reproduction in facsimile (Boston, 1892); Halliwell-Phillipps, *The Nursery Rhymes of England* (London, 1842); Green, *A History of Nursery Rhymes* (ib., 1899); Gomme, *Traditional British Games* (London, 1894); Haddon, *The Study of Man* (New York, 1898); Newell, *Games and Songs of American Children* (2d ed., Boston, 1903).

NURSERY RHYMES. Children's rhymes, used in the nursery and in childish games. These songs and sayings, witty or absurd, are peculiar to the English language, and for the most part of no great antiquity, the majority scarcely antedating the seventeenth century. It has been thought that some may have had at first a political significance; but many doubtless owed their origin to the infantile love of nonsense for its own sake. Certain rhymes of nurses, such as those used to amuse children in the process of dressing, may have a more respectable antiquity.

A word may be added about the formulas known as 'counting-out rhymes' in games. One word is told off for each player, and he on whom falls the final syllable is dropped from the row; this process of exclusion is continued until only one remains, who is 'it.' All modern nations possess similar rhymes, which have the common property of being unintelligible. It has been supposed that the rhymes were invented for purposes of sorcery or sacrifice, and have become degraded in their survival; yet it is uncertain whether we are to look for any deeper motive than a childish fondness for mystery and nonsense.

NURSES, TRAINING OF. At the end of the fourth century, when the temples of Æsculapius, Hygeia, and Serapis were closed, the sick poor formerly housed in these temples were turned adrift. Christian monasteries and temples were opened to them, and conventual orders arose whose office was to provide for the sick. In very early times there was a corporation of matrons and elderly women in England who were employed in obstetrics, at that time forbidden to men. The eleventh century saw the beginning of the founding of hospitals, many of which were rendered necessary by the Crusades. The hospitalers were assisted by various bodies of women, in the dearth of physicians. In the latter part of the twelfth century Hildegard, Abbess of Rupertsberg, organized a school of nurses for service in the hospitals. From these beginnings grew the modern system of training nurses for charitable hospital work, for charitable work among the sick poor in their homes, and later for assistance to the sick rich for proper remuneration. In 1840 Mrs. Fry's nursing sisters' composed an organization which cared for the outcasts of London society. Florence Nightingale (q.v.) gave the greatest impetus to the movement toward securing efficient training for nurses, after her return to London in 1853, upon the completion of an inspection of hospitals all over Europe. In 1872 the Bellevue Training School, New York City, sent out the first class of trained nurses graduated in this country.

The course of study for nurses under training has become lengthened during the past ten years. In some small towns in the United States the course at a local hospital may be completed in a year, in others in eighteen months. In New York and Philadelphia the course extends in a few schools over two years' time; in most over three years' time. An applicant is received into the school for a period of two months on probation. During this period applicants receive their board and lodging at the training school without charge, and serve without remuneration, and their education, physical strength, endurance, adaptability, powers of observation, and judgment are tested. Should they prove acceptable, they are required to sign an agreement for the remainder of the term of three (or two) years, to obey regulations, and to remain in the school till the term has ended. Pupils reside in the hospital or in the training-school building, and assist in various departments. They wear a uniform when on duty. No charge is made for instruction. The pupils receive board, lodging, and laundering of clothing, and a certain amount of money for the purchase of text books and uniforms, and for incidental expenses. The instruction is given by the physi-

cians and surgeons of the visiting and resident staffs of the hospital, the superintendent, and the head nurses, and covers anatomy and physiology, and all departments of nursing, including cooking of proper food and delicacies, and frequently massage, obstetrics, and the care of insane as well as alcoholic patients. In some institutions there is a regulation under which nurses are sent out to nurse in families before completing their course of study as a test of fitness.

Perhaps the most prominent training schools in the United States are the following: Bellevue, Presbyterian Hospital, New York Hospital, and Mount Sinai Hospital, in New York City; Massachusetts General Hospital, in Boston, Mass.; Philadelphia Hospital and Pennsylvania Hospital, in Philadelphia, Pa.; Johns Hopkins Hospital, in Baltimore, Md.; and Illinois Training School, Chicago, Ill. Consult: Nightingale, *Notes on Nursing* (London, 1860); Mitchell, *Nurse and Patient* (Philadelphia, 1877); Hampton, *Nursing* (Philadelphia, 1893).

NURSE-SHARK. (1) A shark (*Ginglymostoma cirratum*), the type of a family, which abounds in the waters of the West Indies and on the west coast of Mexico, where it is called 'gata.' It is from six to ten feet in length, and is brownish in color, with an obtuse depressed head and rounded fins. See Plate of GREAT SHARKS. (2) In New England, the sleeper (*Somniosus microcephalus*). See SLEEPER-SHARK. (3) The Port Jackson shark. See CESTRACIANT.

NUS, nus, EUGÈNE (1816-94). A French dramatist, born at Chalon-sur-Saône. His first dramatic success was *Jacques le corsaire* (1844), and his other plays include: *L'enseignement mutuel* (with Desnoyer, 1846); *Le vicair de Wakefield* (with Tisserand, 1849); and *La tour de Londres* (with Brot and Lemaitre, 1855). He was also prominent as a Socialist, and was at the head of the *Bulletin de Mouvement Social* in 1873. His writings include: *Les dogmes nouveaux* (1861), poems; *La république naturaliste*. *Lettre à Emile Zola* (1879); *Choses de l'autre monde* (1880); *A la recherche des destinées* (1891); and *Virisection du catholicisme* (1894).

NUSKU, nūs'kōō. A Babylonian and Assyrian deity. Originally a solar deity (according to some, a lunar god), he became a fire-god. His name is not found in historical inscriptions until the Assyrian period, which may be accounted for by his general identification with another and perhaps older fire-god, Gibil. He was regarded as the messenger of the gods, fire being the medium of intercourse with deity (cf. Agni in the Indian theology), but in this aspect he was inferior to the far better known Nabu. Nusku, along with Gibil, appears especially in the incantation texts, where, according to universal arts of witchcraft, fire is used to destroy symbolic representations of an enemy, and so is supposed to affect the latter's person. In this connection Nusku had a wide vogue in the vulgar religion. As the god of fire he was also honored as a patron deity of civilization. Consult Jastrow, *Religion of Babylonia and Assyria* (Boston, 1898).

NUSLE, nūs'lyā. A town in the Crownland of Bohemia, Austria, situated a few miles southeast of Prague, in a wine-growing region. The

town has a castle and a park. Population, including the adjacent village of Pankratz, in 1890, 11,740; in 1900, 20,440.

NUSSBAUM, nus'bōum, JOHANN NEPOMUK (1829-90). A German surgeon, born in Munich. He became lecturer in surgery and ophthalmology at the University of Munich in 1857, and in 1860 received a professorship. He retired in 1890. As both surgeon and writer on surgical topics he became well known in Germany. His publications include: *Die Pathologie und Therapie der Ankylosen* (1862); *Vier chirurgische Briefe an seine in den Krieg ziehenden ehemaligen Schüler* (1866); *Die Verletzungen des Unterleibs* (1880); and *Ueber Chloroformwirkung* (1885).

NUT (AS. *knuhtu*, Icel. *knot*, OHG. *nuz*, Ger. *Nuss*, nut). A hard, one-seeded, indehiscent (non-opening) fruit, which has usually come from an ovary of several carpels, as the acorn, hazelnut, etc. (See FRUIT.) The best-known and most valuable nuts are almonds, Persian or English walnuts, cocoanuts, pecans, Brazil nuts, hazelnuts, chestnuts, and the various hickory nuts, butternuts, etc., all of which are edible and of commercial importance. Strictly speaking, the peanut is not a nut, although commonly spoken of as such. The various nuts are considered under their separate headings.

In 1899 the United States imported 9,957,427 pounds of almonds, having a value of \$1,222,587. The value of the cocoanuts imported amounted to \$625,789, and of all other nuts, \$879,166. The exports of domestic nuts the same year amounted to \$140,250. The most important nuts now grown commercially in the United States are the Persian or English walnuts, almonds, pecans, and chestnuts. The culture of the first two is confined almost entirely to California. The Persian walnut crop amounts to about a million pounds a year, and the almond crop to between 600,000 and 800,000 pounds. Pecan orchards are largely confined to the Southern and Southwestern States and California, but the bulk of the crop is obtained from native trees in Louisiana and Texas. Commercial chestnut orchards are few in number in the United States, but they are increasing from year to year, European and Japanese varieties being largely used to top graft the small native sweet varieties. As with pecans, the bulk of the crop is produced on wild trees. Other native nuts of the United States, which have a greater local than commercial value, are black walnuts, butternuts, the various shellbark hickory nuts, hazelnuts, and chinquapin.

FOOD VALUE. From 50 to 65 per cent. of the nuts most commonly eaten (almonds, Brazil nuts, filberts, hickory nuts, pecans, and walnuts) consist of shell. All of these nuts contain little water. The percentage of protein is fairly high, but fat constitutes the largest part of the edible portion, and carbohydrates, which are usually important constituents in vegetable foods, are generally present in small amounts. The chestnut, however, contains nearly 40 per cent. carbohydrates. The percentage in cocoanuts, acorns, and litchi nuts is also fairly high. The meat of nuts, excepting those last mentioned, contains nearly fifty times as much fat and less than one-fifth as much carbohydrates as wheat flour, and has about double the fuel value, i.e. energy-producing power. A pound of unshelled nuts will furnish about half

as much protein and the same amount of energy as a pound of flour. Owing to their high fuel value and low protein content, nuts would not make a well-balanced food when eaten by themselves. This is no reason, however, why nuts should not fill an increasingly large place in dietaries. Very few foods supply the needed nutrients in the proper proportion to form a well-balanced ration. Foods rich in fuel constituents need to be combined with other foods of relatively high protein content.

The composition of a number of different kinds of nuts used as food is shown in the following table:

COMPOSITION OF NUTS

	Refuse	Edible portion	Composition and fuel value of the edible portion					
			Water	Protein	Fat	Carbohydrates	Ash	Fuel value, per pound
	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Calories
Almonds.....	64.8	35.2	4.8	21.0	54.9	17.3	2.0	3,030
Brazil nuts.....	49.6	50.4	5.3	17.0	66.8	7.0	3.9	3,329
Filberts.....	52.1	47.9	3.7	15.6	65.3	13.0	2.4	3,432
Hickory nuts.....	62.2	37.8	3.7	15.4	67.4	11.4	2.1	3,495
Pecans.....	53.2	46.8	3.0	11.0	71.2	13.3	1.5	3,033
English walnuts.....	58.0	42.0	2.8	16.7	64.4	14.8	1.3	3,305
Chestnuts, fresh.....	16.0	84.0	45.0	6.2	5.4	42.1	1.3	1,125
Chestnuts, dried.....	24.0	76.0	5.9	10.7	7.0	74.2	2.9	1,875
Acorns.....	35.6	64.4	4.1	8.1	37.4	48.0	2.4	2,718
Beechnuts.....	40.8	59.2	4.0	21.9	57.4	13.2	3.5	3,263
Butternuts.....	86.4	13.6	4.5	27.9	61.2	3.4	3.0	3,371
Walnuts.....	74.1	25.9	2.5	27.6	66.3	11.7	1.9	3,105
Cocconut.....	48.8	51.2	14.1	5.7	50.6	27.9	1.7	2,866
Cocconut, shredded.....		100.0	3.5	6.3	57.3	31.6	1.3	3,125
Pistachio, kernels.....		100.0	4.2	22.6	54.5	15.6	3.1	3,010
Pine nut or pignon.....	40.6	59.4	3.4	14.6	61.9	17.3	2.8	3,364
Peanuts, raw.....	24.5	75.5	9.2	25.8	38.6	24.4	2.0	2,500
Peanuts, roasted.....	32.6	67.4	1.6	30.5	49.2	16.2	2.6	3,177
Litchi nuts.....	41.6	58.4	17.9	2.9	2	77.5	1.5	1,453

There is little reliable information regarding the digestibility of nuts. The belief that they are indigestible, i.e. digest with difficulty, causing more or less pain or distress, seems to be widespread, and perhaps has some basis in fact. It is quite probable that if the nuts were properly prepared and eaten at proper times much of this prejudice would disappear. There is also a general belief that salt eaten with them aids in their digestion. The present practice of munching them at odd hours, or as a dessert, when sufficient food has been taken to meet the requirements of the body, overtaxes the digestive organs and places the nut under a reproach that is, at least in part, undeserved. While most nut meats are generally eaten without any previous preparation, they may be used in a variety of ways. Chopped nut meats are much relished for sandwiches, and nut salads are not uncommon, while nuts, most commonly chestnuts, are often used as stuffing for roast fowl. The use of nuts in cakes, confectionery, creams, etc., is common. Large quantities of pecans are used by confectioners for making salted pecans, and bonbons of various sorts; and in some European countries, where the chestnut is abundant, bread is made from the ground kernels. Many attempts have been made to prepare nut foods, and to extend their use in various ways. An oil used for salad and other culinary purposes is expressed from beechnuts, walnuts, and very likely from others. Cocconut oil is much used for culinary purposes, especially in the tropics. This and other nut oils also have various commercial uses.

Consult: United States Department of Agriculture, *Nut Culture in the United States*

(Washington, 1896); Fuller, *Nut Culturist* (New York, 1896); Parry, *Nuts for Profit* (Parryville, N. J., 1897); Maine Agricultural Experiment Station, Bulletin 54, *Nuts as Food* (Orono, Maine, 1899).

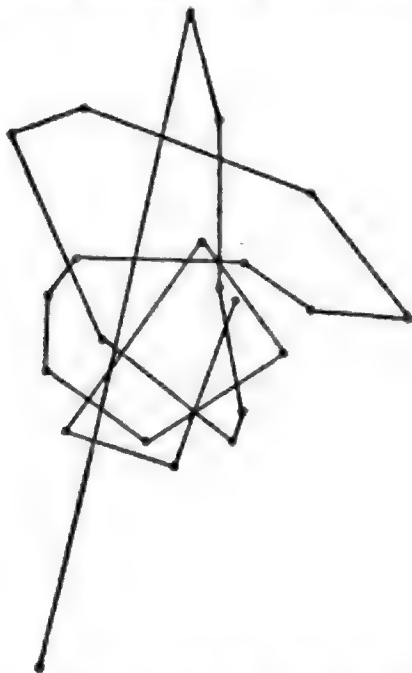
NŪT, nōt. An Egyptian goddess, the wife of Seb (q.v.), or, according to other accounts, of the sun-god Rē. She personified the sky, and is usually represented as a naked woman bending, with feet and hands touching the ground, over Seb (the earth), who lies prostrate beneath her. Nūt is also depicted as a cow uplifted by the god Shū and supported by other divinities, while over

her body, which is adorned with stars, travels the bark of the sun. In the legend, the sun-god Rē, weary of ruling over the earth, retires to rest upon the back of the celestial cow, which typifies the goddess Nūt. Consult: Wiedemann, *Religion of the Ancient Egyptians* (New York, 1897); Lepsius, *Ueber die Götter der vier Elemente* (Berlin, 1856); Brugsch, *Religion und Mythologie* (Leipzig, 1888-90).

NUTATION (Lat. *nutatio*, a nodding, from *nutare*, to nod). A vibratory motion of the pole of the equator due to the unequal attraction of the moon on the equatorial ring of the earth. Astronomers define the positions of the stars on the celestial sphere by means of their right ascensions and declinations (q.v.), which are analogous, respectively, to longitudes and latitudes on the earth. But one of the effects of gravitational attraction is to change the position on the sky of the celestial equator, thus altering continually the right ascensions and declinations of all stars. This alteration is called *precession* (q.v.). The general effect of precession is to cause the celestial pole to describe a circle around the pole of the ecliptic (q.v.) once in about 25,800 years. This rotation, however, is not quite uniform. It is subject to a small disturbance of about nine seconds of arc, called *nutation*. This nutation acts forward and backward about 1400 times in the course of one 25,800-year rotation of the celestial pole. The stars' right ascensions and declinations are therefore alternately increased and decreased by nutation, whereas precession generally acts in one direction over a great number of years.

NUTATION (in Plants). The bending movements executed by organs of plants, such as stems, leaves, roots, etc., by which the part is inclined successively in various directions. Nutations are due to the unequal rate of growth of different sides of the organ, an inequality which, as far as is known at present, is dependent upon internal (unknown) causes, and is not called forth by the action of external stimuli. See **IRRITABILITY**.

Simple nutation occurs in dorsiventral organs, such as flat leaves, both foliage and floral. The movements are only in one plane, being dependent upon the unequal growth of the opposite sides. When young the growth of the foliage leaves is most rapid upon their outer (dorsal) face, in consequence of which the leaf applies itself to the axis, arches over the apex, and with its neighbors forms a compact bud. Later, growth becomes more rapid on the inner (ventral) face, the bud opens, and the leaves straighten out. Similar inequality of growth, but more sharply localized, leads to the folding and rolling of the leaf in the bud. (See *Vernation*, under **LEAF**.) Like movements of radial organs, such



NUTATION OF THE TIP OF THE PEA-STEM.

The dots represent the observations; the line is drawn merely to show their serial relation. The true path is doubtless less angular.

as stems, cylindrical leaves, and roots, have been termed circumnutation or revolving nutation, to distinguish them from the simple nutation of dorsiventral organs. When any plant is in vigorous growth the axis rarely grows in length uniformly on all sides. The side on which growth is most rapid will push the apex over toward the side on which growth is less rapid. If the region of more rapid growth changes, shifting around the axis, the tip will be inclined successively to all points of the compass, and with its simultaneous upward growth will describe a spiral; but since the rate of growth is not uniform at successive intervals, the path described will be a very irregular spiral. A path of this kind, reduced to a plane, is shown in the accompanying figure.

Movements quite similar to those above described are called forth in plant organs as re-

sponses to external stimuli. Thus twining plants exhibit both true nutation and nutation due to a geotropic sensitiveness. (See **GEOTROPISM IN PLANTS**.) Changes in temperature cause flowers to open or close by movements which resemble the simple nutation of dorsiventral organs. Thus the tulip, crocus, and other vernal flowers are very sensitive to changes in temperature. The latter can perceive a change of 0.5°C ., and will respond to a change of 20°C . in two minutes.

NUT-BROWN MAID, THE. An English ballad of the fifteenth century, telling the exceptional story of the maid, a high-born lady, who maintains her love and constancy to her outlaw lover through the tests he uses to try her. Finally she conquers, and finds the outlaw is also of high degree, and his banishment is feigned. The lover has been supposed to be the Earl of Cumberland, and the nut-brown maid, Margaret Percy. The earliest version is found in Arnold's "Chronicle," a collection of London antiquities (1502). It was reprinted in 1707 in the "Muses' Mercury," and paraphrased by Prior in his "Henry and Emma," in 1718.

NUT-CRACKER. A bird of the crow family, of the genera *Nucifraga* and *Picicorvus*. The form and characters are similar to those of crows, but the habits are rather those of jays, and in some respects indicate an approach to woodpeckers. One species (*Nucifraga caryocatactes*) is not uncommon in Europe and Asia, particularly in mountainous regions covered with pines. It is about the size of a jay, but has a longer tail. The plumage is light brown, speckled with white, except on the wings, rump, and tail, which are nearly black. The nut-cracker frequents the tops of high pines, is shy, and breeds earlier than most birds, and in a very secretive manner. Its food, apart from some insects in summer, consists of the seeds extracted from pine cones. These it holds with its feet while it works at them; but its ability to crack a nut, in spite of its name, is doubtful. The only American nut-cracker (*Picicorvus Columbianus*), usually called 'Clarke's crow,' inhabits the pine regions of the West from Mexico to Alaska, and is gray with black and white wings and tail. It is noisy and gregarious, but during the breeding season it is shy. It builds its nest in the tops of tall pines and conceals it with care. The eggs are light grayish green, marked with grayish brown and lilac. Consult: Newton, *Dictionary of Birds* (London, 1893-96); Coues, *Birds of the Northwest* (Washington, 1874); Keyser, *Birds of the Rockies* (New York, 1902). See Plate of **JAYS, MAGPIES, ETC.**; and Colored Plate of **EGGS OF SONG BIRDS**.

NUTGALL, or GALL. See **GALLS**.

NUT GRASS. See **CHUFA**, and Plate of **CYPRESS, ETC.**

NUTHATCH (formerly also *nuthack*, ME. *nuthake*, *nuttehake*, from *nut* + *hack*). A genus of birds of the family *Paridae*, having a straight bill and short legs, the hind toe very strong. The genus is represented in North America by four species, of which the white-bellied nuthatch (*Sitta Carolinensis*) is the commonest and best known. It is found throughout the whole United States and Canada, and is about six inches long, clear ashy blue above, white beneath, and with the crown rich, glossy, green-black. It is abundant in most localities in the fall and spring and

often during the winter, when its thrice-repeated querulous call, *nee-nee-nee*, is constantly heard; but in summer it is rather retiring. The nest is made in holes in trees, and the eggs, six to eight in number, are white, speckled with reddish and lilac. The other American species are the smaller red-breasted nuthatch (*Sitta Canadensis*), the brown-headed nuthatch (*Sitta pusilla*) found in the South Atlantic and Gulf States, and the pygmy nuthatch (*Sitta pygmaea*), found from the Rocky Mountains to the Pacific. The last two species are only four inches long. The red-breasted nuthatch is found throughout temperate North America, but is not nearly so common as its white-breasted brother. The European nuthatch (*Sitta Europaea*) is common in most parts of Europe. If taken young, it is easily tamed, and becomes very familiar and amusing. Several other species are known in Asia and Africa.

NUTMEG (ME. *nutmegge*, *nutmege*, from *nut* + *muge*, OF. *muge*, musk, from Lat. *mucus*, musk). The kernel of the fruit of several species of *Myristica*, of the natural order Myristicaceæ, which contains about eighty species, all tropical trees or shrubs, natives of Asia, Madagascar, and America. The fruit is succulent. It opens like a capsule by two valves. The seed is nut-like, covered with a lacinated fleshy aril which appears in commerce as mace. The species which furnish the greater part of the nutmegs of commerce is *Myristica fragrans*, or *moschata*, a tree about 25 feet in height, with oblong leaves, and axillary, few-flowered racemes; the fruit, which is golden yellow when ripe, resembles a pear in size and appearance. The fleshy part of the fruit, which is rather hard, is of a peculiar consistence, resembling candied fruit, and it is often preserved and eaten as a sweetmeat. Nutmegs are now successfully cultivated in the East Indies, Spice Islands, West Indies, and Brazil. Nutmegs are chiefly used as a spice. They yield, by expression, a peculiar yellow fat, called oil of mace (because of its color and flavor, it was generally supposed to be derived from mace), and by distillation is obtained an almost colorless essential oil which has very fully the flavor of the nutmeg. In 1890 the United States imported nutmegs to the value of \$534,340.

Other species of *Myristica* yield nutmegs which, though sometimes used, are of inferior quality. The fruits of several species of Lauraceæ also resemble nutmegs in their aromatic and other properties, as the cotyledons of *Nectandra* *Puchury-major* and *Puchury-minor*, the *Pichurim* beans of commerce, and the fruit of *Acrodielidium Camara*, a tree of Guiana, the *camara* or *ackawai* nutmeg. The clove nutmegs of Madagascar are the fruit of *Ravensara aromatica*, and the Brazilian nutmegs of *Cryptocarya moschata*. The calabash nutmeg is the fruit of *Mondora Myristica*, of the natural order Anonaceæ. See Colored Plate of FLAVORING PLANTS.

NUTMEG-BIRD. A bird-dealer's name for one of the mynas (*Munia punctulata*), also known as the 'cowry-bird.' An East Indian fruit-(nutmeg-)eating pigeon of the genus *Myristicivora* is known as the 'nutmeg pigeon.'

NUTMEG FLOWER. See NIGELLA.

NUTMEG STATE. Connecticut. See STATES, POPULAR NAMES OF.

NUTRIA. The local Spanish name in South America for the coypu (q.v.), also called 'ra-coonda,' and the trade name for its fur.

NUTRITION (from Lat. *nutrire*, to nourish). The process by which living organisms appropriate, modify, and utilize the materials needful for their existence, growth, and development. The ultimate appropriation of food takes place in the individual cell, which seems to have a gland-like power not only of attracting materials from the blood, but of causing them to assume its structure and participate in its properties. A necessary complement to the process of assimilation is that of excretion, which consists in the discarding of effete matter—the products of its own vital activity—by the cell. In modern terminology the assimilative or building up process is called anabolism; the disassimilative or breaking down process is called katabolism, and the sum of the two, metabolism. The blood is the medium through which nutritive materials are brought to the cells and excreted products are carried off. It is borne by the capillaries to the several tissues of the body and is the source from which they derive the materials for their growth and development; and there is a direct relation between the vascularity of any part and the activity of the nutritive operations which take place in it. Thus in muscle, skin, and mucous membrane, and in nerve tissue, rapid decay and renovation are constantly going on, and in these tissues the capillaries are most abundant; while in cartilage and bone, tendon and ligament, disintegration is comparatively slow, and the capillaries fewer.

All the processes of development and growth are the results of the plastic or assimilative force by which living bodies are able to form themselves from dissimilar materials (as when an animal subsists on vegetables, or when a plant grows by appropriating the elements of water, carbonic acid, and ammonia); but they are the results of this force acting under different conditions.

Development is the process by which each tissue or organ of a living body is first formed, or by which one, being already incompletely formed, is so changed in shape and composition as to be fitted for a function of a higher kind, or finally is advanced to the state in which it exists in the most perfect condition of the species.

Growth, which commonly concurs with development, and continues after it, is properly mere increase of a part by the insertion or super-addition of materials similar to those of which it already consists.

Nutrition, on the other hand, is the process by which the various parts are maintained in the same general conditions of form, size, and composition.

In the elementary forms of animal and vegetable life, represented on the one hand by the ameba and on the other by bacteria, the process of nutrition is a comparatively simple one. They are surrounded by a material which they can use as food, and each individual cell, being fitted to digest and absorb, appropriates what it needs and rejects what it does not require. In the higher animals, however, careful selection and a high degree of preparation and modification of the food is necessary; and these processes are carried

on in the digestive canal and by the secretions of the glands (q.v.) which open into it. The series of phenomena attending the elaboration of food and its preparation for assimilation by the tissues are described under **DIGESTION** (q.v.).

In order that nutrition may be carried on in a healthy manner, certain conditions must be present. The blood must be normal in composition and amount, and circulate with suitable rapidity; there must exist a certain nervous stimulation and control; and the part to be nourished must be able to appropriate the materials brought to it by the blood. The dependence of nutrition upon the first of these conditions is shown in anemia, in which disease the contents and carrying capacity of the blood are lowered, and nutrition correspondingly depressed. The influence of the nervous system is demonstrated by the atrophy or even death of a part which follows the destruction or cutting off of its nerve supply. This often happens in certain diseases of the spinal cord.

It is not only necessary that the body should be supplied with food in order that its natural functions may be performed, but it is equally necessary that the food supplied should consist of the proper materials. Each animal by instinct seeks those substances which best meet the needs of its own metabolism, and it is a matter of every-day experience that man endeavors to supply himself with food suitable to the conditions under which he lives, and alters his diet with respect to season, latitude, age, activity, and occupation. Food is intended to supply the place of that which is given out by the body. But in the choice of diet this is not enough; the food should be sufficient to meet such needs without waste, and without increasing unduly the output of excreta, while the organism should be maintained in health. Careful analysis of the excreta shows that they are made up, besides water, chiefly of the chemical elements, carbon, hydrogen, oxygen, and nitrogen, but that they also contain, although in smaller amounts, sulphur, chlorine, potassium, and certain other elements. To balance this waste it is evident that food must be supplied containing all these elements in something like the proportion in which they are excreted; that is, a 'mixed diet' is necessary. Experiments upon the lower animals have shown that a diet composed exclusively of one class of food, such as fat, or sugar, results in the death of the animal after a longer or shorter period of time. See **DIET**.

The subject of nutrition is exhaustless. It comprehends all vital phenomena, for none of the functions of life are performed without involving replacement by living matter, and therefore nutrition. The subject of hygiene in all its aspects is connected with it, whether in eating, drinking, exercise, sleeping, or breathing. A change in each of these processes involves a corresponding change in the elaboration and appropriation of new material, and the disassimilation or elimination of old, or its reconversion.

Consult the chapters on "Nutrition and Diet," in Kirke, *Handbook of Physiology* (Philadelphia, 1902); and Foster, *Textbook of Physiology* (New York, 1900). See **RESPIRATION**; **SECRETION**.

NUTRITION (in Plants). In its widest sense the nutrition of plants includes all processes by which food is obtained and used. The

food of plants consists of organic material. Even the green plants require organic food, which they manufacture out of the simpler substances, carbon dioxid and water, that they absorb. The mode in which plants obtain both foods and the materials out of which foods can be made, is described under the head of **ABSORPTION**. (For the nature of the materials which plants require, see **FOOD OF PLANTS**.) Reserve foods are stored in the special tissues or organs. Such materials must be moved first from regions of absorption or manufacture to the points of storage, and after digestion at some later time thence to the regions of growth. Having been brought to the regions of growth, some of the food is used for the supply of energy to the protoplasm, either directly or after incorporation into the substance of the protoplasm itself. The energy is released through the process of oxidation and the by-products are carried away. All processes of nutrition connected with the release of energy for growth and movement constitute the function called respiration (q.v.). Other portions of the food are utilized for the making of new parts. See **GROWTH**; **PHOTOSYNTHESIS**; **ASSIMILATION**; **STORAGE**; **DIGESTION**.

NUTT, nūt, ALFRED TRUBNER (1856—). An English folk-lorist, born in London, and educated at the University College School and the Collège de Vitry, France. He studied the publishing business in Leipzig, Berlin, and Paris from 1874 until 1877, and then succeeded to that of his father in London. He was one of the original members of the Folk-Lore Society, became its president in 1897, and was a founder of the Irish Texts Society in 1898. His publications are: *The Legend of the Holy Grail, with Especial Reference to the Hypothesis of the Celtic Origin* (1888) and *The Voyage of Bran* (2 vols., 1895-97).

NUTTALL, THOMAS (1786-1859). An American ornithologist and botanist, born at Long Preston, Settle, England. He came to the United States in 1808, and went West. Though an ardent ornithologist, and constantly in the wilderness, he rarely carried a gun. In 1822 he was made professor of natural history at Harvard University, but gave only irregular instruction, devoting himself mainly to the culture of the botanic garden, founded in 1805 by his predecessor, Dr. W. D. Peck. He remained in Cambridge ten years, and wrote and published *The Genera of North American Plants* (1818) and *A Manual of the Ornithology of the United States and Canada* (1832-34), in two volumes, which is a classic in American science. A second enlarged edition was published by Nuttall in 1840; and a third edition, with notations by M. Chamberlain, was published in Boston in 1896. In 1834 Nuttall suddenly resigned his professorship and started on an expedition to the Pacific Coast, led by Captain Wyeth, and accompanied by another naturalist, J. K. Townsend, who published a *Narrative of the journey* (1839). From California he went on to the Sandwich Islands, whence he returned around Cape Horn, in the vessel which had among its crew Richard H. Dana, author of *Two Years Before the Mast*. Nuttall then settled in Philadelphia and prosecuted scientific study and writings for a few years. After publishing a second edition of his *Ornithology* (1840), and a *Supplement to Mi-*

chaux's *North American Sylva* (1842-49), he returned to inherited estates in Lancashire, where he died.

NUT-WEEVIL. Any one of several species of weevils, of the family Curculionidæ, which infest chestnuts, hickory nuts, and other nuts. They belong to the genus *Balaninus*, and are of rather large size, usually clay-yellow in color, and possess an exceedingly long, slender beak or snout. By means of this beak they puncture the burs of young chestnuts, the husks of hickory nuts and walnuts, and the coverings of young acorns, reaching nearly to the centre of the nut, and placing an egg in the hole thus made. The larva, which is a stout white grub, eats out the interior of the nut and burrows its way through the shell, and then enters the ground to pupate.

NUX VOMICA (Neo-Lat., vomit nut, from Lat. *nux*, nut, and Neo-Lat. *vomicus*, relating to vomit, from Lat. *vomere*, to vomit). The pharmacopœial name of the seed of *Strychnos nux vomica*, or *poison nut*. The seeds, which are imported from the East Indies, are nearly circular and flat, about an inch in diameter, umbilicated and slightly convex on one side, externally of an ash-gray color, thickly covered with short satiny hairs, internally translucent, tough, and horny, taste intensely bitter, inodorous.

The *nux vomica* tree is a native of Coromandel, Ceylon, and other parts of the East Indies. It is a tree of moderate size, with roundish-oblong, stalked, smooth leaves, and terminal corymbs. The fruit is a globular berry, about as large as a small orange, one-celled, with a brittle shell, and several seeds lodged in a white gelatinous pulp. The bark is sometimes known as *false Angostura bark*, having been confounded with *Angostura bark* in consequence of a commercial fraud; but its properties are very different, as it is very poisonous.

The seeds contain (in addition to inert matters, such as gum, starch, woody fibre, etc.) two alkaloids closely related to each other, which act as powerful poisons on the animal frame, and speedily occasion violent tetanic convulsions and death. These alkaloids or bases are named *strychnine* and *brucine* (q.v.).

Nux vomica is poisonous in a greater or lesser degree to most animals. In very small doses, its effects upon man are those of a general tonic, acting as a stimulant to digestion, circulation, respiration, and the nervous system. It seems to exert a selective action upon the cells of the anterior horn of the spinal cord. In larger doses there is a disordered state of the muscular system; the limbs tremble; a slight rigidity or stiffness is felt when an attempt is made to put the muscles in action; respiration is jerky and there is a sense of uneasiness. If the use of the medicine is continued these effects increase in intensity, and the voluntary muscles are thrown into a convulsed state by very slight causes—as, for example, by inspiring more deeply than usual, or even by turning in bed. In paralysis the effects are most marked in the paralyzed parts. In poisonous doses the symptoms are like those of tetanus, but with the muscles of the jaw the last to be affected, followed by death. It is difficult to say what is the smallest dose that would prove fatal to an adult. Thirty grains of the powdered nuts, given by mistake to a patient, destroyed life. Three

grains of the extract have proved fatal, half a grain of sulphate of strychnine caused death in fourteen minutes. Its chemical antidote is tannin, which forms a partially insoluble compound.

NYACK, nī'āk. A village in Rockland County, N. Y., picturesquely situated on the west bank of the Hudson River, at the broad expansion called Tappan Bay, opposite Tarrytown, with which it is connected by ferry, and 27 miles north of New York City; the terminus of the Northern Railroad of New Jersey, a branch of the Erie Railroad (Map: New York, G 4). It is popular as a place of residence and as a summer resort. It has a public library, and is the seat of the Hudson River Military Academy, Rockland Military Academy, and Nyack Military Academy. There are cloth-finishing and yacht and boat building establishments, also manufactories of shoes, carriages, sleighs, etc. Nyack was settled about 1700, was incorporated as a village in 1873, relinquished its charter in 1876, and was reincorporated in 1883. The government, under a general village law, revised in 1897, is vested in a president and board of trustees. The water-works are owned and operated by the village. Population, in 1890, 4111; in 1900, 4275.

NYAM-NYAM. An African people. See NIAM-NIAM.

NYAN. The name in Ladak for an argali (q.v.).

NYANGWE, nyāng'wē. A trading station on the Upper Congo, in Congo Free State, Central Africa, in longitude 26° 20' E., and latitude 4° 15' S. (Map: Congo Free State, E 3). It is connected by a caravan route with Lusambo, on the Sankuru, from where there is steam communication with Leopoldville. It is also connected with Albertville, on Lake Tanganyika. Nyangwe was visited by Livingstone in 1871, and was the starting point for Stanley's expedition to the mouth of the Congo in 1876.

NYANZA, nyān'zā. A word in the eastern Bantu languages meaning 'great water,' and applied to several of the large lakes in Central Africa. See ALBERT EDWARD NYANZA; ALBERT NYANZA; NYASSA; VICTORIA NYANZA.

NYASSA, nyās'sā (a form of the Bantu word *nyanza*, meaning 'great water'). One of the large lakes of Southeastern Africa. It is situated southeast of Lake Tanganyika, and about 380 miles from the Indian Ocean, between latitudes 9° 30' and 14° 25' S. (Map: Congo Free State, F 5). It is 340 miles long from north to south, with an average breadth of 40 miles, and an area of 14,200 square miles. Near its southern and eastern shores it reaches a depth of 700 feet, and in many places its bottom lies below the surface of the Indian Ocean, but it becomes shallow toward the north and west. It closely resembles Lake Tanganyika (q.v.) in shape and formation, both being formed by deep fissures in the great plateau. Lake Nyassa is surrounded on all sides by mountains, which on the east coast are from 5000 to 10,000 feet high. Between these and the shores there is an intervening strip of low, sandy or marshy alluvial land from 2 to 10 miles wide, except in the northeast, where the mountains approach close to the water's edge. On the west the mountains are broken in several places by gaps through which rivers find their way to the lake, which is drained southward into

the Zambezi through the Shire River. Anchorage can be found in some of the creeks and river mouths, and several British and German steamers ply regularly on the lake, which is bounded on the west by British Central Africa, and on the northeast by German East Africa. Lake Nyassa was discovered by Livingstone in 1859.

NYASSALAND, *nyās'sā-lānd*. Formerly the name of the British Central Africa Protectorate (q.v.).

NYĀYA, *nyā'yā* (Skt., analysis). The name of the sixth and latest of the orthodox systems of ancient Hindu philosophy.

Of the six systems the Mimamsa and Vedanta are grouped together as more closely connected in dealing with divine and spiritual matters. The Nyaya and Vaiśeshika systems form a group, having in common especially the atomic theory of the universe, and a clear and logical classification of ideas. The latter feature is particularly characteristic of the Nyaya system, so that it is commonly spoken of as 'Logic,' although it is really a philosophical system. The Nyaya agrees with all the other systems in promising to its followers final beatitude. The way to the attainment of supreme bliss is through a knowledge of the principles taught by this particular system. These principles are embodied in the sixteen 'topics,' *pramāṇa*, or means of knowledge, *pramēya*, or objects of inquiry, *saṁśaya*, or doubt, *prayōjana*, or purpose, *dr̥ṣṭānta*, or precedent, *siddhānta*, or tenet, *avayava*, or syllogistic member, *tarka*, or confutation, *nirṇaya*, or ascertainment, *vāda*, or discussion, *jalpa*, or wrangling, *vitaṇḍa*, or caviling, *hētvābhāsa*, or fallacy, *chala*, or prevarication, *jāti*, or futile objections, and *nigrahasthāna*, or failure in argument.

The great prominence given by the Nyaya to the method by means of which truth might be ascertained has sometimes misled European writers into the belief that it is merely a system of formal logic, not engaged in metaphysical investigations. It was, however, really intended to be a complete system of philosophical investigation; and some questions, such as the nature of intellect and articulated sound, or those of genus, variety, and individual, it has treated in a masterly manner.

The founder of the Nyaya system is said to have been Gotama, or Gautama. The events of his life and his date are quite unknown, though it is probable that the work attributed to him is, in its present shape, later than the work of the grammarian Panini (q.v.). It consists of five books, or *Adhyāyas*, each divided into two 'days' or diurnal lessons, which are again subdivided into sections or topics, each of which contains several aphorisms, or *Sūtras*. Like the text-books of other sciences among the Hindus, it has been explained by commentaries, which, in their turn, have been made the bases of more popular or elementary treatises.

The Nyaya system, like the kindred Vaiśeshika, was originally atheistic. It became theistic later, but without acknowledging the existence of a personal God as a creator of matter. This feature, which it shares with the later form of the Vaiseshika, was elaborated in Udayanacharya's *Kusumanjali* (about A.D. 1200), and in some other works.

The Sanskrit text of the Sūtras of Gotama, with a commentary by Visvanatha, was edited at

Calcutta (1828), and the first four books, and part of the fifth, of the text, with an English version, an English commentary, and extracts from the commentary by Ballantyne (Allahabad, 1850-54). More recent is the edition of the *Nyāya Sūtras* at Benares (1896); also Udayanacharya's *Kusumanjali* (Calcutta, 1895). Consult: Garbe, *The Philosophy of Ancient India* (Chicago, 1897); Max Müller, *The Six Systems of Indian Philosophy* (New York, 1899). See *Mīmāṃsā*; *SAMKHYA*; *SŪTRA*; *VAIŚEŚHIKA*; *VEDANTA*; *YOGA*.

NYBLOM, *ny'blóm*, KARL RUPERT (1832—). A Swedish poet and critic, born at Upsala. He studied at the university in his native town, and was professor of æsthetics and of the history of art and literature there from 1867 to 1897. His publications include some valuable studies of art under the title, *Estetiska studier* (1873-84). His works in poetry include: *Dikter* (1860); *Bilder från Italien* (1864, revised as *Et tår i Södern*, 1883); *Nya Dikter* (1865); *Vers och Prosa* (1870); and *Valda Dikter* (1876). Besides these original works he translated Moore's *Melodies* and the *Sonnets* of Shakespeare.

NYBORG, *ny'bör-y'*. A seaport of Denmark, situated on the east coast of the island of Flin, 17 miles southeast of Odense (Map: Denmark, D 3). There are an old Gothic church, and the remains of an ancient palace, formerly a royal residence, but now used as an arsenal. The harbor is accessible for large vessels, and a line of ferry-boats runs across the Great Belt to Korsör in Zealand. Nyborg is of considerable industrial importance, having large iron foundries, steam textile mills, and tobacco factories, besides a large trade in grain. Population, in 1890, 6049; in 1901, 7785. Nyborg was founded in the twelfth century, and soon became one of the foremost cities of Denmark, being the regular meeting place of the early Government assemblies.

NYCTALOPIA (Lat., from Gk. *νυκτῶπις*, *nyktalōps*, night-blind, from *νύξ*, *nyx*, night + *ὤψ*, *ōps*, face, eye). Night-blindness. An affection of vision due rather to defective power of retinal adaptation than to defective light-sense, but resulting in a limited ability to see in a faint light. See *SIGHT*, *DEFECTS OF*.

NYCTERIBIA (Neo-Lat., from Gk. *νυκτερίς*, *nykteris*, bat + *βίος*, *bios*, life). An extremely curious genus of degraded, parasitic flies having neither wings nor balancers. It is the sole genus of the family Nycteribiidae. It resembles the Hippoboscidae in parasitic habits, and in the retention of the eggs within the abdomen of the female, until they have not only been hatched, but have passed from the larva into the pupa state. The few species are all parasitic on bats.

NYCTOTROPIC (from Gk. *νύξ*, *nyx*, night + *τροπή*, *tropē*, a turning, from *τρέπω*, *trepein*, to turn). A term applied to those movements of plants which are called forth by variations in the intensity of the light. A later and more exact term is *photoclinic*.

NYDIA. In Bulwer's *Last Days of Pompeii*, a blind flower-girl, of gentle birth, rescued by the hero from the slavery into which she had been sold. The story of her love for Glaucus is modeled on Mignon's passion, but is individual-

ized by her blindness, which the author handles with much art.

NYE, EDGAR WILSON (1850-96), better known as Bill Nye. An American humorist, born in Shirley, Maine, August 25, 1850. Nye's childhood was passed in Wisconsin. He went as a young man to Wyoming, studied law, was admitted to the bar there in 1876, was elected to the Legislature, and afterwards served as Postmaster and newspaper correspondent. His health failing, he returned to Wisconsin in 1883 and settled in New York in 1886, having already achieved wide popularity as a humorist, lecturer and writer. His humor consists very largely in punning and in making free with the English tongue. The more noteworthy of his books are: *Bill Nye and the Boomerang* (1881); *Forty Liars* (1883); *Baled Hay* (1884); *Bill Nye's Blossom Rock* (1885); *Remarks* (1886); *Chestnuts* (1887); *Railroad Guide*, with James Whitcomb Riley (1888); and, with the same, *Fun, Wit, and Humor* (1889); a play, *The Cadi* (1891); *Comic History of the United States* (1894); and *Comic History of England* (1896). Nye died in Asheville, N. C., February 27, 1896.

NYIREGYHÁZA, nyé-réd-y'hä-zö. A town and railway junction in the District of Szabolcs, Hungary, Austria, on the Nyir, 167 miles by rail northeast of Budapest (Map: Austria-Hungary, G 3). Situated near the Tokay wine region, the inhabitants are largely engaged in viticulture; other branches of agriculture are also profitably developed, and there are manufactures of soda, saltpetre, and matches; important annual fairs are held. Population, in 1900, 33,088.

NYKÖPING, ny'chê-ping. A seaport of Sweden, situated on an inlet of the Baltic Sea, 50 miles southwest of Stockholm (Map: Sweden, G 7). It possesses regular steamship connections with the capital city and Norrköping, and has cotton and wool spinning establishments, and an active trade in grain. Population, in 1901, 7375. In the Middle Ages Nyköping was one of the most important towns of Sweden.

NYLANDER, ny'lân-dér, WILLIAM (1822-99). A Finnish botanist, born at Uleåborg. From 1857 to 1863 he was professor of botany at Helsingfors, and then settled in Paris. He left his valuable collections and his library to the University of Helsingfors. Nylander wrote on the lichens of Europe and of the tropics, *Essai d'une nouvelle classification des lichens* (1854); *Prodromus Lichenographiæ Galliar et Algeriar* (1856); and *Lichenographiæ Novo-Granatensis Prodromus* (1863).

NYLGHAU. See NILGAI.

NYM CRIN'KLE. A pseudonym of the American newspaper writer Andrew C. Wheeler (q.v.).

NYMPH (Gk. Νύμφα, *Nympha*). In Greek mythology, a lesser divinity or spirit of the woods and streams. The nymphs are mortal, though gifted with long life and free from old age. Their homes are the groves and fountains, forests, meadows, and the sea. There were many classes of nymphs, such as the Nereids (q.v.) in the sea, the Naiads (q.v.) at the springs, and the Dryads (q.v.) and Hamadryads in the trees. The Naiads especially, as goddesses of the waters, were regarded as divinities of fruitfulness and increase. The cult of the nymphs was very

widespread, but never attained special splendor. They were worshiped with Pan in caves, or at the springs where they dwelt. In art they are found as spectators or participants in many mythological scenes, and are also represented on many reliefs dedicated by votaries at their shrines. In Greek art they are usually represented as fully draped maidens, often holding hands and dancing; the number is usually three, and sometimes Hermes appears as their leader. In later times they are commonly in the form of maidens, nude above the waist and holding before them a large mussel-shell or basin as a symbol of their control over fountains.

NYMPH (from Lat. *nympha*, from Gk. νύμφη, *nymphê*, nymph, bride). The third stage of any insect which undergoes an incomplete metamorphosis. It is an active stage, and in it the insect as a rule closely resembles the adult, except in not possessing wings. See METAMORPHOSIS.

NYMPHÆACEÆ (Neo-Lat. nom. pl., from Lat. *nympha*, Gk. νύμφα, *nymphaia*, water-lily, from νύμφη, *nymphê*, nymph, bride). THE WATER LILY FAMILY. A natural order of more than 60 species of dicotyledonous plants growing in the mud of lakes, ponds, ditches, and slow rivers, in warm and temperate regions. Their large, long-stalked, heart-shaped or peltate leaves float on the surface of the water, and the large, often beautiful and fragrant flowers either float or are raised slightly above the water. There are usually four sepals, and numerous petals and stamens, often grading into one another. The many-celled ovary with radiating stigmas and numerous ovules in some of the genera is more or less surrounded by a large fleshy disk. The seeds have a farinaceous albumen and those of many species are used as food, as are also the root-stocks of some. See WATER-LILY; LOTUS; NELUMBO; VICTORIA; EURYALE.

NYORO, nyô'rô, or **BA NYORO**. One of a group of powerful Bantu tribes, living on the east side of Lake Albert Edward, Africa. They are the northernmost of the Bantu. They are as a rule good-looking, tall and well proportioned, but their countenances are disfigured by their custom of extracting the four lower incisors. The huts are conical frames, covered with thatch. Their weapons are spears, assegais or throwing spears, wooden shields, and bows and arrows. They make dugout canoes and rafts of bundles of papyrus for navigating the streams and lakes. Game and fish are caught with ingenious traps and nets. Their staple food is the sweet potato and grain, from which beer is brewed. The clan system prevails, and it is forbidden for a Nyoro to kill or eat the totem of his clan. The best defined religious practice is the worship of ancestors, which grows out of the clan system. As iron-workers, weavers, and potters they show decided skill. They number about 110,000. Consult Johnston, *The Uganda Protectorate* (New York and London, 1902).

NYRÉN, ny-rân', MAGNUS (1837-). A Swedish-Russian astronomer, born in the Province of Wermland, Sweden. He studied at Upsala, and in 1868 was first engaged in the Observatory at Pulkova, of which he became vice-director in 1890. Nyrén made valuable researches for the determination of the constants of precession, nutation, and aberration, and wrote: *Détermina-*

tion du coefficient constant de la précession au moyen d'étoiles de faible éclat (1870); *Bestimmung der Nutation der Erdschse* (1873); *Die Polhöhe von Pulkowa* (1873); *L'aberration des étoiles fixes* (1883); and *Variations de la latitude de Poulkova* (1893).

NYS'SA. A genus of North American trees. See TUPELO.

NYSSENS, né'sän', ALBERT (1855—). A Belgian politician, born at Ypres. He studied law at Ghent, and became professor in the Catholic University at Louvain. Afterwards he entered politics, was representative from Louvain in 1892, and played a prominent part in the struggle over the suffrage in 1893. Nyssens was made Minister of Industry and Labor in 1893. The labor laws he succeeded in having passed in this capacity did not suit the extremists of either party. He wrote *E. Pirmez* (1893), a

biography of the celebrated leader of the Left. See BELGIUM.

NYSTAD, ny'städ. A town in the Län of Abo-Björneborg, Finland, situated on the Gulf of Bothnia, about 40 miles southeast of Abo (Map: Russia, B 2). It is noted for the treaty concluded here in 1721 between Sweden and Russia, by which the territory conquered by Peter I. along the Gulf of Finland and the Baltic was conceded to Russia. Population, in 1897, 3928.

NYX (Lat., from Gk. νύξ, night). In Greek mythology, the goddess of night, called Nox by the Romans. She was the daughter of Chaos and mother, by her brother Erebus, of Day and Light. Among her children were the Mære, Hypnos, Nemesis, Discord, and Thanatos, and some of the poets call her the mother of all things.

O

O The fifteenth letter and fourth vowel in English, and a symbol for a sound in general common to all languages. Its form is derived through the medium of Latin from the Greek, and still more remotely from the Phœnician character. In Semitic the name of the letter was *ayin*, 'eye,' having reference to the form of the letter, which must originally have been a pictograph. This Semitic letter represented a guttural breathing, the 'ain, which did not exist in Greek. The sign was adopted by the Greeks to represent different *o*-sounds, for the long sound of which they afterwards developed the character omega (Ω). In post-classical times the names *omicron*, 'little *o*,' and *omega*, 'big *o*,' were given to these symbols. See ALPHABET.

SOUND. In English the letter *o* is used to indicate two chief divisions of *o*-sound, first the close or 'long *o*' in *old*, *no*, etc., which is sometimes represented also by digraphs, as in *sew*, *dough*, *toiw*; second, the open or 'short *o*,' which may be wide, as in *hot*, *rot*, or narrow, as in *shorn*, *lord*. The main source of the English long *o* is an Old English *ā*, Germ. *ei*, Goth. *ai*, as in Eng. *stone*, A.S. *stān*, Germ. *Stein*, Goth. *stains*; the short *o* is usually a retention of a West Germanic *o* as in *gold* (A.S. *gold*, Germ. *Gold*). As a graphic device, moreover, *o* is sometimes used to express a *u*-sound, as in *who*, *wolf*, *love*, *monk* (A.S. *munuc*), etc. This spelling is really not orthographic, but was due to the Anglo-Norman scribes adopting a looped *o* instead of *u* when adjoining an angular pointed letter like *m*, *w*, *n*, *v*, where the vowel could not readily be distinguished by the eye. In some words this has even affected the pronunciation, as in 'sovereign,' and often 'wont.'

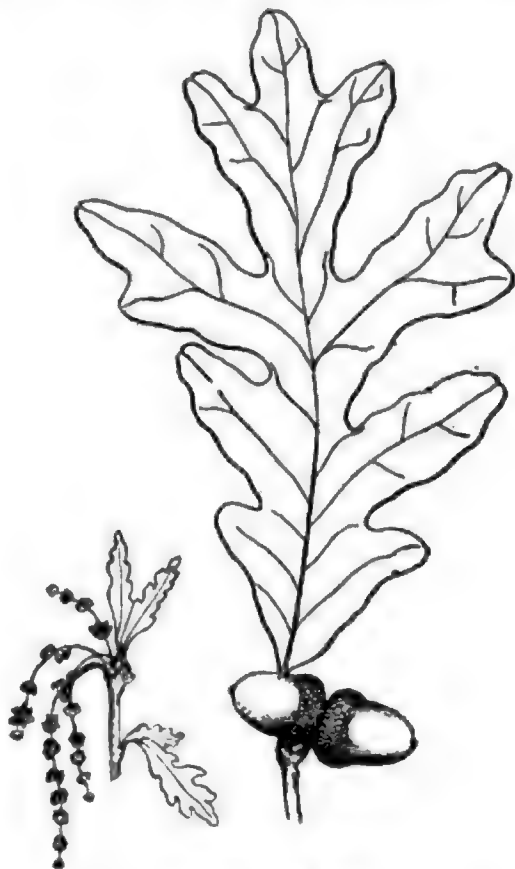
AS A SYMBOL. In mediæval notation as a numeral *o* = 11; in chemistry *O* = oxygen; in logic it is the sign of the particular negative proposition; and it is common in abbreviations, O.T. = Old Testament; O.H.G. = Old High German, etc.

OAHU, wā'hōō. One of the Hawaiian Islands (q.v.).

OAJACA, wā-hā'kā. A State and a city of Mexico. See OAXACA.

OAK (AS. *ac*, OHG. *eih*, Ger. *Eiche*, oak; connected with Lat. *æsculus*, Gk. *αἰγίλωψ*, *aigilōps*, oak), *Quercus*. A genus of trees and shrubs of the natural order Cupuliferae, having a three-celled ovary, and a round (not angular) nut

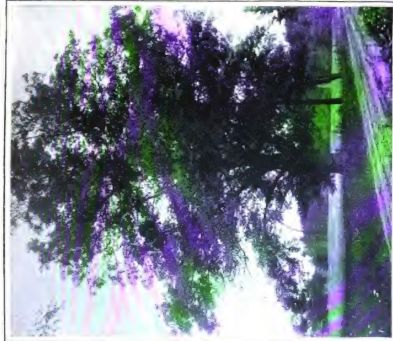
(acorn) placed in the lower part of and invested by a scaly truncated cup. The species number about 300 and are natives of temperate and tropical countries. Several are found in Europe. North America produces many, and many are natives of Asia, especially of mountainous regions. None are found in tropical Africa, in Australia, or in South America except in the most northern parts. The oaks have alternate simple leaves, which are entire in some, but in the greater number variously lobed and sinuated or cut; evergreen in some, but more generally deciduous, when they have well-developed winter buds.



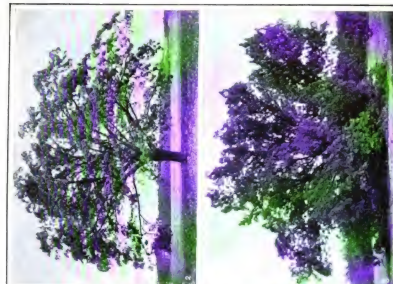
OAK (*Quercus alba*).

The oaks are famous for the strength and durability of their timber, the majesty of their appearance, and their great longevity. They reach maturity in from 120 to 200 years, depending upon the species, and well-attested specimens are known to be nearly 1000 years old. Some species rise tall and stately to a height of from 50 to

OAKS



1. SCARLET OAK (*Quercus rubra*).

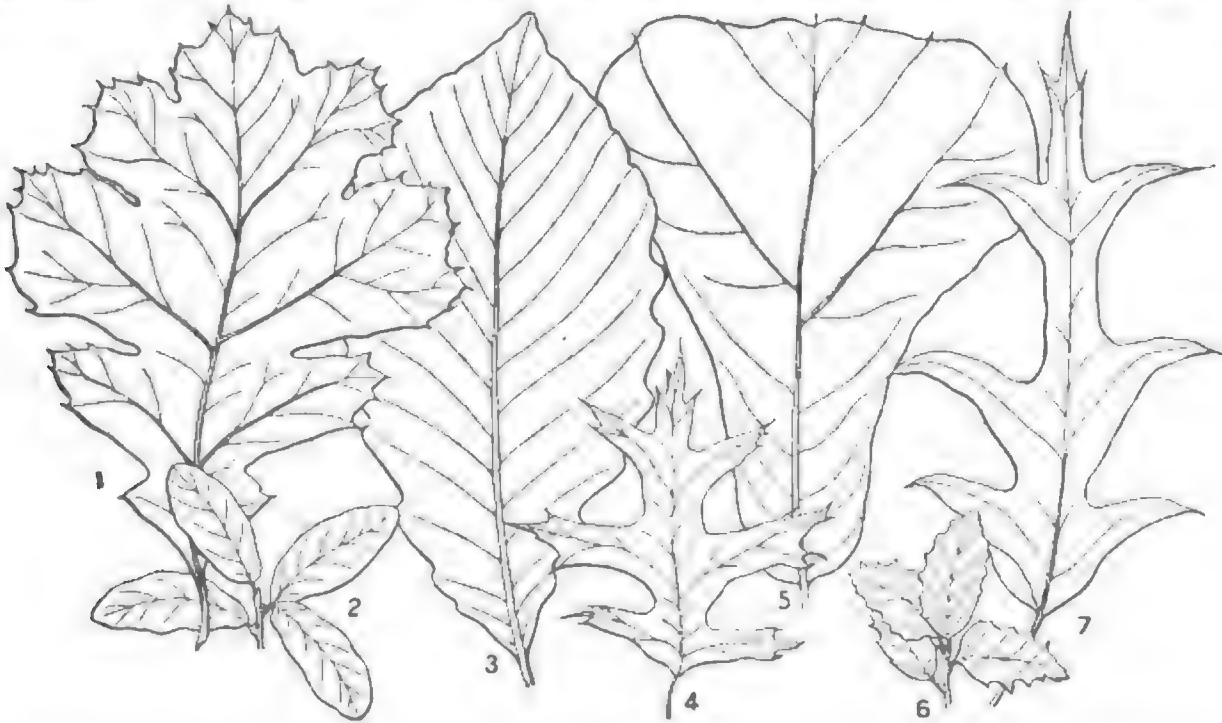


2. WHITE OAK (*Quercus alba*).
3. SPANISH OAK (*Quercus digitata*).

100 or even 150 feet, and have thick trunks and wide-spreading branches. The trunk is often four, six, or even eight feet in diameter. The oak succeeds best in loamy soils, and especially in those that are somewhat calcareous. The timber is very solid, durable, peculiarly insusceptible of the influence of moisture, and therefore eminently adapted to ship-building. It is also employed in carpentry, mill work, etc. The bark abounds in tannin, and contains a peculiar bitter principle called quercine, and is used in medicine, chiefly in gargles, on account of its astringency, sometimes also as a tonic; it is used along with gall-nuts in the manufacture of ink; but most of all for tanning (see BARK), on which account the oak is often planted as copse-wood (see COPSE) in situations where it cannot be expected to attain great size as a tree. The acorns of some trees

cork of commerce is obtained, is a native of Spain and the north of Africa. (See CORK.) The Valonia oak (*Quercus Ægilops*), of Eastern Europe and Asia and extensively planted in Algeria and elsewhere, is celebrated for the amount of tannin contained in its acorns and cups, large quantities of which are used in tanning leather. The gall oak (*Quercus lusitanica*), a common, low shrub native of Asia Minor, is noted for the galls produced upon its leaves by insects.

In the United States more than 50 species of oaks are found with a score or more additional described varieties and hybrids. Some species are very restricted in their distribution, being known from only a single locality, where others range from Maine to Minnesota and southward to the Gulf of Mexico. The American species, and



OAK LEAVES.

1, Black oak (*Quercus velutina*); 2, Live oak (*Quercus Virginiana*); 3, Rock Chestnut oak (*Quercus prinus*); 4, Pin oak (*Quercus palustris*); 5, Black Jack oak (*Quercus Marylandica*); 6, Corn oak (*Quercus suber*); 7, Spanish oak (*Quercus digitata*).

are also much less bitter than others, and species occur which produce acorns as sweet as chestnuts.

Economically considered the principal oak of Europe, also distributed over Western Asia, is *Quercus robur*, the British oak, of which there are two well-known varieties, *pedunculata* and *sessiliflora*, so named because in the former the acorns have stalks, in the latter not. These and other differences in habit have no apparent influence upon the value of the timber. Of these varieties, which some botanists call distinct species, *pedunculata* is more abundant in the north and *sessiliflora*, often called durmast oak, in the south. The Turkey, or Adriatic oak, sometimes called Austrian oak (*Quercus Cerris*), native to Southeastern Europe, is large and valuable and extensively planted. Its leaves are acutely lobed and the cups of the acorns have long acute bracts, from which it is called mossy-cupped. The holm or evergreen oak (*Quercus Ilex*) is an evergreen species occurring commonly in the south of Europe. It is more fully described under ILEX. The cork oak (*Quercus Pseudo-suber*), from the bark of which the

possibly the others, readily fall into two great groups, the white oaks and black oaks, respectively, the former with round-lobed, never bristle-tipped leaves, and acorns which ripen the first year; the latter with acute bristle-tipped leaf lobes, and fruits which mature the second year. The American white oak (*Quercus alba*), a large tree of rather rapid growth and tough, hard, strong, close-grained wood, is one of the most valuable of timber trees. It is found from Canada to the Gulf and west to Texas. The bur oak, or mossy-cup oak (*Quercus macrocarpa*), is a large tree of much the appearance and distribution of the white oak and is one of the most valuable oaks for Western planting. Its timber is coarser grained and not so strong, but otherwise equals that of the former species. The red oak (*Quercus rubra*) and the scarlet oak (*Quercus coccinea*) are large, valuable trees that occupy about the same territory. They belong to the second class of oaks mentioned above. Their timber is coarse-grained, heavy, hard, and strong, and is used in various kinds of building and for furniture. No difference between the

two is noticed in the lumber trade. The chestnut oak (*Quercus Prinus*) is a large tree with a deeply furrowed bark and leaves resembling those of the chestnut. The bark, which is rich in tannin, is used extensively in tanning leather. The chinquapin oak (*Quercus acuminata*), and the dwarf chinquapin oak (*Quercus prinoides*), by some botanists referred to *Quercus Prinus*, bear edible acorns. The yellow oak, or quercitron (*Quercus tinctoria*), or *Quercus discolor* of some botanists, yields a valuable bark for use in tanning, and a dyestuff, quercitron. The live oak (*Quercus virens* or *Quercus Virginiana*) is found growing in the rich soil of moist climates from Virginia to Texas, also in California, Mexico, Central America, and Cuba. It is one of the hardiest of the evergreen oaks, attaining a height of 60 feet or more, and six to eight feet in diameter. It was formerly extensively used in ship-building. The Spanish oak of the southeastern United States is variously called *Quercus digitata* and *Quercus dilatata*, the latter name being also applied to an East Indian species.

The name oak is given to many other trees and plants not related to *Quercus*. The African oak is a kind of teak (q.v.). In Australia a number of species of *Casuarina* (q.v.) are called oak, as are also species of *Grevillea*, *Lagunaria*, etc. *Rhus toxicodendron* is often called poison oak in the United States, etc. Fossil oak leaves are known in the Cretaceous rocks, where are also found some forms intermediate between the oaks and chestnuts. These latter indicate for the two genera *Quercus* and *Castanea* a common ancestry in early Cretaceous times. In the Tertiary oaks were prominent members of the vegetation and ranged to far northern latitudes, for their leaves are found in the Lower Eocene beds of Disco Island, on the west coast of Greenland.

OAK APPLE, or GALL. See GALLS.

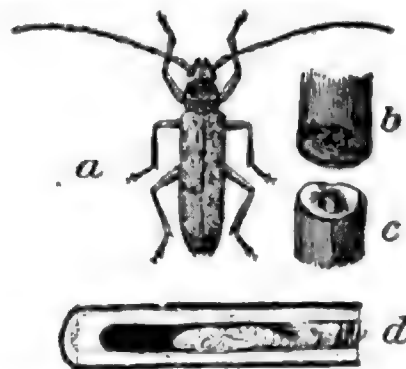
OAK CROWN, ORDER OF THE. A civil and military order of Luxemburg, founded in 1841 by King William II. of the Netherlands. It has five classes and is conferred on distinguished artists. The decoration is an eight-pointed silver star, with a golden W beneath the royal crown on a green field, surrounded by an oak crown. The cross is suspended from an orange ribbon with three green stripes. The motto is *Je maintiendrai*.

OAKELEY, 5k'li. Sir HERBERT STANLEY (1830—). An English organist and composer, born at Ealing, Middlesex. He was educated under native teachers, and at Oxford University. Later he studied at the Leipzig Conservatory and privately (organ) with Schneider of Dresden and Breidenstein of Bonn. He held several university appointments as lecturer on musical topics, and held high degrees from most of the leading universities of Great Britain. He was composer (in Scotland) to Queen Victoria, and was knighted by her in 1876. His organ recitals were famous throughout the United Kingdom. His compositions include the Cantata *Jubilee Lyrics*, a sonata op. 20, considerable church music, songs, and an orchestral "suite in the olden style" (1893).

OAKES, 5ks. Urian (1631-81). An American colonial clergyman and poet, born in England. He was brought to Massachusetts in 1634. He graduated at Harvard in 1649, and showed his

precocity by the early publication at Cambridge of a set of astronomical calculations, and shortly afterwards accepted a pastorate at Titchfield, England. His Non-Conformist views compelled him to relinquish his pastorate in 1662, although later he preached to another congregation. On account of his learning and piety he was chosen pastor of the church in Cambridge, Mass., where he began his labors in 1671. He accepted the presidency of Harvard College in 1675 (being formally installed five years later), and held this position until his death, which occurred in Cambridge, Mass., July 25, 1681. He was an eloquent preacher, but is remembered chiefly for *Elegy Upon the Death of Thomas Shepard* (1677), one of the best and most elaborate of early colonial poems. This poem has been more than once reprinted. For specimens and criticism, consult Tyler, *History of American Literature*, ii., 15-18, 163-167.

OAK INSECTS. The insect fauna of oak is very extensive. Between 500 and 600 species of insects have been recorded that live upon the different species of *Quercus*, and there are in addition many other species which live in decaying oak wood and oak stumps. In Germany 537 species of insects of all orders have been recorded by Kaltentbach as preying upon the oaks of that country. It has been estimated that it is not improbable that 1000 species of oak insects exist in the United States. The roots of the live oak, and probably of the water oak, are infested by a great longicorn borer (*Mallodon melanopus*) by which the trees are permanently dwarfed and their growth arrested. There are several species which burrow into the trunk, the most prominent being the caterpillar of the carpenter moth (*Prionoxystus robinia*), which occurs from New England to Texas and honeycombs the wood with large black burrows. Several flat-headed borers (Buprestidae) and many bark-boring beetles (Curculionidae) affect oak.



OAK-PRUNER.

a. Adult beetle (*Elaphidion villosum*); b. end of twig severed by larva from tree; c. reverse end containing maggot; d. same from side, split to show pupa within it.

The oak-pruner (*Elaphidion villosum*) and the periodical cicada (see CICADA) cut off the twigs and small limbs. The leaves of various oaks are eaten by many species of lepidopterous larvae, the most prominent being the forest tent-caterpillar (*Clisiocampa disastria*) and the large black and red striped spiny caterpillar of *Anisota senatoria*. These two caterpillars in the Atlantic and Central States, as a rule, do more harm to oak forests than all other species combined.

Several species of leaf-rollers (q.v.) are found upon oak, and leaf-miners (q.v.) frequently dis-

WHITE OAK



WHITE OAK (*Quercus alba*), Santa Ynez Valley, California.

figure the leaves. There are also plant-lice and scale-insects which are confined to the trees of this kind, and the so-called gloomy scale (*Aspidiotus tenebrosus*) frequently endangers the life of half-grown trees, while the imported oak-scale (*Asterodiaspis quercicola*) enfeebles the trees in many localities, disfiguring the smaller branches by pitting the tender bark with its peculiar depressions.

A striking characteristic of the insect fauna of oak is the occurrence of many kinds of galls produced mainly by gall-flies of the hymenopterous family Cynipidæ. One hundred and eight distinct species of gall-flies live upon oaks in the United States, each species making its characteristic gall either upon the roots, the twigs, the buds, or the leaves. Some of the most striking of the oak galls are: The oak potato-gall, the large, hard, uneven swelling resembling a potato in shape, growing upon white oak twigs and attaining a length of two inches or more; the wool-sower gall, which consists of a round mass resembling wool, from the size of a walnut to that of a goose-egg, growing on the side of or surrounding white oak twigs in June, pure white in color tinged or speckled with rose-red; and the oak cup-gall, which consists of a very curious swelling on the acorn cups, terminating in a bunch of curly, woolly fibres. Several galls are made by dipterous insects of the gall-midge family, Cecidomyiidae. Consult Packard, *Fifth Report, United States Entomological Commission* (Washington, 1890).

OAKLAND. A beautiful residential city and the county-seat of Alameda County, Cal., six miles across the bay from San Francisco; on the Southern Pacific Railroad (Map: California, B 3). Oakland, named from the number of evergreen oaks within its limits, has a healthful climate, is surrounded by beautiful scenery, and possesses fine drives and wide and level streets, 146 miles paved, a great proportion with macadam, and five miles with bitumen. Steam ferries connecting with San Francisco and eighty miles of street railway demonstrate the city's accessibility as a residence district. Many of its private dwellings are finely situated and are notable structures. Particular mention may be made also of Macdonough Theatre, the public library, which contains nearly 30,000 volumes, the high school, and other public school buildings, as prominent architectural features. Oakland is the seat of California College (Baptist), established in 1870. Lake Merritt, south of the city and connected with San Francisco Bay by a narrow inlet entering an indentation of the bay, is a popular resort.

The city, adjacent to a fertile agricultural and fruit-growing region, controls a large commerce as a railroad terminus and as a shipping centre, both vessels and cars meeting here to exchange commodities. With its manufacturing advantages it also has important industrial interests—ship-building yards; marble, smelting, and metallurgical works; flour, cotton, quartz, and planing mills; fruit-canning works; cordage, carriage, jute, and windmill factories, etc. The government is vested in a mayor, elected every two years, a unicameral council, and in subordinate administrative officials, the board of health being appointed by the executive, and all other officers chosen by popular vote. Oakland spends an-

nually, in maintenance and operation, about \$785,000, the principal items of expense being \$295,000 for schools, \$100,000 for the police department, \$90,000 for the fire department, \$70,000 for municipal lighting, and \$55,000 for street cleaning and sprinkling. The bonded debt of the city is about \$400,000, and the assessed valuation of property, real and personal, amounts to \$45,000,000. Oakland was settled about 1850, was incorporated as a town in 1852, and was chartered as a city in 1854, though in 1860 there were only 1543 inhabitants. Population, in 1870, 10,500; in 1880, 34,555; in 1890, 48,682; in 1900, 66,960, including 17,300 persons of foreign birth and 2200 colored persons.

OAK LUNGS. A species of lichen. See LUNGWORT.

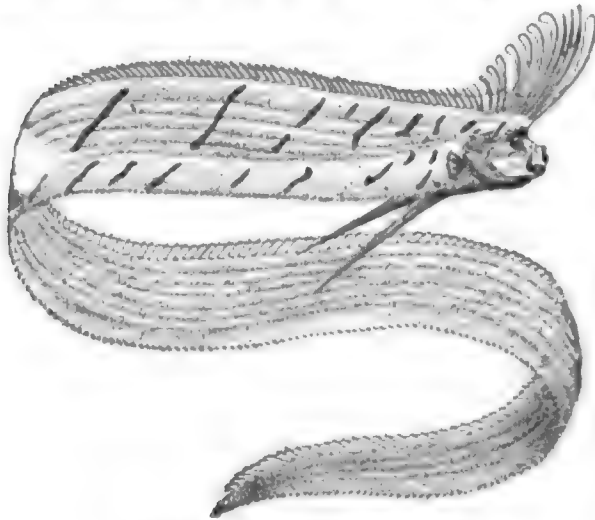
OAKS, THE. One of the most important English horse races, run at the Epsom Summer Meeting on the Friday following the Derby. The race is confined to three-year-old mares.

OAKUM (AS. *ācumba*, *āccumba*, OHG. *āchambi*, tow, oakum, from AS. *ā*, out + *cemban*, to comb). A tangled mass of tarred hempen fibres, made from old rope by untwisting the strands and rubbing the fibres free from each other until it is in about the same condition as the loose tow of which it was made originally. Its principal use is in calking the seams between planks, the space round rivets and bolts, and the joints of water and other pipes, to prevent leakage. It is sometimes used in dressing wounds. White oakum is made from untarred hemp.

OANNES, *ō-ān'nēz*. The name of a Babylonian god found in the fragments of Berosus (q.v.). It is said that in the first year of the foundation of Babylon he came out of the Persian Gulf. He is described as having the head and body of a fish, to which were added a human head and feet under the fish's head and at the tail. He lived among men during the daytime, without, however, taking any food, and retired at sunset to the sea, from which he had emerged. Oannes instructed men in the use of letters, and in all the principal arts and sciences of civilization, which he communicated to them. The story has not yet been found among the remains of Babylonian literature, and we are dependent, therefore, largely upon conjecture in attempts to identify Oannes with any of the Babylonian deities known. He is evidently the deity supposed to reside in the Persian Gulf, and this fact points to his identification with Ea, the chief deity of Eridu, a city that once lay at the Persian Gulf. Ea is a prominent figure in the religious literature and is distinctly a water-deity. He is also portrayed as the source of wisdom to whom Marduk (see MERODACH), the head of the Babylonian pantheon, goes for advice, and the fact that Marduk is represented as the son of Ea points to the great antiquity of the Ea cult and the reverence in which it was held. On Assyrian sculptures and on seal cylinders we find frequently the body of a man, but covered with fish scales, and it is likely that this is a representation of Ea. A difficulty, however, remains in accounting for the curious name, which yet must in some way be connected with Ea. Consult Jastrow, *Religion of Babylonia and Assyria* (Boston, 1898).

OAR-FISH. One of the band-fishes or ribbon-fishes of the genus *Regalecus*, family *Regalecidae*.

The body is much elongated and at the same time attenuated and compressed. The dorsal fin extends the whole length of the back, and the ventral fins consist only of a single long ray and



BANKS'S OAR-FISH (*Regalecus Banksi*).

often are dilated at the end; the mouth is small. Specimens 20 feet long have been taken. The anterior portion of the dorsal fin is produced so as to suggest a mane, and it is probable that most of the so-called sea serpents are referable to this fish. The only species (*Regalecus Banksi*) is cosmopolitan in its distribution. Compare UNICORN-FISH.

OÁS, ó-as'. A town of Southern Luzon, Philippines, in the Province of Albay. It is situated on the main road, 16 miles northwest of Albay (Map: Philippine Islands, H 6). Oás is the centre of an important hemp-growing region, and carries on a considerable river trade. Population, in 1896, 15,987.

OASIS, ó'a-sis (Lat., from Gk. *οασις*, oasis; connected with Copt. *ouahe*, dwelling-place, oasis, from *ouih*, to dwell). A fertile place in a desert. As the barren condition of most deserts results from small rainfall, the presence of oases depends upon the occurrence of springs or streams which can be utilized for irrigation. In the Sahara there are mountains of sufficient height to provoke precipitation, and the neighboring lowlands may thus receive sufficient water to support vegetation. A water supply is frequently obtained also from wells located at considerable distances from regions of precipitation. A combination of soil that holds water, but prevents evaporation, is sometimes found, and greatly favors the formation of oases. See ARTESIAN WELLS.

OAT (AS. *āte*, of unknown derivation). Numerous species of plants of the genus *Avena*, belonging to the order Gramineæ, or grasses. The commonest species, characterized by loose panicles instead of spikes of flowers as in the case of wheat, barley, and rye, is of unknown nativity, but it is believed to have been derived from a single prehistoric form, probably a native of eastern temperate Europe and of Tartary.

The common cultivated varieties of oats are classified under two groups, or types, based on the form of the panicles, namely, common oats with open spreading panicles, and Tartarian oats with contracted one-sided panicles. These types are sometimes considered as distinct species, the former as *Avena sativa*, the latter *Avena orien-*

talis. In general the varieties of oats differ in the color and thickness of the husk, the form of the grain, the length of the straw, and the time of ripening. In color they are usually yellow, white, or black. There are a number of species of but little importance, such as wild oats (*Avena fatua*), which is generally considered as a weed, but has become an abundant and valuable wild pasture grass in California; bristle-pointed oats (*Avena strigosa*), also a weed, but sometimes grown for green fodder; animated oats (*Avena sterilis*), so named from the fact that when the dry awn absorbs moisture it untwists and thus gives motion to the grain; and short oats (*Avena brevis*), cultivated for its grain at high elevation in the mountainous parts of France and Spain, ripening where other kinds do not, and also grown as a forage plant in other parts of Europe. See COLORED PLATE OF CEREALS.

The oat is a hardy plant, especially well adapted to temperate climates, and is not cultivated to any great extent in hot countries. It is extensively grown in the United States and Canada, in Great Britain, and in the countries of Northern Europe. It succeeds best in a cool, moist climate, but it will grow quite well in warmer regions if the soil is sufficiently moist. In hot and dry regions it grows very poorly. Oats are not a fastidious crop as to the character of the soil, and will grow on light or heavy soils, but are intolerant of excess of water. The seed-bed for oats is prepared about the same as for wheat and barley, but not quite so deep. In the Eastern United States the land is usually plowed before the oats are sown, but in the Western States, especially in new and fertile regions, they are frequently sown on corn land without plowing and covered with a corn cultivator or disk harrow, the surface of the soil being then smoothed with an ordinary harrow. When sown on unplowed land oats are always broadcasted, and on plowed ground the practices of both drilling and broadcasting prevail. On the whole, the greater portion of the crop is broadcasted. From two to three bushels of seed is the usual quantity sown per acre. Oats are sown in the spring and in the fall. Spring-sown oats represent the bulk of the crop, while fall-sown or winter oats are limited to southern localities. When sown as early in the spring as possible the crop has the advantage of making most of its growth during the cooler part of the season, which is best adapted to its development. In northern latitudes it ripens in ninety days, or even less, but in southern regions a longer time is required.

From forty to sixty bushels per acre is considered a good yield, but much larger yields are sometimes obtained. Russia and the United States are the greatest oat-producing countries of the world. In 1899 the United States produced 796,177,713 bushels. The average yield per acre in the United States for the years 1890 to 1899, inclusive, was about 26.14 bushels. The highest average yields, about 40 bushels per acre, are produced by Germany and Great Britain. The oat, although quite free from insect enemies and plant diseases, is subject to rust and loose smut in a way similar to wheat. (See RUST; SMUT.) Early maturing varieties are usually preferred because they often ripen before rust becomes injurious to the crop, and, on account of being

shorter in the straw, they are not so apt to lodge as late varieties. For a concise treatise on the culture of oats, consult Morrow and Hunt, *Soils and Crops of the Farm* (Chicago, 1892).

FOOD AND FEEDING VALUE. The oat plant furnishes green forage, hay, and straw, while the ripe grain and its milling products are of great importance as foods and feeding stuffs. The grain has long been used as a food for man, in the United States chiefly as a breakfast food. In the following table the average percentage composition of a number of oat products is shown:

AVERAGE COMPOSITION OF A NUMBER OF OAT PRODUCTS

	Water	Protein	Fat	Nitrogen-free extract	Crude fibre	Ash
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Oat forage.....	62.2	3.4	1.4	19.3	11.2	2.5
Oat hay.....	15.0	5.2	2.3	39.0	29.2	5.2
Oat straw.....	9.2	4.0	2.7	42.4	37.0	5.1
Whole oats.....	11.0	11.8	5.0	59.7	9.5	11.0
Oat hulls.....	7.3	3.3	1.0	52.1	29.7	6.7
Oat bran.....	7.7	7.1	2.3	57.9	19.3	5.7
Oat shorts, middlings or "feed".....	7.7	16.0	7.1	59.4	6.1	3.7
Oat dust.....	6.5	13.5	4.8	50.2	18.2	6.9
Oat meal.....	7.3	16.1	7.2	66.6	0.9	1.9
Roller oats.....	7.7	16.7	7.3	64.9	1.3	2.1

Oat forage and hay compare favorably with similar products from the common grasses. (See HAY.) Oat straw contains a higher percentage of crude fibre than the hays, due to the fact that as the plant ripens the percentage of crude fibre increases. Hay and straw may be fed whole or chopped. The oat grain is rich in protein and carbohydrates and contains a fairly high percentage of fat. It is very valuable for all classes of farm animals, though it is perhaps most commonly thought of as a feeding stuff for horses. It has been claimed that oats contain a peculiar stimulating principle, 'avenine,' to which is due their especial value as a horse feed. Careful analysis fails to detect 'avenine,' and the common opinion now is that there is no such substance in the oat. Although the reason is not definitely

When oats are low in price they may be profitably fed to sheep for the production of mutton. Like wheat, they induce growth rather than the production of fat. When it is desired to fatten lambs some corn should be fed with the oats. Oats are useful for poultry, ground oats being very valuable as one of the constituents of the morning ration.

The different milling and by-products obtained from oats resemble the whole grain more or less closely. The hulls represent the loose outer covering of the grain, and the shorts (called also middlings or feed) and the bran consist of the

outer layers of the kernels. After the grain is hulled in milling the little tuft of hairs on the end of the kernel is removed. These accumulate and constitute the basis of 'oat dust.' The material, which should also contain some broken kernels, is a useful feeding stuff provided it does not also contain too much mill sweepings. The hulls resemble the straw in composition and are not regarded as an especially valuable feed. The bran and middlings contain a large amount of nutritive material in proportion to their bulk. The oat feeds marketed under various trade names are mixtures of the different oat by-products with or without other materials, and differ in nutritive value, some being much more valuable than others. The average coefficient of digestibility of a number of oat products follows:

CO-EFFICIENTS OF DIGESTIBILITY OF A NUMBER OF OAT PRODUCTS

	Total dry matter	Protein	Fat	Nitrogen-free extract	Crude fibre	Ash
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Oat forage.....	59.5	71.8	69.2	62.6	52.8	53.4
Oat hay.....	49.3	54.2	61.9	52.0	43.5	34.6
Oat straw.....	50.3	.....	38.3	53.2	57.6	.....
Oats whole.....	72.4	86.1	82.4	79.4	31.1	33.1
Oats ground.....	75.7	82.4	79.9	86.1	14.4	29.2
Oat feed.....	62.0	81.1	89.0	67.4	42.6	.....

known, practically all are agreed that horses fed oats excel in mettle and general condition—and it is certain that no feeding stuff is eaten with greater relish. Oats are usually fed unground to horses—grinding being necessary only for foals and for animals whose teeth are not good. New oats should not be fed to work-horses, as they cause looseness of the bowels and render the animals liable to sweat easily and put them out of condition. The reason for the bad effects of new oats is not definitely known. For very young pigs, oats should be ground and the hulls removed by sieving. For more or less mature pigs and for breeding stock some oats, either ground or unground, are very desirable.

OATES, 5ts, TITUS (1640-1705). The principal informer in the so-called Popish Plot in England. He was born at Oakham, and in 1665 entered the Merchant Taylors' School, but was expelled the first year. After that he went to Sedlescombe School, and from there to Gonville and Caius College, Cambridge, and later to Saint John's College. Though he never took a degree, he contrived to be ordained, and in 1673 was appointed vicar of Bobbing in Kent. The following year he became curate to his father at All Saints in Hastings, but both were expelled for having invented a scandal concerning a school-master there. Moreover, Titus Oates was thrown into prison. Escaping from prison, he became

a chaplain in the navy, but was soon expelled. He now obtained the position of chaplain to the Protestant members of the Duke of Norfolk's household. Here he met a number of Catholic priests, and presumably first contrived his plot of informing against Catholics. He associated with himself in 1676 a fellow clergyman, Israel Tonge, and together they planned the various schemes. In order to carry these out, Oates pretended to become Catholic, and in 1677 was sent to the Jesuit College at Valladolid, and afterwards to Saint Omer, but from both he was expelled for misconduct, and in 1678 returned to England. Taking advantage of the hostile state of the public mind toward the Catholics, Oates and Tonge induced, in 1678, a Lancashire gentleman, Christopher Kirkby, to reveal to the persons interested fictitious details of a plot of Roman Catholics to murder Charles II. and make the Duke of York King. Terrible excitement resulted in London, and by the perjured testimony of Oates and his followers, about thirty-five people lost their lives between 1678 and 1681, while Oates himself for a time received a large pension, lived in Whitehall Palace, and enjoyed great favor. A reaction, however, set in, and in 1684 he was imprisoned. Upon the accession of James II. Oates was found guilty of perjury and sentenced to be pilloried, whipped, and afterwards imprisoned for life. Rather unexpectedly he survived the terrible flogging, and after the Revolution of 1688 he was set at liberty. He died July 12, 1705. Consult: Burnet, *History of His Own Time* (London, 1883); Lingard, *History of England*, vols. ix., x. (ib., 1855); Macaulay, *History of England*, vol. i. (New York, 1856-62).

OAT GRASS. A popular name of a number of grasses whose inflorescence somewhat resembles the oat panicles, among them certain species of *Avena*, to which the oat belongs. Various species of *Danthonia* are called oat grass, but are not considered valuable either for hay or pasture. The best known oat grass is *Arrhenatherum elatius*, a tufted perennial grass introduced into America from Europe, where it is highly prized for hay. It is common east of the Mississippi River and is grown in the Southern States for hay and winter pasturage. It grows rapidly, resists drought well, and yields a large amount of leafy fodder, especially upon light soils. In some regions upon good soils if cuttings be made as soon as the grass is in flower or before, three or four cuttings may be made during the season. After flowering it quickly becomes woody and less valuable.

OATH (AS. *ap*, Goth. *aips*, OHG. *eid*, Ger. *Eid*, oath; connected with OIr. *oeth*, oath). A declaration or compact, in which the declarant confirms the truth of his assertion by invoking supernatural penalties on his head in the event of perjury. The punishment is often ceremonially represented, as when a victim is sacrificed, and the person making a pledge expresses a desire that he himself, if he prove false, may undergo a like fate. In Aracan, a native swears on a sword, a crocodile's tooth, or a thunderbolt (stone celt). The implication is that the weapon may wound him, the crocodile devour him, or the god who hurls the lightning smite him. In the Hebrew ritual a sacrificial beast was cut in pieces and burned; the oath-taker then passed through the fire, in order to symbolize the fate which

would punish his falsehood. Quite similar was the ancient Greek usage, in which an animal was slaughtered, and the pieces thrown into the sea; or the victim might be burned on the altar; hence perhaps it became common to take oaths before altars, where the swearer touched the holy things, or raised his eyes and hands to heaven, where was supposed to dwell the deity who watched over the sanctity of compacts. Oaths were usual in the case of every solemn agreement, public or private, relating to business, war, or politics; of this practice survivals remain in our official and judicial custom.

In law, an oath is a solemn declaration or pledge, made by a person of discretion, before a properly authorized officer, to the effect that a thing stated or promised by him is true, and with some ceremony believed to be binding on the conscience of the declarant, as by an appeal to God to witness his good faith.

With the development of Roman jurisprudence the practice of thus insuring the truthfulness of witnesses in legal actions became fixed and common, and continued in the civil law. In England, up to the time of the reign of William and Mary, no one could testify in a court of justice who did not believe in God, and recognize the doctrine of future punishment for sins. By the Toleration Act, 1 William and Mary, c. 18, § 13, Quakers were permitted to make a declaration of fidelity to the State, instead of the oath of allegiance; and by 7 and 8 William and Mary, the solemn affirmation of Quakers was made of equal weight with an oath, and was allowed in judicial proceedings when the privilege was claimed. In 1854 Parliament passed the 'Common Law Procedure Act,' 17 and 18 Vict., c. 66, § 1, permitting any one whose conscience prevented him from taking an oath, or who did not believe in its binding efficacy, to make a solemn affirmation instead. The 'Oaths Act,' 51 and 52 Vict., c. 46, made further liberal provisions in regard to oaths and affirmations.

With reference to their legal effect, oaths are considered assertory, judicial, or extra-judicial. An *assertory* oath is one required by law other than one for use in judicial proceedings, as an oath of office, or a revenue or custom-house oath. False swearing in such a case does not amount to perjury, but in most jurisdictions, and in the acts of Congress, there are statutory provisions making it a crime. A *judicial* oath is one required by law in, or for use in, a judicial proceeding, and a false statement made under such an oath is punishable criminally. An *extra-judicial* oath is one which is voluntarily taken, and not intended for use in a legal proceeding, as an oath taken merely to convince some one in a private transaction of the good faith of the declarant. Its falsity does not constitute a criminal offense.

The most important class of oaths affecting the general public are those which are required to enforce the truth from witnesses in courts and legal proceedings. Where a statute requires an oath to be administered, it is held that only persons having sufficient understanding to know the nature and obligations of such a ceremony may be sworn. Therefore, children and mentally deficient persons who are not able to comprehend the difference between right and wrong are often excluded from testifying in legal actions. In most of the United States a witness may either

swear or affirm. False testimony in either case amounts to perjury. An extra-judicial oath is said to be binding only in *foro conscientie*—that is, morally; but it is not legally binding upon the person taking it. An example of such an oath is the common one to abstain from the use of intoxicating liquors.

The statutes of each State prescribe the various officers who shall administer oaths for different purposes. Judges, clerks of courts, referees, justices of the peace, and coroners usually administer oaths to witnesses, and notaries and commissioners of deeds commonly take oaths outside of court for use in judicial proceedings, or to authenticate legal instruments. A person authorized to administer oaths cannot delegate his powers, except that where an officer, such as a sheriff, is authorized to appoint a deputy, it is usually held that the deputy represents his principal for all purposes including the administration of oaths. An oath should be administered strictly in the form prescribed by statute and by a competent officer. For example, it has been held, where a statute prescribed the form of an oath which ended with the words, "so help me God," that the omission of such words would invalidate it. The oath administered to a person subscribing and swearing to an affidavit is usually in the following form: "You do solemnly swear that the contents of this affidavit by you subscribed are true, so help you God." Hebrews are often sworn on the Pentateuch, keeping on their hats, and their oath ends with the words, "so help me Jehovah." A Mohammedan is sworn on the Koran; a Chinese witness in the Western States is sometimes sworn by his kneeling, breaking a saucer, and uttering an imprecation that his "soul may be broken into as many pieces as the saucer" if he does not tell the truth. The tendency at present is to consider that the statutes against perjury and false swearing have a more potent effect than religious fears in deterring a witness from making false statements, and accordingly it is not considered of as great importance whether a witness swears or affirms that his testimony will be true. See AFFIDAVIT; EVIDENCE; NOTARY; PERJURY; WITNESS. Consult the authorities referred to under EVIDENCE; PROCEDURE; CRIMINAL LAW.

OATHS, MILITARY. Article 2 of the Articles of War, United States Army, prescribes that every enlisted man shall, within six days after his enlistment, take oath or affirmation in the following form: "I, A. B., do solemnly swear (or affirm) that I will bear true faith and allegiance to the United States of America; that I will serve them honestly and faithfully against all their enemies whomsoever; and that I will obey the orders of the President of the United States and the orders of the officers appointed over me, according to the rules and articles of war." In England all soldiers take a similar oath, swearing fealty, allegiance, and obedience to the King, his heirs, and those placed in authority under him. The most impressive ceremony is that arranged by the German Emperor William II., who follows the custom of the ancient armies, and swears in the recruits of the guards regiments en masse. Officers sitting on courts-martial and witnesses testifying are required to take oath or make affirmation. This

latter is a rule in all armies throughout the world.

OAXACA, wá-hü'ká, or **OAJACA**. A Pacific State of Mexico, bounded by the States of Puebla and Vera Cruz on the north, Chiapas on the east, the Pacific Ocean on the south, and Guerrero on the west (Map: Mexico, L 9). Its area is 35,382 square miles. The whole State, with the exception of a low, sandy belt along the coast, is covered with the numerous southern ramifications of the Sierra Madre, inclosing many fertile and beautiful valleys. The slopes are covered with abundant timber, and the State is watered by a multitude of streams. The climate is for the most part temperate and healthful. The soil is very fertile and yields abundant crops of sugar, coffee, cacao, tobacco, cotton, and other tropical and semi-tropical products. Stock-raising is also an important industry, but the mineral deposits, though very rich, are but little worked. The province is traversed by two railway lines and has good roads. There is also steamship communication through the ports of Salina Cruz and Puerto Angel. Population, in 1900, 947,910. The capital is Oaxaca (q.v.).

OAXACA, OAJACA, or **OAXACA DE JUAREZ**. The capital of the State of Oaxaca, Mexico. It is situated in a beautiful valley in the centre of the State, 82 miles from the Pacific coast and 225 miles southeast of Mexico City (Map: Mexico, K 9). It is the chief centre of population in Southern Mexico, the terminus of the Mexican Southern Railroad, and is well built, with large squares and public parks. The notable buildings and institutions are the Government building, the Cathedral, the Institute of Arts and Sciences, the public library, and the Museum of Antiquities and Natural History. Owing to its isolated position, it is not one of the important industrial cities of the Republic, but it has some thriving local industries, especially the spinning and weaving of the pita fibre. A United States consular agency is located here. Population, in 1895, 32,641. Oaxaca was founded by the Zapotecs in 1486, under the name of Huaxyacac, and was occupied in 1522 by the Spaniards, who named it Antequera. Juarez was born here.

OAXACA, RUINS OF. Enormous works of the ancient Mexicans near the city of Oaxaca. The whole range of Monte Alban as seen in profile gives evidence of artificial modification. On ascending the summits one is amazed at the display of pyramids, terraces, quadrangles, and mounds covering every available space, and one finds that the whole mountain has been remodeled by the hand of man at cost of immense labor. The greatest of these works is located on the summit of Monte Alban at 1000 feet elevation, and covers an area of 3400 by 1200 feet, sculptured into a vast series of level courts, inclosed by successive terraces and bordered by pyramids. The quadrangles are flanked at the corners by pyramids, and in the centre is a mound, the ruins probably of a temple. One of these pyramids is 400 feet square and rises 40 feet to the summit, which is 300 feet square. Another court, or plaza, is a level, sunken field 600 feet wide and 1000 feet long, inclosed by pyramids and terraces and having a line of four pyramids ranged along its centre. It has been found that these constructions, no matter how situated with regard to the mountain profile, are accurately oriented, as are the ruins

of Mitla (q.v.), some thirty miles away, and it is conjectured that the same people were their authors. In the absence of suitable building stone at Monte Alban, the builders employed cores made up of small stones and adobe faced usually with small rough blocks, but sometimes with dressed masonry, and covered with cement on the exterior. There is no evidence that the surface was finished in fresco as at Mitla. Cement floors may also be observed in the ruins, and there are traces of strong walls. Little sculpture has been found, the principal examples being a serpent carved from quartzite originally on the face of a pyramid, and two colossal turbaned heads in low relief cut in limestone. The pottery scattered on the surface and in the débris is of slate color like the ware sold in Oaxaca market. The makers of the old ware decorated their vessels with raised ornaments and modeling. Innumerable small amulets of jadeite and other hard stone in form of a rudely carved human figure are found. These objects show drilling, sawing, and other methods of stone-working. A few gold and copper objects have been taken from the ruins.

Prof. W. H. Holmes, who made a careful examination of Monte Alban in 1896, concludes that we have there the remains of a hill-top city occupied by a population which utilized for their crops the rich valley in which the city of Oaxaca stands, and covered the mountain slopes with their garden plots. There are also evidences of other cities in the valley. In the State of Guerrero, directly west of Oaxaca, are many square miles of similar ruins covering the slopes of the mountains, indicating an extension of this culture. The local museum at Oaxaca contains a large and instructive collection of archaeological objects from Monte Alban and other ruins in the State.

Consult: Bandelier, *Report on Archaeological Tour in Mexico* (Boston, 1885); Bancroft, *Native Races of the Pacific States*, vol. iv. (New York, 1875); Holmes, *Archæological Studies Among the Ancient Cities of Mexico* (Chicago, 1897).

OB. A river of Siberia. See **OBI**.

O'BADIAH (Heb. 'Obadyāh). The author of the fourth book of the minor prophets according to the arrangement in the Jewish canon, and the shortest book of the Old Testament. Concerning Obadiah nothing is known; it may even be that the name is a mere symbol, chosen on account of its meaning—'servant of Yahweh' (cf. Malachi, 'my messenger'). The book consists mainly of a prophecy of the destruction of Edom for abetting the destruction of Jerusalem. It must, therefore, be later than B.C. 586, and internal evidence is in favor of a period much later—during the Persian rule, if not, indeed, after the Greek conquest of Palestine. A peculiar problem in the case of Obadiah is presented by the similarity of verses 1-10 to Jer. xlix. 7-22. It appears certain that one of these passages is dependent upon the other, or that both are dependent upon a common source. Perhaps the more probable view is that Jeremiah is dependent upon Obadiah. Consult the works mentioned in the article **MINOR PROPHETS**: Caspari, *Der Prophet Obadja ausgelegt* (Leipzig, 1842); Winckler, in *Alttestamentliche Untersuchungen*, part iii. (Leipzig, 1892); Perowne, *Obadiah and Jonah*, in the *Cambridge Bible for Schools and*

Colleges (Cambridge, 1882); Peters, *Die Prophetie Obadias* (Paderborn, 1892).

OBADIAH. (1) In Mrs. Centlivre's *Bold Stroke for a Wife*, one of the guardians of Anne Lovely. He is a hypocritical Quaker. (2) In Howard's farce *The Committee*, and in Knight's adaptation, *The Honest Thieves*, a brainless clerk given to drinking.

OBAN, ō'ban. A seaport and fashionable watering place in Argyllshire, Scotland, on the Bay of Oban, 20 miles northwest of Inveraray (Map: Scotland, C 3). The bay, protected by the island of Kerrera on the west, and by the high shores of the mainland, has the appearance of a lake. Oban is the great rendezvous for tourists in the west Highlands. The town owns its water supply. Population, in 1891, 4500; in 1901, 5374.

OBANDO, ō-bān'dō, JOSÉ MARIA (1797-1861). A South American general and statesman, President of Colombia. At twenty-five he joined the Republican forces; and as leader of the Liberals opposed Urdaneta when the latter became Dictator, and defeated his army at Palmira (1831). The Republic of New Granada, with a constitutional government, was formed immediately; Obando was elected Vice-President (1831-32) and then served for five years as Secretary of War. He led a rebellion against Marquez (1838-41), but was defeated and exiled until his party was restored to power in 1849. He was elected President in 1853, proclaimed himself Dictator in 1854, and was forced out of office. Obando sided with the Federalists in the Revolution of 1860 and was killed at Cruz Verde.

OBLIGATO, ōb'blē-gā'tō (It., bound, compelled). A term in music signifying that the instrumental part so marked is absolutely necessary to the performance of the composition, and cannot be omitted. The word is especially applied to an instrumental accompaniment to a vocal solo.

Ó-BECSE, ō'bēch'ē. A town of Hungary. See **BECSÉ**.

OBEDIENCE (Lat. *obedientia*, from *obedire*, *obedire*, to obey, from *ob*, before + *audire*, to hear). In canon law, the duty by which the various gradations in ecclesiastical organization are held subject to the several superiors placed immediately above each, respectively, in the hierarchical scale. Thus priests and inferior clergy owe canonical obedience to the bishop, and priests are bound thereto by a solemn promise administered at ordination. The bishop primitively took a similar oath to the metropolitan; but by the modern law, the jurisdiction of the metropolitan is confined to the occasions of his holding a visitation, or presiding in the provincial synod. Bishops, by the present law of the Roman Catholic Church, take an oath of obedience to the Pope. This obedience, however, is strictly limited by the canons, and is only held to bind in things consistent with the divine and natural law. In ecclesiastical history the word obedience has a special signification, and is applied to the several parties in the Church which, during the great Western schism, adhered to the rival popes. Applied to the monastic institute, obedience means the voluntary submission which all members of religious Orders vow, at the religious profession, to

their immediate superiors, of whatever grade in the Order, as well as to the superior general, and still more to the rules and constitutions of the Order. This forms, in all Orders, one of the essential vows. It is, however, expressly confined to lawful things. The name obedience is sometimes given to the written precept or other formal instrument by which a superior in a religious Order communicates to one of his subjects any special precept or instruction—as, for example, to undertake a certain office, to proceed upon a particular mission, to relinquish a certain appointment, etc. The instruction, or the instrument containing it, is called an obedience, because it is held to bind in virtue of religious obedience.

OBELISK (Lat. *obeliscus*, from Gk. *ὀβελίσκος*, *obeliskos*, spit, pointed pillar, diminutive of *ὀβελος*, *obelos*, spit, pointed pillar). A word applied to prismatic monuments of stone, terminating with a pyramidal top. In Arabic they are called *mesellah*, 'pack needle.' The ancient Egyptians called them *tekhen*, a name of unknown etymology, and state that they were dedicated to the sun-god; they were therefore most numerous in the sacred city Heliopolis, whence most existing obelisks come. As most Egyptian gods were sooner or later identified with the sun, it eventually became appropriate to place obelisks at the entrance of every temple; even Isis had, in Ptolemaic times, two obelisks before her temple in Philæ. We first meet small private obelisks in the time of the pyramid builders; in the Fifth Dynasty some gigantic monuments, half obelisk, half pyramid, which were also dedicated to the sun-god, seem to be an attempt to develop the obelisk into larger proportions by sacrificing the monolithic principle. The pairs of obelisks flanking the entrances of temples were always monoliths, usually of granite from Syene (Assuan). From unfinished specimens in these quarries, we can form an opinion of the way in which they were roughly separated from the rock, by means of borings and moistened wooden pegs. How these gigantic monuments were, during the inundation, transported by water on rafts or specially constructed boats is depicted in a relief at Deir el-Bahri, reproduced in the *Archæological Report of the Egypt Exploration Fund* for 1895-96; unfortunately, in regard to the machinery used for erecting them, we know nothing. Judging from the difficulties experienced by mediæval and even modern engineers in transporting and erecting them, it is difficult to conceive how the ancient Egyptians, with the simple apparatus at their disposal, could handle these great blocks of a hundred and more feet in length. One of the tallest obelisks—that of Queen Hat-shepsut (Hatasu) at Karnak—is estimated at 97½ feet in length, its diameter at the base is 8½ feet, its mass is estimated at 4873 cubic feet, and its weight at 367 tons. The inscriptions state that this obelisk, together with its companion, was cut in 7, and finished in 19 months. Inscriptions mention still taller obelisks. All obelisks have four faces, and are broader at the base than at the top; the pyramidion or cap on the top is sometimes round. The pyramidion was often covered with metal (brass or gold), as were also the hieroglyphic inscriptions running down the sides of the obelisk. The pyramidion frequently contained more elaborate sculptures than the obelisk

itself. These sculptures merely represent the King engaged in worshiping and making offerings before the god; the inscriptions also are always of a very simple character, containing nothing more than the titles and praises of the dedicating King. The obelisk always stood on a cubical pedestal, slightly broader than the base of the obelisk, and on this pedestal significant ornaments were sometimes sculptured. For example, on the pedestal of an obelisk in Karnak may be seen the cynocephali worshiping the rising sun. In later times, the Romans put decorations on the top, like brazen spheres.

The earliest obelisk yet standing is that of Heliopolis (modern Matarieh), erected by User-tesen I. (the second King of the Twelfth Dynasty) before the sun-temple; another of the Twelfth Dynasty is the fallen obelisk of Begig in the Fayum. In Karnak, of two obelisks of Thothmes I., one is still standing, 76 feet high. Obelisks of Thothmes III. were specially numerous. One was removed in antiquity to Constantinople (now in the Atmeidan or Hippodrome); it is only the upper part of an obelisk originally much over 100 feet in height. Another is that of Saint John of the Lateran at Rome, now 106 to 107 feet high. The two famous 'needles of Cleopatra' were first erected by Thothmes III. at Heliopolis, and were, in Ptolemaic times, transported to Alexandria. One came thence to London in 1879 (now on the Thames embankment), the other to New York by the ship *Dessong*, at the expense of William H. Vanderbilt, in 1880 (erected in Central Park, February 22, 1881). Both these monuments were richly reornamented by Rameses II. The Paris obelisk, whose companion still stands at Luxor, dates from the time of Rameses II. It was removed in 1831 and erected in the Place de la Concorde in 1833. The Flaminian obelisk is the work of Rameses II., though his father, Seti I., commenced it. It was removed to Rome by Constantius, and in the Pontificate of Gregory XIII. it was found 16 feet under the surface of the earth. The architect Fontana reerected it under Sixtus V. with great difficulty. Of the numerous obelisks brought to Rome, that of the Monte Citorio (brought to Rome by Augustus, rediscovered in 1748) dates from the Twenty-sixth Dynasty, having been sculptured by Psammetichus II. Two obelisks in the British Museum bear inscriptions of Nekht-har-heb of the fourth century B.C.; others from the reign of Ptolemy VIII. once stood before the Temple of Philæ. These monuments were so popular at Rome that the emperors had several of them cut; for example, the Pamphilian obelisk, erected by Bernin, in 1651, in the Piazza Navona, was originally erected before the Serapeum at Rome by Domitian, whose name it bears; thence it was removed to the circus of Maxentius. The Barberini obelisk originally stood before the mausoleum (or cenotaph?) of Antinous, the favorite of Hadrian, whose death it commemorates. It was found in the circus of Aurelian in 1633, and erected on the Monte Pincio in 1822. The Sallustian obelisk and that of Beneventum belong to the same period. In modern Rome obelisks are always used as ornaments in the centre of public places, sometimes near a fountain, and often with the addition of Renaissance ornaments.

In Assyria several monuments have been found which are called obelisks, although they bear but

a slight resemblance to those of Egypt, being merely stelæ in the shape of truncated, slanting prisms, with step-shaped apices. The most remarkable is the 'black obelisk' of Shalmaneser II., covered with long inscriptions recording the victories of this King and representations of the tributes brought to him, among them the tribute-bearers of King Jehu of Israel (B.C. 842). A broken 'obelisk' of Assurnazir-pal (B.C. 885-860) is the next in importance; then one of Shamsiramman (B.C. 825-812).

Consult: Loega, *De Origine et Usu Obeliscorum* (Rome, 1797); Cipriani, *Sui dodici obelisci di Roma* (ib., 1823); L'Hôte, *Notice historique sur les obélisques égyptiens* (Paris, 1836); Birch, Notes under "Obelisks" in the *Museum of Classical Antiquities* (London, 1853); above all, Marucchi, *Gli obelisci egiziani di Roma* (Rome, 1898); and see illustration EGYPT, Fig. 1.

OBER, Ȯbër, FREDERICK ALBION (1849—). An American traveler and author, born in Beverly, Mass. He was educated at the Massachusetts Agricultural College, and in 1872 he began his tropical explorations. He traveled in the West Indies (1876-80), making a valuable collection of birds; and visited Mexico, Spain, North Africa, and South America. He wrote travels, historical sketches, and novels, including *Camps in the Caribbees* (1879); *Travels in Mexico* (1883); *Porto Rico and Its Resources* (1892); *Josephine, Empress of the French* (1895); *History of the West Indies* (1900); and *The Cacique's Treasure Cave* (1901).

OBERAMMERGAU, Ȯbër-līm'mër-gou. A village in Upper Bavaria, Germany, noted for the celebration of the Passion Play (q.v.).

OBERDIECK, Ȯbër-dëk, JOHANN GEORG KONRAD (1794-1880). A German pomologist, born at Wilkenburg. He had studied theology at Göttingen, but after a year in pastoral work devoted himself to the improvement of German orchards. He held various clerical charges, made a great collection of fruit trees, and in 1855 became editor of the *Pomologische Monatshefte*. Among his publications, the more important are: *Die Probe- oder Sortenbäume* (1844; 2d ed. 1871); *Illustriertes Handbuch der Obstkunde* (9 vols., with Lucas and Jahn, 1858-79); and *Deutschlands beste Obstsorten* (1881). Consult his *Kurzer Abriss meines Lebens* (Stuttgart, 1870).

OBERGE, Ȯbër'ge, EILHARD VON. A German poet of the close of the twelfth century. Eilhard wrote, from French sources, the first German version of *Tristan and Isolde*. Of his original work there now exist a few fragments, a complete revision dating a century later, another version in prose (1484), and a Bohemian translation. Lichtenstein edited the remains of the work in German verse (Hamburg, 1877), and Pfaff the prose romance of the fifteenth century (Stuttgart, 1881).

OBERHAUSEN, Ȯbër-hou'zen. An important manufacturing town in the Rhine Province, Prussia, situated near the Rhine, 40 miles north of Cologne (Map: Prussia, B 3). It has extensive iron foundries, rolling mills, railway shops, chemical works, and manufactures of various iron and tin wares, soap, porcelain, wire, glass, flour, etc. In the vicinity are important coal mines and coke ovens. Population, in 1890, 25,249; in 1900, 42,148.

OBERLÄNDER, Ȯbër-län'dër, ADOLF (1845—). A German caricaturist and painter, born at Regensburg. He studied painting in Munich at the Academy and under Piloty with fair prospect of success, as may be judged by his "Siesta" (Dresden Gallery), and "Resignation" (New Pinakothek, Munich), yet found his true field in those humorous productions of his pencil which he began in 1863 to contribute to the *Fliegende Blätter*. These soon made his name familiar in every part of the world whither that publication has made its way, and placed him among the foremost of the humorists in art. Some of the best of his work is collected in the *Oberländer-Album* (Munich, 1879-98). Consult, also: Whibley, in *Art Journal* (London, 1889); and Pratt, in *The Cosmopolitan* (New York, 1890).

OBERLEUTENS DORF, Ȯbër-loi'tens-dörf. A town in the Crownland of Bohemia, Austria, 32 miles south of Dresden. It has a church built in 1690 by the Archbishop of Prague, and a castle dating from 1732. Its principal manufactures are furniture, toys, hats, and woollens; some coal is mined in the region. Population, in 1900, 12,928.

OBERLIN. A village in Lorain County, Ohio, 33 miles west by south of Cleveland; on the Lake Shore and Michigan Southern Railroad (Map: Ohio, F 3). There are no important industries; the village is noted chiefly as the seat of Oberlin College (q.v.). Settled in 1833, upon the establishment of the college, Oberlin was first incorporated in 1846. The government is vested in a mayor, elected every two years, and a unicameral council, chosen on a general ticket. The village owns and operates the water-works. Population, in 1890, 4376; in 1900, 4082.

OBERLIN, Ȯbër-län', JEAN FRÉDÉRIC (1740-1826). An Alsatian Lutheran clergyman and philanthropist. He was born at Strassburg, and studied at the gymnasium and university of his native place. After finishing his theological studies he was ordained to the ministry, but for several years before entering upon its work he gave private instruction in the family of a physician, from whom he acquired considerable medical knowledge. In 1766 he was appointed chaplain in the French Army, but was deterred from entering upon his duties by an appointment in the following year as pastor of Ban-de-la-Roche (Steinthal), a barren district on the borders of Alsace and Lorraine. Oberlin undertook the mission as the call of duty, and during the sixty years of his ministry wrought great changes in the character and condition of the people. His intelligence was superior, his will inflexible, his figure commanding, and in spite of opposition his courage as well as kindness finally won the day. He gave special attention to improving the material condition of the people, himself leading in the work of building roads and bridges. He introduced improved agricultural methods, sent some of the more intelligent young men to Strassburg to learn trades, and opened schools. Three Sabbaths he preached in French, the fourth in German. He created a patriarchal government in its purest form, put to practical use his knowledge of medicine, and founded a bank for lending money without interest or security. An enemy of the aristocracy and clergy, he looked with favor on the French Revolution. The Steinthal became an asylum

of refuge for many who fled to escape scenes of violence elsewhere. Outside his little canton he found admiring friends. Oberlin College (q.v.) in Ohio was named for him. His life has been written many times: by Ströber (Strassburg, 1831); Bodemann (Stuttgart, 1855; 3 ed. 1879); Hackenschmidt (Strassburg, 1902); and in English by Josephine Butler (London, 1882).

OBERLIN COLLEGE. A coeducational institution of higher learning, established in 1833 at Oberlin, Ohio, and chartered as the Oberlin Collegiate Institute. The present name was adopted in 1850. The academy or preparatory school was first opened, but in less than two years the college proper and the theological seminary were in operation. In addition, there are departments of music, drawing and painting, and physical training for women, and a summer school. Oberlin College was among the first institutions of higher learning to admit colored students and was in general a stronghold of the anti-slavery spirit. It was also a pioneer in co-education. In 1903 the faculty numbered 84, and the student enrollment was 1443, of whom 906 were women. The library contained 69,000 bound volumes and 110,000 pamphlets. The college has 16 buildings, valued with their equipment at \$765,900; an endowment of \$1,576,153, and an income of \$135,122. The total value of its property was \$2,342,102.

OBERLIN THEOLOGY. The system of doctrines taught at Oberlin College in its first period by Charles G. Finney (q.v.) and his colleagues. Finney had early come by his own thought to embrace the general system of theology taught by the leading Congregationalists of his time, and known as New School Calvinism. Although it is difficult to establish any direct connection of Finney with New Haven, it is true that the most striking similarity exists between his views and those of N. W. Taylor, even in details. The system is Calvinism modified by the doctrines of the freedom of the will and of benevolence as the constitutive principle of virtue. Sin is conceived as strictly personal to the sinner, and therefore all imputation, whether of Adam's sin or of Christ's righteousness, is denied. Original sin becomes native tendency to evil resulting in actual sin in the case of every man. Regeneration is the act of the Holy Spirit persuading the soul to the choice of the good, which choice is conversion. Great emphasis is laid upon the divine moral government, and the theory of the atonement taught is the governmental. After Finney arrived in Oberlin (1835) the theory of the simplicity of moral action (which had been taught by Emmons) was revived and made the basis of a somewhat new view of sanctification. A volition, it was said, is indivisible in its nature, and must be either right or wrong. In any moment, as having but one act of choice at that moment, the soul is, therefore, either wholly holy or wholly sinful. The ability of man to obey the law of God is complete, for his obligation cannot exceed his ability. Therefore at any moment a man may perfectly and wholly obey the law, and is therefore at that moment perfectly sanctified. If he will only continue thus to choose the right uninterruptedly (which he is able to do in consequence of the freedom of his will), he will maintain a sinless life. Since he can do

this, he ought to do it. Hence sinless perfection is both obligatory upon the Christian and possible. To attain this, the aid of the Holy Spirit was to be sought in prayer. This theory, in connection with the great practical earnestness of the Oberlin colony and their conviction of their call to effect large things in the extension of Christ's kingdom, led to efforts and professions in the attainment of holiness which were in time largely modified, but which were at first the occasion of great suspicion and opposition. A still greater occasion of antagonism was the stand taken by Oberlin in favor of the negro, and the introduction of the coeducation of women with men in the institution. The peculiarities of Oberlin were greatly exaggerated; but what peculiarities there were have largely passed away with the progress of time. Consult Finney, *Systematic Theology* (Oberlin, 1847; new ed. 1878).

OBERMÜLLNER. Ōbēr-myl'nēr, ADOLF (1833-98). An Austrian painter, born at Wels. He studied in Munich, Italy, France, and Holland, and settled in 1860 in Vienna. His splendid views from the high Alps in Bavaria, Tyrol, and Switzerland include the "Goldberg Glacier in Rauris Valley" (1874, Vienna Museum); "Mont Blanc," and "The Nassfeld near Gastein" (Linz Gallery). After sketches and drawings by Julius Payer he painted a series of twelve "Scenes at the North Pole" (1875), and in the Museum of Natural History, Vienna, he executed five mural paintings of Alpine scenery.

OBERON. In West European folk-lore, the king of the elves or fairies, and the husband of Titania. Oberon is first mentioned as 'Roi du royaume de la féerie' in the old French poem of *Huon de Bordeaux* (thirteenth century), which was in 1454 made the basis of a popular prose romance. This romance was translated into English by Lord Berners about 1530 (printed in 1534). From this beautiful version Shakespeare must have derived the Oberon and Titania of *A Midsummer Night's Dream*. Chaucer, Greene, and Spenser adopted Oberon. Wieland got the idea of his *Oberon* (1780) from the *Bibliothèque universelle des romans*, published in 1775. Using Wieland, Planché worked up his text for Weber's opera *Oberon*. The mediæval French poem done into modern French by Gaston Paris was edited by Guessard and Grandmaison (Paris, 1860), and Lord Berner's version by Lee for the Early English Text Society (London, 1883-85).

OBESITY, CORPULENCE, or POLYSARCIA (Lat. *obesitas*, from *obesus*, fat, p.p. of *obedere*, to eat up, from *ob*, before, near + *edere*, to eat). An abnormal deposit of fat under the skin and around the viscera. The amount of fat possessed by an individual may vary widely within the limits of health, but so long as it does not interfere with the bodily functions or movements, it is not pathological; indeed, a certain quantity is useful and necessary to protect the various organs and to maintain their temperature, as well as to serve as a reserve supply of nutrition. (See **FATS**.) The normal proportion of fat to the whole body weight is given as about one-fifteenth to one-twentieth. Obesity may occur at any period of life, but the tendency to corpulence is greatest after forty. In women the predisposition is greatest after the first years of child-bearing, and again after the menopause. In the pro-

duction of obesity three great causes are active as a rule. These are heredity, overindulgence in food and drink, and lack of exercise. Most persons over forty eat too much and exercise too little. Alcohol tends to fatten by substituting itself for food in the oxidizing process. Fat when once deposited favors the deposition of more fat, for by acting as a non-conducting envelope to the body it prevents the radiation of heat, and so decreases the combustion of those substances which, when not used to produce heat, are stored up as fat. The immediate cause of obesity is generally a faulty assimilation due to some digestive derangement by which oxidation of the albuminous elements of the food is interfered with. The carbohydrates are not as was long thought *directly* to blame, since they are readily converted into carbon dioxide and water. On account, however, of the ease with which the carbohydrates are oxidized, the albuminous elements of the food undergo incomplete oxidation, are not so fully decomposed, and the fat is in reality derived from them. The fatty portions of the food are not so prone to cause undue deposition of fat as are the carbohydrates, since they interfere less with the conversion of the nitrogenous elements, and are less easily oxidized.

The symptoms which may attend extreme degrees of corpulence are a falling off of mental and physical activity, shortness of breath on the least exertion, and impairment of the functions of respiration, circulation, and digestion, together with anemia and muscular weakness. This, however, is an extreme picture. It is a matter of daily observation that obesity is compatible with a high degree of mental and physical alertness and general good health.

Many plans of treatment, based on systems of exercise and diet, have been advocated for the reduction of fat, the most notable being those of Banting, Ebstein, and Oertel. All of these systems have for their object the regulation of exercise in such a way that oxidation may proceed in a normal manner, and regulation of the diet so that a less quantity than normal of the fat-producing elements is taken in. This object is attained in various ways. In the method of Banting the total quantity of food is reduced, the liquids restricted, and the fats and carbohydrates excluded. Ebstein's method permits the use of fats, but eliminates the carbohydrates. Oertel's system is especially intended for individuals with cardiac complications, and consists of three parts. First, the reduction of liquids with promotion, by baths or other means, of perspiration; second, restriction of the diet largely to proteid substances; and third, the taking of graduated exercises in walking up hill. Cathell proposed some years ago a method which was entirely independent of diet and exercise. This was the taking, on alternate days, of Kissingen and Vichy mineral waters, with the addition, in obstinate cases, of lemon juice to the Kissingen, and aromatic ammonia to the Vichy. Thyroid extract enjoyed for a time a reputation as a fat-reducer, but its tendency to interference with the heart, which is apt to be weak in obese persons, makes it a somewhat dangerous drug. Among other substances which have been used for this purpose are iodine, bromine, mercury, lead, arsenic, lemon juice, sour wines, vinegar, Phytolacca, Gulf weed, and bladder wrack. Many

of these, while having an influence on the fat, act as slow poisons and damage the assimilative organs, so that their ultimate effect is injurious.

OBI, *ô'bê*, or **OB**. The westernmost of the great rivers of Siberia (Map: Asia, G 2). It rises in the Altai Mountains, and flows northwest, then north through the Siberian governments of Tomsk and Tobolsk, emptying into the Arctic Ocean through an immense estuary, the Gulf of Obi, which is 600 miles long and 60 miles in average width. The length of the river itself above the estuary is about 2500 miles, and it is nearly two miles wide at its mouth. After emerging from the foot-hills of the Altai range the river flows for the remainder of its course through an almost perfectly level country consisting first of sandy steppes, then of rich tracts of fertile soil, and finally of vast marshes. In its lower course it divides repeatedly into parallel arms connected by cross-channels, forming a network of islands, which during floods are submerged under sheets of water many miles wide. Although not yet extensively used as a waterway, the Obi with its tributaries presents a total navigable length of over 9000 miles. In summer the main river and all its larger tributaries are navigable almost to their sources, and during the spring floods many secondary tributaries can be ascended by light-draught steamers. The river is ice-bound near its mouth from October to June. Of its numerous tributaries the largest is the Irtysh (q.v.), which is considerably longer than the main stream from the point of confluence.

OBIS'PO (Sp., bishop). A Cuban name of the spotted stingray (*Aëtobatus narinari*). It is one of the eagle-rays, and is brown in color, with small, round, pale spots.

O'BIT (OF. *obit*, from Lat. *obitus*, death, approach, from *obire*, to meet, from *ob*, toward + *ire*, to go). Literally, the decease of an individual. But as a certain ecclesiastical service was fixed to be celebrated on the day of death (in *die obitus*), the name can be applied to the service itself. *Obit* therefore signifies, in old Church language, the service performed for the departed. It consisted, in the Roman Church, of matins and lauds, followed by a mass for the dead.

OBITER DICTUM. See **DICTUM**.

OBJECT-GLASS. The lens in a telescope (q.v.) or microscope (q.v.), which is placed at the end of the tube nearest the object, and first receives the rays of light. Its function is to produce a real image of the object, and it is generally an achromatic lens.

OBJECT TEACHING. A mode of teaching in which objects are made the studies of young pupils. By this method a systematic attempt is made to exercise and train the senses of the child. Comenius (q.v.) in the *Great Didactic* writes: "Let the senses be applied to the subject as often as possible, e.g. let hearing be joined with vision and the hand with speech. It is not enough to apply to the ears, but the teacher must present to the eyes, that through them instruction may reach the imagination. Leave nothing till it has been impressed by means of the ear, the eye, the tongue, the hand." His *Orbis Pictus* was the first school-book in which pictures were used to illustrate the various topics. In the work of

Comenius, therefore, is to be found the first clear presentation of the principles of object teaching. To Pestalozzi (q.v.), however, may with justice be given the credit of introducing the method as a special feature of primary education. Since Pestalozzi all educators have agreed that the child's activity, manifested through the senses, should be directed to the things about him. In this way, (1) the child's senses are trained, (2) his judgment aroused, and (3) he is given a language. The three must go together. Pestalozzi saw that in order to reach clear knowledge of anything the mind must pass through a necessary sequence of processes. From sense-perception it must rise through ideation to clear concepts. Mere presentation of objects is not sufficient. There must be the inner reaction of the learner. There must be, therefore, (1) the sense-material, (2) the inner reaction of mind, (3) the word. Consult: Barnard, *Object Teaching* (New York, 1860); Calkins, *Manual of Object Teaching* (ib., 1890). See KINDERGARTEN; NATURE STUDY; PEDAGOGY.

OBLATES, òb'lāts (ML. *oblatus*, oblate, from Lat. *oblatus*, offered, p.p. assigned to *offerre*, to offer). The name of a class of religious communities in the Roman Catholic Church, which differ from the religious Orders strictly so called in not being bound by regular vows, instead of which they make an offering (oblation) of themselves to the superior or bishop, with a promise of constancy. The principal associations of this class are: (1) The Oblates of Saint Ambrose, or of Saint Charles, whose foundation in 1578 was one of the many works undertaken in his diocese by Saint Charles Borromeo (q.v.), Archbishop of Milan. The members were secular priests who lived in community, and were merely bound by a promise to the Archbishop to devote themselves to any service which he should consider desirable for the interest of religion. Saint Charles made use of them chiefly in the wild and inaccessible Alpine districts of his diocese. In the suppression of small communities under Urban VIII. and Innocent X., the institution became extinct, but was revived by Archbishop Romilli of Milan in 1848. In 1856 a community on the same model was established in England by the future Cardinal Manning and his successor as Archbishop, Cardinal Vaughan, for aggressive work in London. The English oblates, whose statutes were confirmed by the Pope in 1857 and 1877, have now several houses. (2) The Oblates of Mary Immaculate was founded in 1816 by Charles Eugène de Mazenod, Bishop of Marseilles (1837-61), to repair the losses to religion caused by the French Revolution. Their rule was confirmed by Leo XII. in 1826. They were introduced into Canada in 1841 and the United States in 1848. The congregation, which has about 70 houses in all parts of the world, now numbers over a thousand members, the majority of them priests. The mother house is in Paris, in which city the great basilica of the Sacred Heart on Montmartre is principally their work. The general is elected for life; a general chapter is held every six years. They conduct a large number of educational and charitable institutions, among them the Catholic University of Ottawa. For the life of the founder, consult Ricard, *Monseigneur de Mazenod* (Paris, 1892). (3) The Oblates of Saint Frances of Rome,

popularly known as *Donne di Tor di' Specchi*. This association grew out of the charitable work of the pious woman whose name it bears, and took up its community life in 1433 in the house in Rome which it still occupies. To this house, still the only one possessed by the institute, Saint Frances went on her husband's death, and here she died as superior in 1440. The oblates are mostly ladies of noble birth, and have done much good in educational and charitable works. They, with the Jesuits, were expressly excepted from the reforming decrees of the Council of Trent affecting the regular Orders; and their statutes gave Saint Frances de Sales the idea of his Order of the Visitation. For the original foundation, consult Lady Georgiana Fullerton, *Life of Saint Frances of Rome* (London, 1855).

OBLIGATE PLANTS (from Lat. *obligare*, to bind, from *ob*, before, toward + *ligare*, to bind). Plants which can grow in but one life condition. This term, which is contrasted with facultative plants, is applied particularly to parasites and saprophytes. For example, dodder is an obligate parasite, because it has not the power to grow independently. Obligate is also used in a still more restricted sense; certain forms of dodder can grow upon only one host plant, and are, therefore, regarded as obligate in that sense.

OBLIGATION (Lat. *obligatio*, bond, from *obligare*, to bind), AT CIVIL LAW. In the widest sense legal obligation is equivalent to legal duty, but the technical meaning of the expression is much narrower. Continental jurists confine the term, in the first place, to duties toward a particular person or group of persons, excluding duties toward the State or community; in the second place, to duties assumed by or imposed upon a particular person or group of persons, excluding duties which rest upon all members of the community. Further, not all duties of particular persons to particular persons are designated as obligations; they are not so described when the duties result from some preëxisting legal relation between the parties, like marriage. Such duties have indeed been called obligations *ex re*, but this use of the word is not approved by modern writers. Finally, the term obligation is ordinarily restricted to cases where the right which corresponds to the duty imposed upon or assumed by the person obligated has economic value. Technically, then, obligations are special legal relations in which one or more persons, usually described as creditors, are entitled to claim from one or more persons, usually described as debtors, acts or forbearances which are in the economic interest of the creditors. In Roman law, and in the law of Latin countries at the present time, the word obligation is used to describe the legal relation, the duty of the debtor, and the right of the creditor. The German Imperial code has distinct terms, viz. *Schuldverhältniss*, or debt-relation; *Verbindlichkeit*, or obligation; and *Forderungsrecht*, or right of demand.

The creditor's right is a right to performance. In early law this right ran directly and exclusively against the debtor's person. Later the claim could be satisfied by seizure of goods, and ran against the person only in second instance; and execution upon the person was transformed into imprisonment for debt. Since the abolition of imprisonment for debt the creditor's claim

has become simply a claim against the goods, i.e. against the estate of the debtor. It is a right in *personam* only in this respect, that from the outset the creditor's claim runs against his debtor and no other person, while a right in *rem* runs against all the world. The duty of a person in possession of property to restore such property to its owner resembles the duty of a vendor to deliver the thing sold to the purchaser; but in the former case the duty results from the owner's right in *rem* and is not properly described as an obligation. See *IN REM*; *IN PERSONAM*.

In the Roman Imperial law the courts enforced specific performance whenever this was possible, awarding pecuniary damages also on account of the debtor's delay (*mora*). If specific performance could not be enforced, they awarded pecuniary damages, which were so measured as to put the creditor in as good a position, economically, as he would have occupied if the debtor had performed at the proper time and place. The same rules are applied in modern civil law, although some of the modern codes provide that, in case of money debts, damages shall not exceed the legal interest. The fact that the creditor's claim is, in most cases, enforceable only through the award of damages is the reason why it is usually asserted that no obligation exists unless the creditor's interest is measurable in money. Indirectly, however, an act or forbearance in which the promisee has no pecuniary interest can be secured by an agreement that the promisor shall pay a certain sum of money if he fails to do what he has promised, or does what he has promised not to do. Such 'conventional penalties' were enforced in the Roman law and are enforced at modern civil law; and although some of the modern civil codes do not require that the creditor's interest be measurable in money, claims not thus measurable can be enforced only where a decree of specific performance can be obtained from the court, or where a penalty has been stipulated.

While the obligation is thus sharply distinguished from the right to a thing, it is nevertheless true that the right of a creditor, like the right of an owner, is a property right. Like any other property right, it may be transferred or 'ceded' to a purchaser; it may be pledged or hypothecated by the creditor to his creditor; it may be attached by the creditor's creditor; in case of the bankruptcy of the creditor it passes, with his other assets, to his creditors or to those who represent and act for his creditors; and in case of the creditor's death it passes with the rest of his estate to his legal or testamentary heirs (as in English law it passes to the executors or administrators). Hence the Roman jurists, viewing property as consisting of 'things,' termed the obligation an 'incorporeal thing,' and English law operates with the same conception.

JOINT OBLIGATIONS. Where there are two or more creditors, or two or more debtors, each creditor may be entitled to sue only for his share of the claim, and each debtor may be liable only for his share of the debt. In certain cases, however, any one of the creditors may be entitled to demand full performance, and any one of the debtors may be held liable for the full debt. In such cases the obligation is said to be 'solidary,' 'actively' as regards the creditors, 'passively' as regards the debtors. The effect of performance

to one creditor is to extinguish the right of the others, and the effect of performance by one debtor is to liberate the others. All such rules, however, apply only to the relation between the creditor or creditors, and the debtor or debtors, and do not touch the relation of the joint creditors to each other, or that of the joint debtors to each other. If the joint creditors have really (i.e. equitably) a joint interest, the creditor who has received payment must satisfy the other creditors; and if the debt was really a joint debt, the debtor who has paid is entitled to hold the other debtors to 'contribution.' As between joint wrong-doers contribution is regularly excluded.

ESTABLISHMENT. Obligations, as regards their origin, were divided by the Roman jurists into four classes: (1) those established by contract (*ex contractu*); (2) those established by tort of the debtor (*ex delicto*); (3) those which resemble contractual obligation, although no contract has been concluded (*quasi ex contractu*); and (4) those which resemble obligations on tort, although the debtor himself has committed no tort (*quasi ex delicto*). The most important quasi-contractual obligations are those based on unjust enrichment and those which spring from unauthorized agency. The quasi-tortious obligations include all the cases in which a person (father, employer, etc.) is held liable for a tort which he did not commit or authorize. The classification is open to criticism, and while modern civil codes recognize obligations of the third and fourth class, they are sometimes described as 'obligations imposed by law.' This description is also open to criticism, as implying that contractual obligations are not imposed by law. In the new German code all attempt at classification is abandoned, except that contractual obligations and quasi-contractual obligations are thrown together, and that all cases of liability for illicit conduct are placed under a separate title.

EXTINCTION. Obligations are normally extinguished by performance. If the creditor sees fit to accept as performance something other or something less than he is entitled to demand, the obligation is extinguished. Tender of performance does not have the same effect; but if the obligation is to pay a sum of money or to deliver goods, the debtor is liberated by depositing the money or goods in a safe place subject to the creditor's order. Obligations are also extinguished by the substitution of new obligations (*novation*), if such was the intention of the parties. Obligations are likewise extinguished by merger (*confusion*) when the claim and the debt are united in the same person (e.g. by inheritance); by set-off (*compensation*) when a debtor, being sued, is able to put in a counterclaim; by release; and by discharge in bankruptcy proceedings.

NATURAL OBLIGATION. The Roman jurists sometimes used the term natural obligation to mean an obligation recognized by natural law (q.v.), thus including the majority of legal obligations. More technically, however, they employed the term to describe an obligation which was legally imperfect, and which could not be enforced by action at law, but which a scrupulous man would recognize and perform. To all such natural obligations they attributed at least this effect, that voluntary performance was to be regarded as performance and not as gift. Fur-

ther, money paid or property transferred under the mistaken impression that a legal obligation existed could not be recovered if a natural obligation existed. In many cases, moreover, a natural obligation was a sufficient basis for suretyship or for a new promise, and in a few cases such an obligation could be used as a set-off against a legal obligation. Modern legislators do not regard the conception with favor, but the courts have not been able to dispense with it. Consult the authorities referred to under CIVIL LAW.

OBLIQUE MOTION. See MOTION.

OBOE (It. *oboe*, from Fr. *hautbois*, Eng. *hautboy*, high wood, so called from the high notes of the instrument, from *haut*, high + *bois*, wood). The oldest and most important wood-wind instrument. It is of great antiquity and is traced in the sculpture of Egypt and Greece. The oboe is the most elaborate and difficult of reed instruments. It is made of wood, generally of box, ebony, cocoa, or rosewood, and is constructed in three pieces, or joints, forming a continuous tapering tube, about 21 inches long, the bore of which is narrow at the small end, and widens into a bell-shaped opening, one and one-half inches in diameter at the mouth. In the upper and middle piece there are holes, by stopping or opening which with the fingers the player forms the notes of the natural scale, the intermediate semitones being formed by the keys. The reed is fixed upon the end of a small brass tube which fits, socket-like, into the small end of the upper piece. The sound of the oboe is reedy and penetrating, though mild, and from its great power in swelling or diminishing the sound, it is capable of every variety of expression. In the modern orchestra two oboes are employed, the *treble oboe*, a non-transposing instrument, the music for which is written in the G clef, and the *alto-oboe* or *cor anglais* (q.v.), a transposing instrument. The principal solo compositions for the oboe are: Handel's six concertos; Mozart's quintet for oboe and strings; Beethoven's trio for two treble oboes and *cor anglais*; Hummel's variations, with orchestra; and Kalliwoda's concertino in F, with orchestra. The *oboe d'amore*, in use in the eighteenth century, became obsolete, but was reconstructed by M. Mahillon, of Brussels, at the order of M. Gevaert, in order to perform correctly the works of Bach. See MUSICAL INSTRUMENTS.

OBOK, ô-bôk'. A seaport of French Somaliland (q.v.), situated at the western end of the Gulf of Aden (Map: Africa, J 3). It was acquired by France in 1855, and with the surrounding district formed the colony of Obok, which became the nucleus of the French possessions in Somaliland. Population, about 1000.

OBOLE/LA (Neo-Lat., diminutive of Lat. *obolus*, from Gk. *ὀβολός*, small coin). A small fossil brachiopod of oval or rounded outline common in and very characteristic of Cambrian rocks of North America and Europe.

OBOLUS (Lat., from Gk. *ὀβολός*). The name of a Greek measure of weight and a Greek coin. Six of these oboli made a drachma. See DRACHMA.

OBRAĐOVIĆ, ô-brâ'dô-vîch, DOSITHEUS (1739-1811). A Servian author, the father of modern Servian literature. He was born at

Coškovár, Hungary, and at the age of fifteen entered the Monastery of Oprovo in Syrmia. He afterwards traveled in the East and in Italy; and in 1783 he published *Zivot i priključenija*, or "Life and Adventures," partly autobiographic and partly fantastic. This was the first book written in the popular speech of the Servians, and made it a literary language. In Belgrade, where he settled in 1807, he was made Senator and Minister of Public Education. Besides many translations, especially of *Æsop's Fables* (1788), he wrote *Sověti zdravago razuma*, or "Wise Counsel" (1784), and a work on morals, *Sobranie pravoučitelnykh veščej* (1793 and 1818). A complete edition of his works in ten volumes appeared at Belgrade (1833-45). Consult Sevic, *Dositheus Obradović* (Neusatz, 1889).

OBRENOVITCH, ô-brên'ô-vîch. A ruling family of Servia which attained power in 1817, when Milosh Obrenovitch (q.v.) was chosen Prince by the nobility and the clergy. Milosh was compelled to abdicate in 1839 and was followed by his sons, Milan, who ruled only for a few weeks, and Michael Obrenovitch (q.v.), who in turn was deposed in 1842, the power passing to the rival house of Karageorgevitch. Alexander Karageorgevitch fell in 1858 and was succeeded by the old Prince Milosh, who died in 1860 and made way a second time for his son Michael. The latter was assassinated in 1868 and Milan I. (q.v.), a grandson of Jefrem, the younger brother of Milosh Obrenovitch, was chosen Prince. He attained the kingly title in 1882, but in 1889 was forced to abdicate in favor of his son, Alexander I. (q.v.), who was assassinated in 1903, leaving no heirs. Peter Karageorgevitch was chosen King by the Skuptchina. See SERVIA.

O'BRIEN, FITZJAMES (1828-62). An Irish-American poet, story-teller, and journalist, born in Limerick. He was educated at the University of Dublin, served for a time, as is supposed, in the British Army, and squandered a considerable inheritance in London, editing a periodical in aid of the first World's Fair (1851). The next year he came to the United States. His most striking work appeared in the *Atlantic Monthly*—two short stories hardly surpassed for creative imagination in American literature. These are *The Diamond Lens* and *The Wondersmith*. He supplied the stage also with many ephemeral dramas, and with one, *A Gentleman from Ireland*, that held the boards for a generation. In the Civil War he served in the Seventh Regiment, was severely wounded, and after a lingering illness died, in Cumberland, Md. (April 6, 1862). He was a distinguished figure in the Bohemian New York of his day, and witness to the impression that he made in that sprightly circle is preserved in a sheaf of personal recollections prefixed to *The Poems and Stories of Fitzjames O'Brien*, edited by his friend William Winter (1881). O'Brien has never received full praise for his unique, if bizarre, talents, which are most clearly displayed in his stories, but are also visible in a number of poems, such as "The Skaters" and "The Wharf-Rat."

O'BRIEN, JEREMIAH (1744-1818). An American patriot, born probably at Kittery, Maine. In 1775 the captain of the British armed vessel *Margaretta* threatened to bombard the town of Machias, where O'Brien then lived, unless the

liberty pole were removed. On June 12th O'Brien and his five brothers, accompanied by about thirty-five of their townsmen, many of them armed only with pitchforks, manned a little sloop in the harbor, attacked the *Margaretta* and after a brief engagement captured her. After the battle Captain O'Brien transferred the *Margaretta's* cannon to his own vessel, which he rechristened the *Machias Liberty*, and used as a coast patrol. Later he became a privateer captain sailing under letters of marque from the colony, and while commanding the *Hannibal*, 20 guns, was captured by two British frigates and sent to England, where he was confined in the Mill Prison. After the close of the war he was appointed the first collector of the port of Machias.

O'BRIEN, LUCIUS RICHARD (1832—). A Canadian painter, born at Shanty Bay, Ontario, and educated at Upper Canada College, Toronto, where he studied architecture and civil engineering. He came to be considered the best painter in water colors that Canada has produced. As first president of the Royal Canadian Society of Artists, he furthered the interests of other artists, and Canadian art in general. His best paintings are descriptive of scenery upon the Lower Saint Lawrence.

O'BRIEN, WILLIAM (1852—). An Irish journalist and Parliamentary leader. He was educated at Cloyne Diocesan College and at Queen's College in Cork. In 1869 he became a reporter on the *Cork Daily Herald*, in 1875 he joined the staff of the *Freeman's Journal*, and in 1880 founded the *United Ireland*. Because of his political activity, he was nine times prosecuted by the law officers of the Crown and was imprisoned for more than two years. He represented the Nationalists in Parliament almost continuously from 1883 until 1895, when he retired because of dissensions in the party. In 1890 he visited the United States and collected considerable funds for the benefit of the Irish cause, and after Parnell's conviction he became one of the leaders of the anti-Parnell faction. In 1898 he originated a new agrarian movement under the name of the United Irish League, and founded the *Irish People*, as its organ. He published several books, among them *When We Were Boys* (1890) and *Irish Ideas* (1894).

O'BRIEN, WILLIAM SMITH (1803-64). An Irish politician. He was educated at Harrow School, whence he passed to Trinity College, Cambridge. He entered Parliament for the Borough of Ennis in 1828. In 1835 he was returned for the County of Limerick, and for several years strongly advocated the claims of Ireland to a strictly equal justice with England, in legislative as well as executive measures. Professing his inability to effect this in the United Legislature, and having been committed to prison in the House of Commons by the Speaker's orders for refusing to serve on committees, he withdrew from attendance in Parliament in 1841, and joined actively with Daniel O'Connell (q.v.) in the agitation for a repeal of the legislative union between England and Ireland. In the progress of that agitation, O'Brien sided with the party known as 'Young Ireland,' and when the political crisis of 1848 resulted in a recourse to arms, he took part in an attempt at rebellion in the south of Ireland. He was arrested, convicted, and sentenced to death. The sentence, however, was

commuted to transportation for life. He was transported to Tasmania, but in 1856, in common with the other political exiles, he was permitted to return to his native country. He published *The Principles of Government* (1855). Consult: Sullivan, *New Ireland* (London, 1877); Duffy, *Young Ireland* (2d ed., ib., 1883).

OBSERVATORY (from Lat. *observare*, to observe, from *ob*, before + *servare*, to keep; connected with Skt. *sar*, Av. *har*, to protect). An institution supplied with instruments for the regular observation of astronomical, meteorological, or magnetic phenomena. In some observatories all three classes of observation are carried on, but in most cases special attention is paid to astronomy alone, and only such meteorological observations are taken as are required for the calculation of the effect of atmospheric refraction on the position of a heavenly body; there are, however, a few observatories which are devoted solely to meteorological or magnetical observations.

While observation of the heavenly bodies dates from prehistoric times and individuals at intervals made their crude observations of the heavens, the first observatory, in our modern sense of the word, was that of Alexandria, founded about B.C. 300. It continued in activity till A.D. 200; and it was here that Hipparchus discovered the precession of the equinoxes and fixed the positions of the sun, moon, and planets by means of armillary spheres (q.v.) and astrolabes, having graduated circles on which celestial latitudes and longitudes could be read off, when a pair of sights was pointed to the heavenly body. Ptolemy used a quadrant, with which he measured zenith distances on the meridian. In the ninth and tenth centuries the Arabs founded observatories at Bagdad, Damascus, and Mokattam, near Cairo. In the latter place the Haki-mite tables were constructed. In the thirteenth century the splendid observatory at Meragha, Persia, and in the fifteenth century that of Samarkand were founded by Mongol Khans. Here planetary tables and star catalogues were constructed. The first observatory in Europe was that of Nuremberg, erected in 1472, and the revival of astronomical observations in Europe dates from its foundation. In 1576 Tycho Brahe began the erection of his famous observatory on Hven, an island in the Sound. He converted the quadrant used by Ptolemy into an altazimuth by mounting it on a vertical axis in connection with a horizontal or azimuth circle. It was not till the middle of the eighteenth century that the improvement of time measurement with pendulum clocks enabled astronomers to rely for the determination of right ascensions on the times of passage across the meridian, instead of measurements with a graduated circle. The quadrant was then fixed in the meridian, and being attached to a massive wall, its dimensions were increased, and greater accuracy thereby secured in the determination of meridian zenith distances. Neither the quadrant nor the mural circle (q.v.) which succeeded it, however, could be relied upon for accurate motion in the plane of the meridian, but Römer remedied this defect by inventing the transit instrument (q.v.), which enabled astronomers to observe the times of meridian passage or transit with great accuracy, and thus to determine the right ascension of

OBSERVATORY



THE YERKES OBSERVATORY OF THE UNIVERSITY OF CHICAGO, AT LAKE GENEVA, WISCONSIN

the heavenly bodies by means of the apparent diurnal movement. With the transit and quadrant Bradley commenced that series of observations of the positions of the sun, moon, planets, and stars, which have continued ever since at Greenwich, and on which, in combination with less extensive series at Paris, Königsberg, and elsewhere, all our tables of the motions of the heavenly bodies are founded. In modern observatories the transit and mural circle have been combined into one instrument, the meridian circle (q.v.), which determines both right ascensions and declensions at a single observation.

In planning observatories a very usual mistake is an over-supply of instruments and too few astronomers. A large telescope really needs six persons to keep it busy: two astronomers, two assistants, and two computers. Moreover, the 'life' of a telescope is very short. Every few years new instruments are invented, and unless these are supplied to the observatory its astronomers will work at a disadvantage, and its astronomical output will be diminished in quantity and value.

The great observatories of the world may be divided into several classes. In the first place, we have the great Government institutions occupied with continuous observations such as are needed to strengthen our knowledge of the fundamental parts of astronomy. The Royal Observatory at Greenwich, England, is perhaps the most important of this class. It was founded by Charles II. Similar institutions are established at Paris, Berlin, Pulkova (q.v.), near Saint Petersburg, and Washington. At the last-named place the observatory is called the United States Naval Observatory (see NAVAL OBSERVATORY), and the astronomers are professors of mathematics in the United States Navy. Another class of observatories are maintained by universities and other educational institutions. These are intended to combine instruction with research, and in them an effort is usually made to extend the science of special investigations rather than by long continued routine observation. In the United States the principal observatories of this class are the Harvard University Observatory, the Lick Observatory (q.v.) of the University of California, and the Yerkes Observatory (q.v.), belonging to Chicago University. Finally, we have the very important class of astrophysical observatories, which are occupied with a study of the physics of the heavenly bodies. Probably the most important of these is at Potsdam, Germany. Much astrophysical work is also done at the university observatories of Harvard and Chicago. See TELESCOPE; MERIDIAN CIRCLE. For the lately established observatories for the observation of the variations of latitude, see LATITUDE, VARIATIONS OF.

OBSIDIAN (from Lat. *obsidiana*, false reading for *obsiana*, a sort of mineral, probably obsidian, from *Obsidius*, false reading for *Obsius*, name of a man who is said to have discovered it in Ethiopia). A volcanic glass consisting of silica in combination with aluminum, calcium, iron, potassium, and sodium. It is hard and brittle, with a remarkable vitreous lustre, and a perfect conchoidal fracture, the edges of the fracture, which are semi-transparent or translucent, being very sharp and cutting like glass. Obsidian is generally black or very dark gray,

but sometimes has a green, red, or brown color, is striped or spotted, and even chatoyant or aventurine. It occurs in volcanic regions, in round compact pieces, granular or fibrous. It is often found in association with pumice, which is identical with it in chemical composition, but different in structure. Pitchstone is also of similar composition, but contains a larger percentage of water and is without lustre. Obsidian is found principally in the volcanic regions of Iceland, Italy, Hungary, Spain, New Zealand, Siberia, Mexico, Peru, and the western parts of the United States, especially in Georgetown, Col., and at the Obsidian Cliff in the Yellowstone Park, where it occurs in massive form. The famous locality in Mexico is the Cerro de Navajas, or 'Hill of Knives,' in the State of Michoacan. Obsidian takes a high polish, but is very brittle. Nevertheless, it was extensively used among primitive peoples for arrowheads and spearheads, for knives, mirrors, polished figures, and ornaments, the best specimens of which have been found in Mexico. The early Romans obtained obsidian mirrors from Ethiopia. The mineral is still sometimes employed as material for ornamental boxes, buttons, and other articles.

OBSTETRICAL TOAD. See MIDWIFE FROG.

OBSTETRICS (from Lat. *obstetricus*, relating to a midwife, from *obstetrix*, midwife, form *obstare*, to stand before, from *ob*, before, toward + *stare*, to stand), MIDWIFERY, or TOKOLOGY. That branch of medicine which is concerned with the care of women during pregnancy, and during and after labor, whether natural or irregular, with the diseases peculiar to the puerperal state, and with the care of the new-born child. It also embraces a knowledge of the anatomy of the female generative organs and the physiology of reproduction in the human species. While among savages little or no assistance is given to the parturient woman, and the process is left to unaided nature, among civilized peoples from the earliest times there has been a class of persons—usually women—who have attended women during this trying period. The Jews had women (called *mejel-ledeth*) who acted as midwives, as did the Egyptians; and among the Greeks there was a corresponding class of women known as *mæcetriæ*. Phanarete, the mother of Socrates, was a midwife; and Plato explains the duties undertaken by these women. Hippocrates gave considerable attention to midwifery, and describes the operation of turning the child in abnormal labors. Among the Romans both physicians and midwives (*obstetrices*) attended confinements. Cæsar's section was performed after the death of the mother, and Pliny mentions that Scipio Africanus and Manlius were born in this way. There was a royal law (*rex legia*) providing for the performance of this operation when necessary. Celsus and Paulus of Ephesus wrote of obstetrics during the first century, and a gradual increase in the knowledge of the physiology and mechanism of labor can be traced in the writings of Galen (second century), Aetius (fifth century), and Paulus Ægineta (seventh century). The latter advocated the operation of craniotomy in suitable cases. During the Middle Ages there was little progress in obstetric science in Europe, but the Arabian and Persian schools made many improvements in this branch of medicine as well

as in others. Midwives did most of the work, but physicians were called in abnormal cases. Rhazes of Bagdad (A.D. 800) first advised artificial rupture of the membranes when spontaneous rupture was unduly delayed; and Avicenna of Ispahan (A.D. 900) described an instrument somewhat like the modern forceps. The teachings of these two physicians became celebrated throughout Europe and the East, and were followed for many years. With the revival of learning the science of midwifery began to receive the attention of the most famous physicians. Vesalius (q.v.) in 1543 first correctly described the bony pelvis, and Levret in France (1754) and Smellie in England (1751) completed his work 200 years later by taking exact measurements of the several diameters of the pelvic cavity.

At the commencement of the sixteenth century Eucharius Rhodion published a little book which is remarkable as being the first book published on this subject in England. In 1573 Ambrose Paré published a small work in which he showed that foot-presentations were not dangerous, and that in mal-presentations it was better to deliver by the feet than to attempt to bring down the head. Guillemeau and Mauriceau, his successors, developed and improved his teachings. About 1640 Dr. Paul Chamberlin, an Englishman, invented the forceps with separate blades, such as are now used. The Chamberlins (father and sons) did not publish their discovery, and it was not until 1815 that the exact nature of the instrument became known. The first scientific book on midwifery was published in 1513 by Eucharius Rösslin; and Justine Siegemund, a court midwife of Brandenburg, attained celebrity by her work on this subject. In 1668 Mauriceau's *Treatise* appeared, and was for a long time the standard work on the subject. A point requiring notice in the history of midwifery in the seventeenth century is the discovery of the use of ergot of rye in accelerating parturition. In 1688 Camerarius stated that midwives in some parts of Germany were in the habit of employing it for this purpose; but it is not till 1774 that we find any further reference to the use of this drug. Important contributions to obstetric knowledge during the eighteenth century were made by Smellie and Ould (1742) in England, who described the engagement of the fetal head in the pelvis; Levret (1747), Solayrès de Renhac (1771), Baudeloque (1781), and Madame Lachapelle (1795) in France; and Boer and Schmitt in Germany. The first, however, to give a clear and correct explanation of the entire mechanism of labor was Naegele the elder (1819), who may be considered the founder of modern obstetric science. In the nineteenth century many notable improvements in the art of midwifery were made; among them may be mentioned the induction of premature labor (first in England about 1756; in Germany in 1804; in France 1831); the use of auscultation to detect the fetal heart-beat; the perfection of the obstetric forceps, and its more frequent use in place of craniotomy; and the employment of general anæsthesia in both normal and complicated labors. Partial anæsthesia by the injection of cocaine into the spinal canal in the lumbar region has been introduced within a few years to take the place of general anæsthetics when these have been contra-indicated. Obstetrics is now an important part of

the curriculum of medical schools, and lying-in hospitals in connection with these schools have been established. Vienna has long been recognized as the centre of obstetrical teaching, the hospital in that city confining about 10,000 women annually. Good schools are also to be found in Paris, Berlin, Dublin, and New York. The latter city, on account of its large foreign population, affords unusual clinical advantages. On the Continent and to a less extent in Great Britain, regularly licensed midwives are still extensively employed, but in the United States and among the better classes of Great Britain confinements are intrusted exclusively to physicians.

The science of midwifery may be considered under three main divisions: the anatomy of the female generative organs; the physiology of these organs during the process of reproduction; and the pathological conditions which may arise during this period.

ANATOMY. The generative organs of the female consist of the uterus; the two ovaries, connected with the uterus on either side by the Fallopian tubes, which open into its cavity; and the vagina, or canal leading from the uterus to the external parts. The breasts are also included, although only active after the birth of the child.

PHYSIOLOGY. Reproductive activity, including the functions of menstruation, conception, gestation, parturition, and lactation, is limited in the female to a period of life beginning at about the twelfth year and ending about the forty-fifth. These limits vary by a few years, according to climate, an earlier maturity being characteristic of hot countries. When conception has taken place, the impregnated ovum makes its way through one of the Fallopian tubes to the cavity of the uterus, where it lodges and develops through the agency of a convoluted mass of blood vessels called the placenta, from which a cord of vessels (the umbilical cord) runs to the abdomen of the fetus. The duration of normal pregnancy varies from 275 to 280 days (nine calendar or ten lunar months), but gestation may be prolonged beyond this time in very rare cases to 300 or 306 days. Pregnancy is terminated with the expulsion of the child by the contractions (labor pains) of the powerful muscular fibres of the uterus. The more important signs and symptoms of pregnancy are the perception of the fetal heart-beats by the ear (auscultation); 'quickening,' or active movements of the child in *utero*; passive movements (ballotement) elicited by manipulation; suppression of the menses, morning nausea, gradual enlargement of the abdomen and breasts, and pigmentation of the area immediately surrounding the nipple. Of these only the first three can be considered certain indications of pregnancy, the existence of which can rarely be diagnosed with precision before the third month. During gestation the fetus floats freely in a sac of water called the amniotic fluid, and changes its position frequently. When parturition begins, however, the long axis of the fetus usually coincides with that of the mother, with the head downward, or *presenting* at the pelvic outlet. This is by far the most common presentation, occurring in about 96 per cent. of all cases. In about 3 per cent. the buttocks or feet present. About once in 200 labors what is known as a transverse presentation is met with (that is, the long axis of the

child is at right angles to that of the mother). Delivery being impossible in this position, artificial correction of the presentation, usually by turning and bringing down the feet, must be resorted to. Labor is arbitrarily divided into three stages: The first stage begins with the earliest premonitory pains and ends with the complete dilatation of the uterine outlet; this stage may last several hours or even days. During the second stage the bag of water ruptures, the uterine contractions become stronger, and the child passes through the parturient canal and is born. This event completes the second stage. The third stage ends with the expulsion of the placenta and fetal membrane, and lasts usually about half an hour. The duration of labor in first confinements is on an average about twelve hours; in succeeding labors, six to eight hours; although much longer periods are not dangerous or uncommon. The puerperal or lying-in state begins at the completion of labor and lasts about six weeks. During this time lactation is inaugurated and the uterus gradually resumes its wonted size and shape (involution). The length of the lying-in period varies in different countries and races; among uncivilized people and in parts of the East the mother resumes her usual occupations immediately after parturition; but in civilized countries the woman is confined to her bed for a week or ten days.

THE PATHOLOGY OF PREGNANCY. While the pregnant woman is liable to disease equally with other individuals, there are certain disorders which are peculiarly apt to arise during gestation, or are dependent on it. The teeth may undergo decay, owing to the fact that the mineral elements necessary for their nutrition are appropriated by the embryo. Constipation from both mechanical and sympathetic causes is a common disorder. The kidneys, owing to the increased functional activity demanded of them, not infrequently become diseased, as evidenced by the appearance of albumen in the urine. These organs failing in their function, poisonous products of metabolism accumulate in the blood, pronounced nervous symptoms, such as headaches, vomiting, and impairment of sight and hearing, appear, and if not relieved, uræmic convulsions (the so-called eclampsia) are induced, ending often in coma and death. Besides these and many other affections incident to pregnancy, there are certain chronic diseases which, by reason of the increased strain upon the vitality at this time, are likely to prove fatal. The heart normally undergoes a measure of hypertrophy in pregnant women in order to meet the increased demands of circulation. When, however, there exists chronic disease either of the substance or the valves of this organ, it may prove unequal to the strain. The danger from this condition increases with each succeeding pregnancy. When pulmonary phthisis exists in the mother, gestation in the majority of cases accelerates the progress of the disease.

Pregnancy may be terminated at any time before the normal period of 280 days. When this occurs during the first six months, it is called abortion or miscarriage; when it happens during the three succeeding months, it is termed premature delivery. A fetus born before the fifth month does not ordinarily survive. Abortion is always a serious accident, either from loss

of blood, or blood poisoning and peritonitis. This is particularly the case in forcible or criminal abortion, in which the mortality is very high. Extra-uterine (ectopic, tubal, or abdominal) pregnancy occurs when the impregnated ovum fails to reach the interior of the uterus and lodges in the Fallopian tube or drops into the abdominal cavity. The fetus develops in this situation, and unless the condition is recognized early and operated upon, death is likely to occur during the third or fourth month from rupture of the tube, hemorrhage, and peritonitis. A similar condition of affairs takes place in what is termed 'missed labor' when the fetus fails to be expelled at term. Operation for tubal pregnancy was advocated by Tait, Veit, Mundé, and others, and is now a common procedure.

The progress of natural labor may be obstructed by certain conditions of the mother and child. In the former, deformities of the bony pelvis, disease of the uterus resulting in rupture, and malposition of the placenta (placenta previa) are the most important. The child may be too large, or ill-formed, or present abnormally. These abnormal conditions render necessary various obstetric operations. Among these are: the induction of abortion or premature labor, when the mother's life is in danger, or the size or shape of the bony pelvis is such as to preclude delivery at full term; the extraction of the child with forceps; the Cæsarian operation (delivering the child through an opening in the abdomen); version or turning when the fetus presents abnormally or labor needs to be rapidly completed; and perforation of the head (craniotomy). The chief danger to which the woman is liable after delivery is puerperal or child-bed fever, which is now known to be simply septicæmia (q.v.) or blood poisoning, due to infection from unclean hands, instruments, or appliances. Since the discovery of antiseptics, child-bed fever has been constantly on the decline, and at the present day is a comparatively infrequent complication, both in hospitals and private practice. See PHLEGMASIA ALBA DOLENS.

OBVERSION (from Lat. *obvertere*, to turn toward or against, from *ob*, before, toward + *vertere*, to turn). In logic, the process of transforming a judgment into one of opposite quality, i.e. affirmative into negative, and vice versa. The change may be effected provided due compensation is made by changing the quality of the predicate. E.g. 'All men are mortal' becomes by obversion 'No man is immortal.'

OCALA, ô-kä'lä. A city and the county-seat of Marion County, Fla., 101 miles south by west of Jacksonville; on the Plant System and the Florida Central and Peninsular railroads (Map: Florida, F 2). Emerson Memorial Home and School, a Methodist Episcopal institution for colored girls, is located here. Ocala is surrounded by one of the most productive sections of the State—a region interested largely in the cultivation of oranges and vegetables. It is the centre of extensive phosphate interests. There is a public market; and the electric light plant also is owned by the municipality. Population, in 1890, 2004; in 1900, 3380.

O'CALLAGHAN, ô-käl'ä-hän, EDMUND BAILEY (1797-1880). An American historical scholar

and editor. He was born in Ireland, and was educated in medicine in Paris. He removed to Canada in 1823. Then he became interested in the Irish national movement, was one of the organizers of the Society of the Friends of Ireland, and editor of its organ, *The Vindicator*. In 1836 he was elected to the Provincial Parliament. In the year following he took a leading part in the Canadian insurrection (1837), and on the failure of the movement fled to the United States. Resuming practice in Albany, N. Y., he became greatly interested in the records of colonial New York, and it was largely through his efforts that the work of publishing them was undertaken. His published works include: *History of New Netherlands* (1846); *Documentary History of the State of New York* (4 vols., 1849-51); and *Documents Relating to the Colonial History of New York* (11 vols., 1855-61). The two latter series were edited by him with introductions and elaborate and careful notes.

O'CALLAGHAN, JOHN CORNELIUS (1805-83). An Irish historian, born in Dublin. He was educated for the law, but went into journalism. His chief claim to remembrance rests upon his editorial work in the secret history of the revolution in Ireland in 1688-91, written by Charles O'Kelly, an officer in the service of James II., which was published under the title *Macariæ Excidium* (1846), and upon his *History of the Irish Brigades in the Service of France, from the Revolution in Great Britain and Ireland under James II. to the Revolution in France under Louis XVI.* (1869).

OCAÑA, ó-kān'yā. A town of the Department of Santander, Colombia, 235 miles north of Bogotá, on the upper courses of the Taira River. The town is situated in the midst of a fertile plain noted for its production of coffee, and in addition is the centre of a brisk trade between Western Venezuela and the Magdalena Valley in anise and hides. In the vicinity are deposits of coal and lead. Ocaña was founded in 1572. Its population is about 6200.

OCARINA, ók'á-ré'ná (It., diminutive of *oca*, goose; so called from its resemblance to a goose-egg). A musical instrument of Tyrolean or Austrian origin, improved by French musicians. The ancient prototype of the ocarina is the Chinese *hsüan*, which was invented about 3000 B.C. The modern instrument was at first a molded piece of clay a few inches long, with holes for keys, a mouthpiece, and hollowed within. Five different sizes are now made for the different parts in music, and a piston at the end is used to temper the note. A row of keys in the improved instrument takes the place of the original holes.

O'CAROLAN, ó-kār'ó-lan, TURLOGH (1670-1738). An Irish bard, and one of the last of his calling, born in Newtown, Meath. He was blind from the age of sixteen, and spent his life wandering through Ireland, singing to the accompaniment of his harp. Many of his songs, all of which were vigorously national in character, are still to be heard in parts of Ireland. A collection of his ballads was published during the eighteenth century, but others of them have been handed down by tradition among the peasantry. He died in Roscommon.

OC'CAM, WILLIAM OF, or WILLIAM OCKHAM (?-1349). A famous schoolman, surnamed *doctor singularis et invincibilis*. Little is known of his early life. There is some reason to believe that he was born at the village of Ockham in Surrey, England. He took the degree of B.D. at Oxford and afterwards studied in Paris. He was a Franciscan, and about 1321 became involved in a controversy which arose in his Order concerning the question whether Jesus and the Apostles owned property. A certain Narbonne priest affirmed that the founders of the Christian religion had all things in common, and the doctrine was vigorously supported by William of Occam and other influential Franciscans, notwithstanding its condemnation by the Pope, John XXII. In 1328 Occam and the others, fearing for their safety at Avignon, fled from that city and made their way to Munich, where they were received and protected by Louis, Holy Roman Emperor. The remainder of Occam's life was passed in that city, where he continued his dispute with the popes and labored to perfect his system of philosophy. Whether he ultimately became reconciled with the head of the Church is disputed. He died at the convent of his Order in Munich in 1349 or shortly after that year. Occam's most important work was done in the field of logic and philosophy. His system is commonly classed as nominalism (q.v.), which had never before received so vigorously logical and rational a treatment. Occam's chief works upon logic were the *Summa Logices* and *Expositio Aurea Super Totam Artem Veterem*. On philosophy and theology he wrote *Quæstiones* and *Summæ in Octo Libros Physicorum; De Sacramento Altaris; De Corpore Christi; Quæstiones in Quatuor Libros Sententiarum*, based on Peter Lombard's *Sententiæ*, and containing nearly the entire theology of Occam. His polemical writings against the Pope include the *Opus Nona-ginta Dierum; De Dogmatibus Papæ Johannis XXII.; Compendium Errorum Papæ; Defensorium Contra Johannem Papam; and Dialogus in Tres Partes Distinctus, Quarum Prima de Hæreticis, Secunda de Erroribus Johannis XXII., Tertia de Potestate Papæ, Conciliorum, et Imperatoris*. Consult: Ueberweg, *History of Philosophy* (Eng. trans., London, 1872-74), and the article "Ockam" in Herzog's *Realencyclopædie*.

OCCANEECHI. An eastern tribe of Siouan stock, living, when first noted in history in 1670, in southern Virginia, having their chief town upon an island called by their name, at the confluence of the Staunton and Dan rivers, just above the present Clarksville. The principal trading paths between the northern and southern tribes of Virginia and the Carolinas crossed at this point, which fact made their language the general trade language throughout the region, while their town contained always a considerable reserve store of corn and skins. In 1676 they aided the Virginians against the invading northern Indians, but were repaid by being attacked in turn by the whites, determined to plunder the town. The Occaneechi repelled the attack, but with such heavy loss that they soon after abandoned their island settlement and retired southward into Carolina. In 1701 they were found living at the Occaneechi hills, about the present Hillsboro, N. C., but evidently declining, and shortly afterwards they united with the Saponi.

Tutele, and one or two other broken tribes. Consult Mooney, *Siouan Tribes of the East*.

OCCASIONALISM (from *occasional*, ML. *occasionalis*, relating to occasion, from Lat. *ocasio*, opportunity, cause, occasion, from *occidere*, to fall, perish, set, from *ob*, before, toward + *cadere*, to fall, Skt. *sad*, to fall). The name given to the philosophical system devised by the school of Descartes (q.v.) for the purpose of explaining the interrelation between mind and matter. It is a palpable fact that certain actions or modifications of the body are preceded, accompanied, or followed by corresponding acts of mind, and vice versa. This fact, although it presents no difficulty to the popular conception, according to which each is supposed to act directly upon the other—body upon mind, and mind upon body—has long furnished to philosophers a subject of much speculation because, accepting the erroneous principle that cause and effect must be similar, they could not conceive the possibility of any direct mutual interaction of substances so dissimilar as mind and body. And more than one system has been devised for the explanation of the problem. According to the occasionalists, the action of the mind is not, and cannot be, the cause of the corresponding action of the body. But they hold that whenever any action of the mind takes place, God directly produces, in connection with it and by reason of it, a corresponding action of the body, and conversely. This simply pushed the difficulty a step further back. If mind cannot act upon matter, then God, conceived as mind, cannot act upon matter; but, conceived as other than mind, cannot act upon mind. See GEULINCX, the leading occasionalist; PRE-ESTABLISHED HARMONY.

OCCLEVE, ðk'klév, THOMAS. An early English poet and man of law. See HOCCEVE, THOMAS.

OCCCLUSION (from Lat. *occludere*, to shut up, from *ob*, before, toward + *cludere*, to shut; probably connected with OHG. *sliozan*, Ger. *schliessen*, to close, provincial Eng. *clot*, bolt, and with Gk. *χλαίειν*, *klaiein*, to close). A special case of absorption (q.v.). The word is used to express the fact that gases are absorbed by solids. Sometimes it is a true solution, as in the case of hydrogen and palladium, carbon dioxide, cast iron, etc.; other times it is a condensation on the surface or within the pores, as in the case of charcoal and ammonia or oxygen.

OCCOM, ðk'òm, or **OCCUM**, SAM(P)SON (c.1723-92). An American Indian preacher and missionary. He was born at Mohegan, Conn., and was converted during the religious revivals of 1739-40. He acquired some ability to read, and, desiring to serve as missionary to his tribe, at the age of nineteen entered an Indian school kept by Rev. Eleazar Wheelock of Lebanon. After four years' study he opened a school at New London, but later went to Montauk, L. I., and taught among the Indians for ten years. He became a member of the Suffolk Presbytery in 1759. In 1765-66 he went to England with the Rev. Nathaniel Whitaker to raise funds for Moor's Indian charity school, and while there preached in many parts of England, and secured nearly £10,000. The school thus reinforced was subsequently transferred to New Hampshire and became the nucleus of Dartmouth College. The

latter part of his life was occupied mainly with missionary work among the Indians of central New York. He died at New Stockbridge, N. Y. For his account of the Montauk Indians, consult the *Massachusetts Historical Society's Collections*, first series, vol. x. He published a hymn-book (1774). The hymn "Awaked by Sinai's awful sound" is attributed to him.

OCCULTATION (Lat. *occultatio*, concealment, from *occultare*, to conceal, from *occulere*, to cover, from *ob*, before, toward + *calere*, connected with *celare*, to hide). A term used in astronomy. When the moon, in the course of her orbital motion around the earth, passes between us and a star or planet, the latter is said to be *occulted*. The phenomenon is thus quite analogous to eclipses. Observations of the exact instant when occultations occur were formerly used to determine the longitudes of places on the earth. But this is now done more accurately by telegraphing time signals, and the principal use of modern occultation observations is to determine the angular diameter of the moon. This is done by observing the exact times when certain stars disappear behind the moon, and also the exact moments when the same stars reappear again. From these observed data, we can determine the moon's angular diameter by a process of calculation. See ECLIPSE.

OCCULTISM (from *occult*, from Lat. *occultus*, hidden, p.p. of *occulere*, to conceal). An 'occult' property of matter is, in mediæval phraseology, a property that requires to be made manifest by experimentation; and occult science is simply experimental science. The term has undergone a curious transformation of meaning. As such science was the occupation of the few, and was not seldom suspect to the reigning theology, the word 'occult' gradually assumed the significance that it now possesses, of something magical or uncanny or supernormal. See MAGIC; SPIRITUALISM; THEOSOPHY.

OCCUPANCY (from Lat. *occupare*, to occupy, from *ob*, before, toward + *capere*, to take). A mode of acquiring title to property by taking possession of an unappropriated corporeal thing with the intention of becoming its owner. This mode of acquiring property came into the common law from the Roman civil law, which considered occupancy a mode of acquiring property belonging to no one, but subject to appropriation by the first comer. The finder of unclaimed lost goods has a title to them by occupancy. So has the captor of beasts of a wild nature so long as he keeps possession of them, but there can be no complete property in them till they are domesticated; and if they make their escape, with no intention of coming back, the ownership of the original owner ceases, and their next captor acquires a title in them by occupancy. But if they be once domesticated the title by occupation becomes indefeasible. The owner of property by accession acquires his title by occupancy, and so does the owner of goods obtained by confusion; it being held that where a person with fraudulent intent mixes his property indistinguishably with that of another, the latter is not compelled to distinguish his property from that of the former, but is entitled to the ownership of the whole. (See ACCESSION; CONFUSION.) Blackstone refers the title to literary property to the head of occupancy, and here also belongs the title to trade

marks, which is acquired by a person using such marks to indicate his ownership of certain articles, or of certain business.

The acquisition of title to land by occupancy is also recognized by the law. Land left bare by the gradual action of the sea, or deposited by a river, is acquired by occupancy. While this country was a colony of Great Britain, the ownership of land was held to be vested in the Crown, and individual titles to land were derived from the Crown. Since the separation of the colonies from Great Britain, titles are derived from the grant of the United States or the individual States. The right of the discoverer of uninhabited lands to assume jurisdiction over them is to be referred to the same general principle of title by occupancy. See **REAL PROPERTY**; **TITLE**; and consult the authorities there given.

OCCUPATION NEUROSIS. A nervous condition characterized by a partial paralysis due to excessive fatigue of a set of muscles which have been constantly used by a neurasthenic; muscle-tire. Among occupation neuroses are chorea scriptorum, or writer's cramp, telegrapher's cramp, etc. For discussion of these diseases, see **NEUROSIS**.

OCEAN (OF. *ocean*, Fr. *océan*, from Lat. *oceanus*, from Gk. *Ὠκεανός*, *ōkeanos*, ocean; connected with Skt. *āsāyana*, ocean, from *ā*, toward + *śi*, to lie). The great expanse of salt water occupying the larger depressions of the earth's surface. With the rivers and lakes it constitutes the water envelope or hydrosphere between the gaseous atmosphere and the solid lithosphere. Continental lands lie mostly in one hemisphere and may be regarded as large islands and peninsulas, while the ocean is a continuous water body communicating throughout its entire area. The relative proportion between the land and water surfaces has not been accurately determined, as there are still large unexplored areas in the Arctic and Antarctic regions; but, using the proportion for the known parts of the earth, it is estimated that the ocean covers 72 per cent. of the entire surface, or approximately 142,000,000 square miles. With an estimated average depth of two miles the ocean's volume is 284,000,000 cubic miles, or $\frac{1}{11}$ of the earth's volume.

DIVISIONS OF THE OCEAN. The continents which are massed as great triangles within the hemisphere having Southern England for its pole separate the included portion of the hydrosphere into three broad arms—the Atlantic Ocean, between America and Europe-Africa; the Pacific Ocean, between America and Asia-Australia; and the Indian Ocean, between Asia-Australia and Africa. Of these the Atlantic and Pacific communicate at their northern extremities through the Arctic Sea, which may be regarded as an extension of the Atlantic basin. The three oceans are further divided into northern and southern parts by the equator, but this division is conventional and not based upon physical grounds. Southward, beyond the limits of the continents, they open out into a vast expanse of shoreless water to which the name Southern Ocean may be conveniently given, the Antarctic Ocean being restricted to the area within the Antarctic Circle.

The borders of the ocean are often partially shut in by chains of islands, or they form deep re-

entrants into the continental lands, and such portions may have distinctive physical features. The mediterraneans, illustrated by the classic Mediterranean and the Gulf of Mexico, are inclosed seas, communicating with the ocean only by narrow passages; their depths range from 1000 to 2000 fathoms and over limited areas even exceed the latter figure. Marginal or fringing seas, partially inclosed by island groups, include waters of great depth like the Yellow Sea and the Japan Sea, and shallower bodies like the North Sea. Deep reentrants on continental borders with broad openings toward the main ocean are illustrated by the Bay of Biscay and the Gulf of Guinea.

THE OCEAN FLOOR. The ocean basins are vast depressions, whose surface rises and falls in gentle undulations. Throughout most of its extent the bottom lies at depths exceeding 2000 fathoms, and there are many depressions or 'deeps' lying below 3000 fathoms. The greatest depth yet reported is 5269 fathoms, or 31,614 feet, in the Pacific near the island of Guam. Soundings of 5155 fathoms and 5147 fathoms have been obtained in the same ocean, while the greatest known depth of the Atlantic is 4561 fathoms off the coast of Porto Rico. In the deeper or pelagic regions the floor consists of soft oozes, formed from the calcareous shells of minute animals living near the ocean surface, and from volcanic dust. The most widespread deposit is globigerina ooze, an accumulation of fossil casts of foraminifera. When the depths exceed 2500 fathoms, however, the calcareous shells are dissolved by the water and there remain only the siliceous remnants and volcanic materials which accumulate very slowly over the floor as red clay. On the borders of the continents, the ocean sometimes overlaps the land in a broad belt of shallow water whose floor is commonly called the continental shelf; here the depths do not often exceed 100 fathoms for considerable distances off shore, and the bottom consists of sand and clays that have been derived from the adjacent land surface by the erosive and transporting action of rivers. The littoral islands are mostly located on such platforms, which are prominent on the eastern coast of America, the western coast of Europe, and the southwestern coast of Asia. The deeper ocean is almost free from large islands, although by volcanic activity many small islands have been built up from great depths, as in the South Pacific. See **DEEP-SEA EXPLORATION**.

OCEAN WATER. By the continuous process of interchange between the surface waters of the land and the ocean, the latter has become a depository of vast quantities of mineral matter that have been dissolved out of rocks through the agency of springs and streams. The principal constituents of sea-water are the more soluble salts—the chlorides and sulphates of the alkalis and alkaline earths. The less easily soluble compounds, although playing a much more important rôle in the formation of rocks, are present in sea-water in only minute quantities. On the average 100 parts of water contain 3.5 parts of solid materials whose composition is about as follows: Sodium chloride, 77.76 per cent.; magnesium chloride, 10.88 per cent.; magnesium sulphate, 4.74 per cent.; calcium sulphate, 3.60 per cent.; potassium sulphate, 2.46 per cent.; magnesium

bromide, 0.22 per cent.; and calcium carbonate, 0.34 per cent. Small amounts of various other substances, including silicon, phosphorus, fluorine, idine, boron, aluminum, barium, strontium, manganese, iron, copper, nickel, lead, and even of the much rarer metals, gold and silver, are also known to be present. The slight portion of dissolved potassium carbonate is of great importance to marine life, being the source from which the corals and shell-building organisms derive their supplies of lime. The amount of salts dissolved in the water varies in different localities, though the range of such variation is small. In regions of heavy rainfall, such as the equatorial calms and off the mouths of large rivers, the salinity is lowered, as it is also in high latitudes, where evaporation takes place slowly. On the other hand, the waters of inclosed seas, like the Red Sea and the Mediterranean, and of trade-wind belts which receive little precipitation and are subject to rapid evaporation, are slightly above the average in salinity.

The freezing point for sea-water of average salinity is 28° F., which is also the point of maximum density, while fresh water attains its greatest density at 39° F. As the surface of the ocean is cooled its density increases steadily, so that the upper layers by sinking distribute the low temperature throughout the mass. Owing to the ocean currents which tend to equalize the temperatures and to chemical changes which lower the freezing point, the ocean, however, never freezes solid even in the coldest regions. Its surface waters show a smaller range of temperature than does the air over it and much smaller than the land in the same latitudes. This tendency to preserve an equable temperature has great influence upon the climate, especially as it tempers the winds which blow over its surface. In the polar regions when the surface waters are freezing, the minimum temperature is somewhat less than 30°, while the waters of the Red Sea attain a maximum of more than 90°, showing an extreme range between the warmest and the coldest parts of over 60° F. The greatest annual variation in any one locality is probably off the coast of Newfoundland, a region affected at different seasons by cold currents from the north and by warm currents from the tropics. With depth there is a rapid decrease in temperature (more rapid in regions near the equator) until a depth of about 400 fathoms is reached, when there is a very gradual lowering to the bottom, where the temperature remains practically uniform at from 32° to 35° and is independent of latitude. In inclosed seas shut off from communication with the deeper parts of the ocean by shallow barriers, the temperature corresponds to that of the ocean only in the upper portions above the level of the barrier; below this depth the temperature remains constant to the bottom and is determined by the coldest surface waters in winter or by the influx of waters at the deepest inlet. Thus the Mediterranean shows a uniform temperature of 55° below 190 fathoms (the depth of the Strait of Gibraltar) to the bottom in 2400 fathoms, while the Atlantic at the latter depth has a temperature of 35°. The Gulf of Mexico and the Caribbean Sea, with inlets 700 fathoms deep, have bottom temperatures of 39°, and the Red Sea below 200 fathoms, which is the extreme depth of the Strait of Bab-el Mandeb, has

a temperature of 70°. The abnormally high temperature of the Red Sea is due to the concentration of its surface waters by evaporation, causing them to sink and thus to maintain a constant vertical circulation.

The average density of sea-water is 1.026, there being a slight variation corresponding to the difference in salinity. Between the surface and great depths the density shows no material change, notwithstanding the enormous pressure exerted upon the lower layers. The color of pure ocean water, examined by transmitted white light, is pale blue, but becomes a deep blue, changing to sky-blue, when it reflects the light of the clear sky, and to gray or almost black under heavy storm clouds. Along the shore, however, it may assume a brown or yellowish color from suspended mud, while in shallow portions or near the coast it is green. Minute vegetable and animal organisms sometimes lend a whitish or reddish color to the surface.

MOVEMENTS OF OCEAN WATERS. The surface waters of the ocean are in constant motion under the influence of waves, tides, currents, and drifts. Waves are vertical oscillations caused by the winds, and have little movement of translation except in shallow water when the upper portions rush forward with great force. (See *WAVE*.) Great waves caused by earthquakes move across the oceans. Tides resemble waves in their motion, but they owe their origin to the attractive force of the sun and moon. (See *TIDES*.) The horizontal movements of the surface waters are known as drifts and currents. A drift is a general movement under the influence of the wind, but slower and more changeable in direction than a current. (See *OCEAN CURRENTS*.) Inclosed seas also have circulatory movements, usually arising from the fact that their waters differ in density from the ocean. Thus in the Baltic Sea the waters are so freshened by the contributions of the numerous rivers that they flow out into the North Sea as a surface current, while the heavier ocean water sets in as an undercurrent. The waters of the Red Sea and the Mediterranean, on the other hand, are saltier and denser than the ocean, and as their level is lowered by evaporation a surface current flows in from the ocean, and the heavier waters move out along the bottom.

ORIGIN OF THE OCEANS. The study of the geological history of the oceans is largely speculative. It is apparent, however, that the form of the oceanic basins has undergone changes corresponding to the variations in the continental outlines (see *CONTINENT*), and it is also probable that the submarine portion of the lithosphere is involved in similar oscillations to those affecting the areas above sea-level. According to Suess, the Atlantic Ocean has resulted from the enlargement northward and southward of the Mediterranean sea which during the Cenozoic era extended from Central America to Southeastern Europe. The Pacific Ocean in recent geological times has increased its area by encroachment upon Australia; and the island chains of Polynesia, which are largely of coral formation, may also mark an area of submergence. The Indian Ocean probably occupies a depression in a former land surface (Gondwanaland) that once extended from Central Africa to India.

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OCEAN (in Law). See HIGH SEAS.

OCEAN CURRENTS. The consensus of scientific opinion at the present day is to the effect that there are two independent circulations involved in the movement of the waters of the sea, the first, the horizontal, having its source in the energy supplied by the wind; the second, the vertical, sustained by differences of temperature. The phenomena ordinarily described as ocean currents, consisting of the horizontal motion of the layer of water immediately at and near the surface, belong wholly to the former. The vertical circulation applies to the much more comprehensive creeping movement of the warm equatorial waters of the ocean toward the poles, a movement which is confined to the upper strata, and of the cold polar water toward the equator, confined to the depths of the ocean.

SURFACE CURRENTS. As our knowledge of the movement of the surface waters of the ocean has increased, it has become more and more apparent that these so-called currents are very unstable both in velocity and direction. The source—indeed, the only source—from which information concerning them is to be derived is found in the log-books of ships at sea, in which the difference between the observed and the computed position at noon of each day is entered as the current experienced by the ship during the preceding twenty-four hours. Upon assembling a number of such observations, extending over any period of time and covering a limited portion of the surface, a one-degree or five-degree square, for instance, it will be seen that these exhibit the utmost lack of agreement, the only indication of consonance being, indeed, that currents in a certain given direction appear with somewhat great-

er frequency than those in any other. These irregularities stand in close relation to the agency by which the currents themselves are produced, viz. the winds, the movements of the surface water being in response to the impulse communicated to it by the moving air. To explain, however, the fact so frequently noted, that the recorded set of the waters is in direct opposition to that which the prevailing wind would lead us to expect, some little consideration is necessary.

If through any cause a thin layer of liquid is set in motion in its own plane, the layer immediately below it and with which it is in contact does not remain stationary, but likewise receives an impulse. This second layer exercises a like influence over the third, the third over the fourth, and so on, the velocity ultimately attained by each successive layer being proportional to its distance from the bottom layer, which is supposed to be at rest. In the case of sea-water the rapidity with which the surface velocity is propagated downward is exceedingly slight. It has been calculated, for instance, that a period of 239 years would elapse before a layer at a depth of fifty fathoms would attain a velocity equal to half that at the surface, the current at the latter being supposed to flow steadily all the time. In a similar manner, a sub-surface current, once established, exhibits a like reluctance to modify its direction. Immediately at the surface the set of the waters will thus be in close accordance with the direction of the wind; at some little distance below the surface, however, the variations will be by no means so closely followed, owing to the sluggishness with which the impulse is communicated downward; and at a moderate depth it may be assumed that the minor fluctuations are eliminated, and that the mean direction and strength of the current become apparent, being those due to the resultant of the winds.

The system of winds covering each of the great oceans, the North Atlantic, the South Atlantic, the North Pacific, the South Pacific, and the Indian, is practically identical, consisting as it does of a general westward motion of the air on the equatorial side of the tropical belts of high pressure, and of a like easterly motion on the polar side—the former constituting the trade winds, northeast in the Northern Hemisphere, southeast in the Southern; the latter, the prevailing westerly winds of higher latitudes. In each of the oceans there is a general movement of the surface waters in response to these winds; in the tropical latitudes of either hemisphere toward the west—the north equatorial and the south equatorial drift—in extra-tropical latitudes toward the east. The north equatorial and the south equatorial drift carry the waters of the Atlantic toward the shores of America, and the waters of the Pacific toward the shores of Asia and Australia, at a rate varying from 12 to 24 miles per day. The central line of either drift is well defined; along its marginal limits, however, north and south, compensation currents manifest themselves, due to the disturbed equilibrium, which, spreading out at first in sheaf-like form, ultimately reverse their direction and flow to the eastward, those on the equatorial side of the main drifts uniting to form the eastward flowing counter-equatorial current, most apparent during July, August, and September, when it is reinforced by the southwest monsoon winds





of the African and the Central American coasts; those on the polar side becoming merged in the general easterly drift of higher latitudes.

The immense mass of water carried by the equatorial drifts in the great oceans causes an accumulation upon the eastern continental shores and a consequent disturbance of equilibrium, which is in each case partially adjusted by a stream current, or current due to gravity alone, which in every case follows the shore line and is directed away from the equator. In the North Atlantic Ocean this current is known as the Gulf Stream; in the South Atlantic as the Brazilian Current; in the North Pacific as the Kuro Sivo; in the South Pacific as the Australian Current; in the Indian Ocean as the Mozambique Current. These are more constant in direction and force than the ordinary drift currents, but likewise are subject to stoppage or even to reversal. Upon attaining middle latitudes the combined effect of the deflective force of the earth's diurnal rotation and of the prevailing westerly winds serves to turn them off shore, and their identity is henceforth lost in the general easterly drift of the temperate zone. The easterly drift of extra-tropical latitudes exhibits none of the persistency of the westerly drift of the tropical, the currents reported being apparently quite as variable as the winds themselves.

In the case of the North Atlantic Ocean, the easterly drift divides to the northwestward of the Azores, one portion carrying to the southward along the Peninsular and African shores, and finally reuniting with the north equatorial current, the whole system forming a vast gentle eddy in close agreement with the prevailing winds; the remaining portion carries eastward and northward toward the shores of Great Britain, Scandinavia, and Iceland. Analogy would suggest a like division in the case of each of the other oceans, with the possible exception of the North Pacific. The information as to these oceans thus far accumulated is, however, not sufficient to establish the hypothesis.

VERTICAL CIRCULATION. The theory of a vertical oceanic circulation rests almost entirely upon the study of the thermal conditions existing in the Atlantic. The main facts in support of the theory may be summarized as follows: (1) The bottom water of every ocean in free communication with the pole has a temperature but little different from that in polar latitudes; (2) this is true even in the equatorial regions, where the entire mass of the ocean, in case an influx of cold water did not exist, would by virtue of the insolation attain in the course of time a temperature not lower than 75° F.; (3) the bottom temperatures in the case of those oceans to which the cold polar water has free access are somewhat lower than the bottom temperatures where this communication is restricted; (4) the thickness of this bottom stratum of cold water (600 fathoms) is too great to admit of the explanation that it is the return flow of the warm water carried poleward by the drift surface currents; (5) there is a continual ascent of glacial water under the line, shown by the moderation of the surface temperatures along the equator, and also by the fact that polar temperatures are here attained at less depth than in somewhat higher latitudes; (6) on the basis of this hypothesis the presence of the cold band along the eastern coast of North America can be explained

as the ascent toward the surface of the polar water, diverted from its original equatorial course by the effect of the earth's rotation, and forced up the Atlantic slope.

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OCEAN GROVE. A summer resort in Monmouth County, N. J., 29 miles (51 by rail) south of New York City; on the Pennsylvania and the Central of New Jersey railroads (Map: New Jersey, E 3). Situated directly on the Atlantic Ocean, south of Asbury Park, from which it is separated by Wesley Lake, Ocean Grove is on the splendid beach for which watering places of the New Jersey coast are noted. It is characterized, moreover, by rigid moral and religious observances due to its management by a church organization. The town, inclosed mostly by natural boundaries, is controlled by a camp meeting association of the Methodist Episcopal Church, founded in 1869, whose regulations enforce a strict respect for the Sabbath, and prohibit theatrical performances and the sale of intoxicants and tobacco. There are three large public buildings: the Auditorium, post office, and school. In the Auditorium, which seats 10,000 persons, religious meetings are frequently held. The Neptune Township high school was erected at a cost of \$72,000. The water-works and electric light plant are owned and operated by the association. The number of summer visitors is estimated at over 25,000, though the permanent population is only about 2775.

OCEANICA, ō'shē-ān'ī-kā, or OCEANIA. An ill-defined term used by some geographers to designate all the islands situated in the Pacific Ocean. Others include under that name also the East Indian Archipelago. The best usage seems to confine the name to the small islands lying between Australasia on the west and the American continent on the east. These islands fall ethnologically, and to a certain extent geographically, into three main divisions: Melanesia (q.v.), in the southwest, nearest to the Australian continent; Micronesia (q.v.), in the northwest; and Polynesia (q.v.), the largest in extent, including all the islands east of the former two. Consult: Gill, *The South Pacific and New Guinea Past and Present* (Sydney, 1892); Baessler, *Neue Südsee-Bilder* (Berlin, 1900); Schanz, *Australien und die Südsee an der Jahrhundertwende. Kolonialstudien* (Berlin, 1901).

OCEANIC DEPOSITS. The materials forming the floor of the ocean may be classed as terrigenous deposits which have been derived from the waste of the adjacent land and as pelagic or abysmal accumulations which are found in the open ocean beyond the influence of the land. The terrigenous deposits, comprising gravel, sand, and clay, are limited in their distribution to the continental shores, seldom occurring at a distance of more than 200 miles from the land. As

a rule the coarser materials occur in the shallow marginal waters, while the fine sands and muds are found in the deeper portions, where they have been carried by the drifts and currents. In the free ocean the character of the bottom shows little variation over great areas. When the depth is comparatively slight the deposits consist of the shells of minute organisms that live at or near the surface, of volcanic dust, bones and teeth of fish, and chemical precipitates. The most widespread and characteristic material in the tropical and temperate regions is globigerina ooze, an accumulation of the fossil calcareous casts of foraminifera. In the colder waters, such as those of the South Atlantic and the Southern Ocean, the principal organisms are of siliceous character, and their remains compose the diatom ooze that is so characteristic of those regions. When the floor lies at a depth of 2500 fathoms or more, only the most refractory materials can resist the solvent action of the water, and the deposits take the form of a red or brownish clay composed of the insoluble portions of shells, mixed with meteoric and volcanic dust. These deposits cover great areas in the middle portion of the Atlantic and the northern part of the Pacific Ocean. See OCEAN; DEEP-SEA EXPLORATION; OOZE, etc.

OCEANIC FAUNA. See DEEP-SEA EXPLORATION; OOZE; PELAGIC ANIMALS.

OCEANIDS (Gk. *Ὠκεανίδες*, *Okeanides*). The three thousand daughters of Oceanus and Tethys, nymphs of the sea.

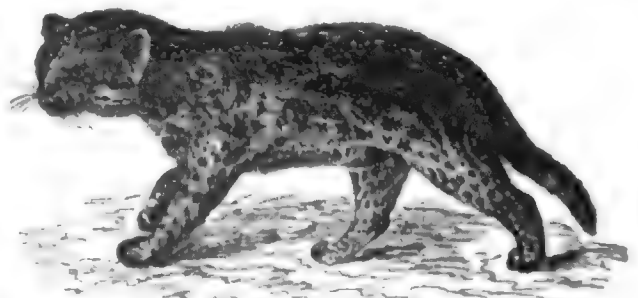
OCEAN LIFE. Ocean life embraces the great company of marine animals, which includes representatives of every phylum. It appears certain that life originated in the ocean (see PROTOZOA), and for a long period at the beginning of the living world remained there exclusively, developing a wide variety and considerable advancement in organization before living beings obtained any foothold on dry land. Great numbers of low forms remain in the oceans (see PELAGIC ANIMALS; OOZE) in substantially the primitive form and condition, owing to the comparative immutability of their environment. Some are very widely distributed, others kept within narrow bounds by inability to dwell except under accustomed conditions of temperature pressure (according to depth), or within definite food-yielding areas. Great numbers are fixed and stationary in adult life. Hence zones and areas of distribution, both lateral and vertical, exist. (See DISTRIBUTION OF ANIMALS.) That the land was populated primarily from the sea is conceded by all naturalists; it is also true that many creatures once terrestrial have been relegated to a wholly marine existence by force of circumstances acting through long past ages, a conspicuous example of which is the group Cetacea (q.v.). See DEEP-SEA EXPLORATION.

O'CEANOGRAPHY (from *Ὠκεανός*, *okeanos*, ocean + *-γραφία*, *-graphia*, description, from *γράφειν*, *graphein*, to write). The name given to the branch of geography which deals with the phenomena of the collected waters of the earth—the oceans and seas. The name has only recently come into general use, as a result of the great expansion in our knowledge concerning the ocean during the last thirty years. See DEEP-SEA EXPLORATION; OCEAN; GEOGRAPHY.

OCE'ANUS (Lat., from Gk. *Ὠκεανός*, *Okeanos*). In classical mythology, the eldest of the Titans, son of Uranos and Gæa, and father, by his sister Tethys, of the 3000 Oceanids, or ocean nymphs. In Homer Oceanus is the ever-flowing stream which surrounds the circular plain of the earth. From him come all streams and fountains, and even the sea. Hesiod first gives the accepted genealogy. He does not appear in any of the myths as a governing personality like Poseidon, but only as a spectator. In the *Prometheus Bound*, Æschylus introduces him as advising the captive to submit to Zeus. Representations in art are very rare before the Hellenistic period, when he is depicted, like the river gods, as a bearded man, often with horns, and is characterized by the steering oar, or the sea animals surrounding him.

OCEL/LUS LUCANUS (Lat., from Gk. *Ὀκελλος*, *Okellos*). A Lucanian Greek and member of the Pythagorean School; perhaps of the fifth century B.C. Stobæus, i. 13, has preserved a fragment of his work in Dorian dialect; and we hear of various philosophical writings which have now been lost. The extant work *On the Nature of the Universe* (*Περὶ τῆς τοῦ Παντός Φύσεως*) in the Ionic dialect, which bears Ocellus's name, is certainly a work of the later Peripatetic School, and cannot be earlier than the first century B.C.; it may be still later, as it shows remarkable coincidences with the similar work of Nicolaus Damascenus. In four chapters the book handles the themes of the eternity of the cosmos, the distinction between the permanent and the transitory, the divisions of the universe, the heavens, earth, and the human race, the nature of time, etc., all being based on the writings of Aristotle. The work closes with a consideration of the relation of the propagation of humankind to certain cosmic and moral questions. It is best edited in vol. i. of Mullach's *Fragmenta Philosophorum Græcorum* (Paris, 1860); English translation by Thomas Taylor (London, 1831).

OCELOT, *otse-lôt* (Mexican *ocelote*). A beautiful wild cat (*Felis pardalis*) of tropical America, from Louisiana to Brazil. It inhabits forests, is an agile tree-climber, and preys mainly on birds. It is from two feet six inches to three feet long, exclusive of the tail, which is from 11 to 15 inches, and nearly of uniform thickness. The ears are thin, short, and pointed. The muz-



THE OCELOT.

zle is rather elongated. The colors vary considerably, but the ground tint is rich reddish gray or tawny, blending finely with the dark brown on the margins of the elongated spots, of which there are chains on the sides; the head, neck, and legs being also variously spotted or

barred with dark brown or black. The ocelot is easily tamed, and is very playful, but excessively mischievous and bloodthirsty. This animal is often called a 'panther-cat.'

ÖCHELHÄUSER, ȕk'el-hoi'zȕr, WILHELM von (1820-1902). A German economist and Shakespearean scholar. He was born at Siegen; was educated for a commercial career, and held several posts in the Imperial Ministry of Commerce. Oechelhäuser was appointed to the colonial council in 1893, and in the same year received an honorary doctor's degree from Erlangen. In the field of economics he wrote: *Die Tarifreform von 1879* (1880); *Die Arbeiterfrage* (1886); and *Soziale Tagesfragen* (1889). He did much to further the study of Shakespeare in Germany as founder and president of the *Shakespearegesellschaft*, as editor of a stage edition of Shakespeare (1878; 14th ed. 1894), and as author of *Einführungen in Shakespeares Bühnendramen* (3d ed. 1895) and *Shakespeareana* (1894).

OCHER. See OCHRE.

OCHINO, ȕ-kȕ'nȕ, BERNARDINO (1487-1566). An Italian preacher and theologian, born at Siena. He entered the Franciscan Order, and then the still more ascetic Order of the Capuchins, of which he was made general in 1538 and reflected in 1541. Remarkd for his preaching by Charles V., he rose to be confessor to Pope Paul III. The Reformation had begun to make converts in Italy, and Ochino's friends, among whom were Juan de Valdȕs and Vittoria Colonna, were suspected of leanings toward heresy. His sermons delivered at Venice (1539) showed the influence of the Reformation, but no active step was taken until 1542, when he was commanded to appear before the Inquisition in Rome and answer certain charges. Fearing the consequences, Ochino made his way to Geneva. Here he published some more sermons of a Calvinistic nature, under the title *Prediche* (1542-44), translated into German (1545), French (1546 and 1561), and English (1548). But with Calvin himself he could not agree. He left Geneva and wandered into Germany, spending some time at Augsburg (1545-47) as pastor of the Italian Protestant church there. He then went to London (1547-53), where he became a prebendary of Canterbury, and was pensioned by Edward VI. His *Tragedy*, written in London, is supposed to have influenced Milton's *Paradise Lost*. In 1555 he went to Zurich, but his congregation was scandalized by his doctrines concerning polygamy and the Trinity, and he moved on to Cracow. Here, again, his sermons were criticised, and he died not long afterwards at Schladkau in Moravia. Consult Benrath, *B. Ochino von Siena* (Leipzig, 1875, and Brunswick, 1892; English translation, New York, 1877).

OCHOA, ȕ-chȕ'a, EUGENIO DE (1815-72). A Spanish poet, critic, and scholar, born at Lezo, in the Province of Guipȕzcoa. He studied in Madrid and then went to Paris (1829), where he worked at the Ecole des Arts et Mȕtiers. On his return to Madrid he contributed to the *Gaceta de Madrid*, directed by Alberto Lista. After the defeat of his political friends, he went back to Paris, and, with Baudry, edited the *Colección de los mejores autores espaȕoles*, and prepared some new editions of Spanish classics. His volume of poems, *Ecos del alma*, appeared in 1841, and in 1844 he made a *Catȕlogo razonado* of all Spanish

manuscripts in the Paris libraries. In the same year he returned to Madrid, and was appointed under-librarian of the National Library, and a member of the Spanish Academy and of the Academy of History. His works include: *Incertidumbre y amor* (1836); *Paris, Londres y Madrid* (1861); and *Miscelȕnea de literatura, viajes y novelas* (1867).

OCHRE, ȕ'kȕr (Fr. *ocre*, from Lat. *ocra*, from Gk. ȕxpȕ, yellow ochre, from ȕxpȕr, ȕchros, pale). A mineral paint consisting of clay colored with some oxide of iron, rarely of manganese, in various proportions, giving to the clay a lighter or deeper color. Ochres are common in many geological formations, more especially the younger ones, in which the materials are consolidated. For use the material is dried, ground, and mixed with oil. The commercial value of the material depends on its shade of color, the regularity of distribution of the iron coloration, and the quantity of oil which is required to mix it up. Calcination is sometimes resorted to in order to produce the desired tint; the operation adds much to the depth of color, by increasing the degree of oxidation of the contained iron. The common color of ochre is yellow. Umber and sienna differ from ochre in containing manganese in addition to the iron. Raw umber has a brown color, while burnt umber is of a red tinge. Raw sienna is brownish yellow, but when burned it yields a rich russet brown pigment. The finer grades of ochres are used by painters, the coarser by carpenters for marking out their work, etc. Common ochre is found in many parts of the United States. The most important States producing it are Alabama, Arkansas, California, Georgia, Iowa, Maryland, Massachusetts, Missouri, New York, Pennsylvania, Texas, Vermont, and Virginia. Umber and sienna are produced by New York, Pennsylvania, and Missouri, but much is also imported. France leads the world in the production of ochre, with Germany second, and the United States third. Consult: Volumes of *Mineral Resources*, issued by United States Geological Survey (Washington, annual); Hill, "Report on Metallic Paint Ores Along the Lehigh River," *Annual Report of the Pennsylvania Geological Survey* (Harrisburg, 1886).

OCHRO. A vegetable. See HIBISCUS.

OCHTERLONY, ȕk-tȕr-lȕ'nȕ, Sir DAVID (1758-1825). A British general in India. He was born in Boston, Mass., of Scotch ancestry, and in 1777 went to India as cadet. In 1814, after the rising of the Nepalese, Ochterlony was put in command of the forces west of the Gurkha frontier, and was successful in storming the forts in the hills, when the three other divisions were defeated or inactive. He closed the campaign at Malaun, where he received the surrender of Amar Singh. Again, in the following year, when the Gurkha Government failed to ratify the peace, Ochterlony with great energy and brilliancy reduced all opposition.

OCHTMAN, ȕk'mȕn, LEONARD (1854-). An American landscape painter, born at Zonne-maire, Zeeland, Holland. His family removed to America in 1866 and settled at Albany, N. Y. For a time he worked at engraving, but afterwards studied painting at the Art Students' League in New York City. His subjects are usually country scenes on or about the Mianus

River. He chose tranquil, quiet stretches of water, shaded by trees, and bathed in moonlight, as in his "Night on the Mianus River," which won a medal at the World's Fair in 1893; "Autumn Moonlight;" "Moonlight Night in Spring." His "Winter Morning," "The Enchanted Vale," "Among the Hills," "View from the Great Hill," "Early Morning," and "A Morning Symphony" are day scenes of equal charm and truth. His work is all distinguished by broad painting, simplicity of expression, serenity of effect, and a certain largeness of treatment that is very characteristic.

OCK'EL, EDUARD (1834-). A German landscape and animal painter, born at Schwante, Brandenburg. As a pupil of Steffek in Berlin, he painted portraits and animals, then studied under Couture in Paris (1858), and from nature in Normandy and in the forest of Fontainebleau, adopting the realistic conception and poetic color treatment of the school of Barbizon, where he lived for several years. The National Gallery in Berlin contains "Cows at the Fairy Pond, Fontainebleau," "Autumn Evening in the Mark," and two others. His other principal works include: "Ploughing Oxen" (1866); "Stags Before the Fight" (1876); "Steinitz Lake in Autumn" (1884); and "The Four Seasons" (1892).

OCKLEY, ʔk'li, SIMON (1678-1720). An English Orientalist. He was born at Exeter, entered Queen's College, Cambridge, in 1693, and in 1705 became vicar of Swavesey. He devoted himself with great assiduity to the study of the Oriental languages. From Arabic manuscripts in the Bodleian Library, Oxford, he prepared *The History of the Saracens* (1708-18), a work containing much serviceable information. In 1711 he was made professor of Arabic in the University of Cambridge. His further works, all noted for their accuracy and erudition, include: *Introductio ad Linguas Orientales* (1706); a translation of Leon Modena's *Italian History of the Present Jews Throughout the World* (1707); and *The Improvement of Human Reason, Exhibited in the Life of Hai ebn Yokdhan* (1708).

OCMUL'GEE. A river of Georgia, formed by several headstreams, near Atlanta, in the northern part of the State (Map: Georgia, D 4). It flows south-southwest, finally turning eastward, and joins the Oconee in Montgomery County to form the Altamaha. It is about 275 miles long, and navigable for small steamers to Macon about half way to its source. Its upper course is broken by many rapids, and furnishes water power, while its lower course is through pine barrens.

O'CON'NELL, DANIEL (1775-1847). An Irish politician. He was the eldest son of an ancient but unimportant family of County Kerry, Ireland, and was born on August 6, 1775. O'Connell received his first education from a hedge schoolmaster, but afterwards, under the patronage of his uncle, Maurice O'Connell, attended Father Herrington's school at Cove, and the Catholic colleges of Saint-Omer and Douai, France. His scholarship had just begun to win for him promises of a brilliant future when he was driven home prematurely by the outbreak of the French Revolution, and in 1794 he entered as a law-student at Lincoln's Inn. In 1798 he was called to the Irish bar. By degrees, the Roman Catholic party having begun to rally

from the prostration into which it had been thrown by the rebellion of 1798, O'Connell was drawn into public life, and his unquestioned ability soon made him a leader. He was an active member of all the successive associations which, under the various names of 'Catholic Board,' 'Catholic Committee,' 'Catholic Association,' etc., were organized for the purpose of procuring the repeal of the civil disabilities of the Catholic body. Of the Catholic Association he was himself the originator; and by means of this association he created so formidable an agitation throughout Ireland that it gradually became apparent that the desired measures of relief could no longer be safely withheld. The crisis was precipitated by the bold expedient adopted by O'Connell, of causing himself to be elected member of Parliament for Clare in 1828, notwithstanding his incapacity to serve in Parliament, in consequence of his being obliged to refuse the prescribed oaths of abjuration and supremacy, which then formed the ground of the exclusion of Roman Catholics from the Legislature. This step, although it failed to procure for O'Connell admission to Parliament at the time, led to discussions within the House, and to agitations outside so formidable that in the beginning of the year 1829 the Duke of Wellington and Sir Robert Peel found it expedient to give way; and deserting their party in the face of strenuous Tory and Royal resistance, they introduced and carried through, in the spring of that year, the well-known measure of Catholic emancipation. O'Connell was at once reflected and took his seat for Clare, and from that date until his death continued to sit in Parliament. During all these years he received, by means of an organized annual subsidy, a large yearly income from the voluntary contributions of the people, by whom he was idolized as their 'liberator,' and who joined with him in all the successive agitations against the Act of Union, against the Protestant Church establishment, and in favor of reform, in which he engaged. In the progress of more than one of these political agitations his associations were opposed by the Government. The agitation for the repeal of the Union, begun in 1841, was carried on by 'monster meetings' throughout Ireland, at which O'Connell himself was the chief speaker. This agitation assumed proportions so formidable that O'Connell, in common with several others, was indicted for a seditious conspiracy in 1843, and was convicted and sentenced to a year's imprisonment, with a fine of £2000. This judgment was reversed by the House of Lords; and O'Connell, on his discharge, resumed his career. But his health had suffered from confinement, and still more from dissensions and opposition in the councils of his party; and since, on the return of the Whigs to power in 1846, he consented to support their Government, the malcontents of the repeal association openly separated from him, and a bitter feud between 'young' and 'old' Ireland ensued. In this quarrel O'Connell steadfastly maintained his favorite precept of 'moral force,' and was supported by the great body of the Catholic bishops and clergy; but his health gave way in the struggle. He was ordered to try a milder climate, and on his journey to Rome in the spring of 1847 he was suddenly seized with paralysis, and died at Genoa on May 15th of that year. As a public speaker, and especially as a master of popular eloquence, he

was almost unsurpassed in his day. His ability as a lawyer was of a high order. He published a single volume, *A Memoir of Ireland, Native and Saxon*, and a few pamphlets, the most important of which, as illustrating his personal history and character, is *A Letter to the Earl of Shrewsbury*. Consult: O'Connell (son), *Life and Times of Daniel O'Connell* (Dublin, 1846); id., *Recollections and Experiences During a Parliamentary Career from 1833 to 1848* (London, 1849); Fitzpatrick, *Correspondence of Daniel O'Connell* (ib. 1888); Darint, *Recollections of Daniel O'Connell* (ib. 1848); Fagan, *Life of Daniel O'Connell* (Cork, 1847).

O'CON'NOR, ARTHUR (1763-1852). An Irish revolutionist, born at Mitchelstown, County Cork. He graduated at Trinity College, Dublin, in 1782, and in 1788 was called to the bar. In 1796 he joined the 'United Irishmen,' and was arrested and imprisoned for six months. On regaining his liberty he became editor of the *Press*, the organ of his society. During a visit to England he was arrested and tried for high treason, and though acquitted was kept in prison on other charges until June, 1803. He then went to France, where he entered the military service under Napoleon. He published *A Speech on the Catholic Question* (1795); *State of Ireland* (1798); *Actual State of Great Britain* (1804); and *Monopoly, the Cause of All Evil* (1848).

O'CONNOR, FEARGUS EDWARD (1794-1855). An Irish politician and Chartist leader, born in County Meath. In 1832 he sat in Parliament for Cork, and when reelected in 1835 was unseated through the lack of property qualifications. He thereupon engaged in the Radical agitation in England, spoke frequently, and founded at Leeds a weekly organ, the *Northern Star*. In 1838 he was foremost in the consolidation of the Chartists, and to that party his somewhat incoherent eloquence lent valuable support. In 1846 he organized the National Land Company, for the purpose of buying up agricultural estates and dividing them into small holdings. Several estates were bought, but the scheme came to nothing. The next year he reentered Parliament for Nottingham, and in 1848 presented to the Lower House his monster petition containing nearly two million names. The movement disappeared soon afterwards and O'Connor became insane in 1852.

O'CONNOR, RODERIC (1116-98). King of Ireland. He was the son of Turlough O'Connor, King of Connaught, whom he succeeded in 1156. After a protracted contest with the O'Briens and others, he took the title of King of Ireland in 1166, though he had no hereditary claim. He drove Dermot, King of Leinster, out of his kingdom, but afterwards reseated him on the throne. He worsted Strongbow and the English in a number of battles, but in 1175 entered into a convention with them, by which Henry II. was recognized as overlord, while O'Connor was to retain the crown of Connaught, and continue to be the head of the Irish chiefs. Roderic kept the crown till 1186, when he was deposed by a revolt of one of his sons. In 1189 he was again King for a short time, after which he entered a monastery, where he passed the rest of his life.

O'CONNOR, THOMAS POWER (1848-). An Irish journalist and politician. He was born at Athlone, in the County of Roscommon, Ireland,

and was educated at the College of the Immaculate Conception, Athlone, and at Queen's College, Galway. He commenced life as a journalist, and after being connected for three years with the Dublin press, was employed on several London journals. In 1880 he was elected member of Parliament for Galway, and soon became one of the most active and prominent members of the party led by Parnell. In 1881 he made a tour through the United States, attended the Irish-American convention and lectured on the Irish cause to large gatherings in nearly all the important cities, raising large sums of money. In 1883 he was elected president of the Irish National League of Great Britain. Since 1885 he has been four times elected member of Parliament for a division of Liverpool. From 1888 to 1890 he edited the *Star*, of which he was the founder. He also founded and edited the *Sunday Sun*, the *Sun*, and *M. A. P.*, a society journal. Besides numerous tales, essays, and magazine articles his published works include: *Lord Beaconsfield: A Biography* (6th ed. 1887); *The Parnell Movement* (1887); *Gladstone's House of Commons* (1885); and *Napoleon* (1896).

OCON'OMOWOC. A city in Waukesha County, Wis., 31 miles west by north of Milwaukee; on the Chicago, Milwaukee and Saint Paul Railroad (Map: Wisconsin, E 5). It is a noted summer resort, picturesquely situated on lakes La Belle and Fowler, and in the heart of a beautiful lake region, popular for its fishing. It has a sanatorium and a public library. Farming, dairying, and stock-raising are the leading industries of the vicinity. The water-works and electric light plant are owned and operated by the municipality. Population, in 1890, 2729; in 1900, 2880.

O'CON'OR, CHARLES (1804-84). An eminent American lawyer. He was born in New York City, and was admitted to the bar in 1824. He devoted himself with great energy and enthusiasm to his profession, and in a very few years was recognized as one of the ablest and most brilliant members of the New York bar. He was an active supporter of the Irish nationalist movement, and for many years after 1848 was a member of the directory of the Friends of Ireland. He was a strong believer in the doctrine of States' rights, and throughout the Civil War was warmly in sympathy with the South. After the close of the war he voluntarily offered his services as counsel for Jefferson Davis when indicted for treason, and afterwards with Horace Greeley went on his bail bond. He was associated with William M. Evarts and Wheeler H. Peckham in the prosecution of the 'Tweed Ring' conspirators, and the organization of the suits against them was largely his work. In 1872 he was nominated, in the face of his absolute refusal, for President of the United States, by a convention held at Louisville, Ky., composed of that portion of the Democratic Party which declined to indorse the Liberal Republican nomination of Horace Greeley. John Quincy Adams, the nominee for Vice-President, also declined, but the ticket remained in the field and 29,489 votes were cast for it.

OCON'OSTO'TA (properly, *Agana-stata*, Ground-hog sausage). A Cherokee chief and leader of his tribe in their war with the English (1759-61). Before the actual outbreak of hos-

tilities a delegation of 32 chiefs, headed by Oconostota, had come down from the mountains to arrange a peaceable settlement of the questions at issue, but by order of Governor Lytleton of South Carolina the whole party was seized and thrown into prison at Fort Prince George, where they were kept under close confinement until it was thought that the Indians had been terrorized into submission, when Oconostota and two others were set at liberty, the rest being still held as hostages. Oconostota collected his warriors and besieged the post, completely cutting off communication for about two months. In February, 1760, on pretense of a desire for a conference, he decoyed the commander outside the stockade, where, upon a concerted signal, the officer was shot down from ambush. All the hostages in the fort were immediately massacred by the garrison in retaliation. War now broke out along the whole Carolina border, Oconostota being the leading spirit among the Cherokee. In June, 1760, a force of over 1600 troops under Colonel Montgomery invaded the Cherokee country and destroyed one town after another almost without resistance until Nikwasi was reached, near the present Franklin, N. C., where Montgomery was defeated and forced to retire upon Fort Prince George with heavy loss. Six weeks later the garrison of Fort Loudon, near the present Loudon, Tenn., was compelled to surrender to Oconostota in person, on promise of permission to withdraw in safety on surrender of their war stores. Finding, however, that the compact had been broken by the concealment of a large quantity of arms and ammunition, the Indians attacked the departing troops and killed 30, including the officer in charge, holding the rest as prisoners until ransomed later. In June, 1761, Colonel Grant with 2600 men again invaded the Cherokee country, and by the destruction of their fields and settlements so nearly reduced the Indians to starvation that they were finally compelled to sue for peace. Oconostota retained his authority in his nation and in 1768 headed a delegation which, at Johnson Hall in New York, concluded a lasting peace with their old-time enemies, the Iroquois. He took no active part in the Revolutionary struggle, being already worn out by infirmities, and in 1782 formally resigned his chiefship in favor of his son. The name still exists in the tribe.

OCONTO. A city and the county-seat of Oconto County, Wis., 157 miles north of Milwaukee; at the mouth of the Oconto River on Green Bay, and on the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul railroads (Map: Wisconsin, F 4). It has large lumber interests and an extensive trade in fish; the industrial establishments, besides the lumber manufactories, include flouring mills, a brewery, canning factories, etc. A productive farming, stock-raising, and dairying region is adjacent to the city. There are fine court-house and high-school buildings and a public library (\$15,000). Settled in 1850, Oconto was first incorporated in 1882. It is governed, under a revised charter of 1891, by a mayor, elected every two years, and a council. Population, in 1890, 5219; in 1900, 5646.

OCTAGON (Gk. *ὀκτάγωνος*, *oktagōnos*, eight-cornered, from *ὀκτώ*, *oktō*, eight + *γωνία*, *gōnia*, angle). A polygon (q.v.) of eight sides. If the

sides and angles are respectively equal, the figure is called a *regular octagon*. In this case each interior angle is 135° and each exterior angle is 45° . If the alternate vertices of a regular octagon be joined, a square is formed; and since the angle between a side of the octagon and a side of the square is one-fourth of a right angle, the regular octagon may easily be constructed from a square as a basis.

OCTAHEDRITE, or **ANATASE**. A mineral composed of titanium oxide, identical in composition with rutile and brookite, but differing in crystal habit. It crystallizes in the tetragonal system, usually in pyramidal form, has a metallic adamantine lustre, brown or black color, and a hardness of 5.5 on the mineral scale. It is found at Smithfield, R. I., in Burke County, N. C., and at various localities in Europe.

OCTAHEDRON (Gk. *ὀκταῖδρον*, *oktaedron*, neu. sg. of *ὀκταῖδρος*, *oktaedros*, having eight bases, from *ὀκτώ*, *oktō*, eight + *ἕδρα*, *hedra*, base). A solid bounded by eight faces. If the faces are equilateral triangles, four meeting at each vertex, the figure is called a *regular octahedron*. (See **POLYHEDRON**.) This solid has four axes of symmetry, passing through opposite vertices, and is one of the five Platonic bodies, or regular polyhedra. The octahedron is a common form in crystallography, appearing as regular, square, and rhombic. Native sulphur is an example of the rhombic system.

OCTAVE (Fr. *octave*, from ML. *octava*, octave, from Lat. *octavus*, eighth, from *octo*, Gk. *ὀκτώ*, *oktō*, Skt. *aṣṭan*, Lith. *aszūni*, OIr. *ocht*, Goth. *ahtáu*, AS. *eachta*, OHG. *ahto*, Ger. *acht*, Eng. *eight*). The interval between any musical note and its most perfect concord, which is double its pitch, and occupies the position of the eighth note from it on the diatonic scale. The name octave is often given to the eighth note itself as well as to the interval. There is between a note and its octave a far closer relation than between any other two notes; they go together almost as one musical sound. In combination, they are hardly distinguishable from one another, and their harmonies agree invariably, a coincidence which occurs in the case of no other interval. For the purpose of absolute pitch every tone is regarded as belonging to a particular series of octaves. The octave from Middle C (q.v.) to the C below is called the *small octave*, the next lower the *great octave*, because in numerical notation (q.v.) these tones are indicated respectively by the small and capital letters of the alphabet. The octave C-C is called the *contra octave*. The octave from middle C upward is the *one-lined octave*, the next the *two-lined octave*, etc.

OCTAVIA. The sister of the Roman Emperor Augustus, and wife of Marcus Antonius. She was distinguished for her beauty, her noble disposition, and her womanly virtues. Her first husband was C. Marcellus, to whom she was married in B.C. 50. He died in B.C. 41, shortly after which she consented to marry Antonius, to make secure the reconciliation between him and her brother. The event was hailed with joy by all classes. In a few years Antonius forsook her for Cleopatra. When the Parthian War broke out, Octavia wished to accompany her husband, and actually went as far as Coreyra, whence Antonius sent her home, that she might not interrupt his

guilty intercourse with the Egyptian Queen. In B.C. 35 Octavia made an effort to rescue him from a degradation that left him indifferent even to the honor of the Roman arms, and sailed from Italy with reinforcements; but a message reached her at Athens ordering her to return home. She proudly obeyed, but, with a magnanimity that reminds us of the Roman character in earlier and better days, she forwarded the supports to her husband. Her brother was indignant at the treatment she had received, and would have had her leave her husband's house, and come and live with him; but she refused. When, in B.C. 31, war, long inevitable, broke out between her brother and Antonius, the latter crowned his insults by sending Octavia a notice of divorce. After her husband's death, she brought up with maternal care not only her own children, but also those of Cleopatra. Her death took place in B.C. 11. Her son Marcellus (q.v.) was adopted by Augustus as his successor, but died in B.C. 23.

OCTAVIA (c.42-62). A Roman empress, wife of Nero. She was the daughter of Claudius and Messalina and married Nero when he was sixteen and she eleven. He deserted her for Acte, and then for Poppæa, at whose request she was divorced and sent to Campania. She was soon recalled because of the outburst of anger on the part of the Roman populace; but, through Poppæa's jealousy, a charge of adultery was brought against her and she was sent to the island of Pandataria and there killed when she was only twenty. The tragedy *Octavia*, of which she is the heroine, usually attributed to Seneca, is probably by some other author, perhaps Curatius Maternus.

OCTAVIAN. See AUGUSTUS.

OCTO-BASS. A double bass invented by Vuillaume in 1851. It is of enormous dimensions, four meters high, and has three strings (C₁, G₁, C), which are stopped by mechanism. The tone is powerful and mellow, but, owing to its enormous size, it is not used in orchestras.

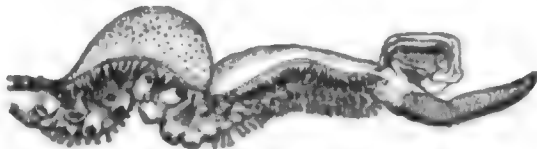
OCTOBER. See CALENDAR; MONTH.

OCTOCORALLA (Neo-Lat., from Lat. *octo*, eight + *corallum*, coral). A subclass of cœlenterates. The families Alcyonidæ, Pennatulidæ, and Gorgonidæ are represented by scattered fossil remains throughout the Mesozoic and Cenozoic formations. Another family, the Helioporidæ, appears in the Tertiary and Mesozoic, and seems to be represented in the Paleozoic by the Heliolitidæ, an important group of reef-building corals of somewhat uncertain affinity that exhibits analogies to the Favositidæ and Chætetidæ. See CORAL; and HELIOLITES.

OCTOPODA (Neo-Lat. nom. pl., from Gk. *ὀκτώπους*, *oktōpous*, having eight feet, from *ὀκτώ*, *oktō*, eight + *πούς*, *pous*, foot). An order of dibranchiate cephalopods having eight arms, the suckers on which are sessile and devoid of horny rims. It includes the argonaut and the various species of octopus (qq.v.).

OCTOPUS (Neo-Lat., from Gk. *ὀκτώπους*, *oktōpous*, having eight feet). The type genus of the Octopoda (q.v.), differing from the squid and cuttlefish in having eight instead of ten arms, all of the same size, and a pear-shaped or sack-like body. The arms are connected at the base by a web. Two cartilaginous stylets imbedded in

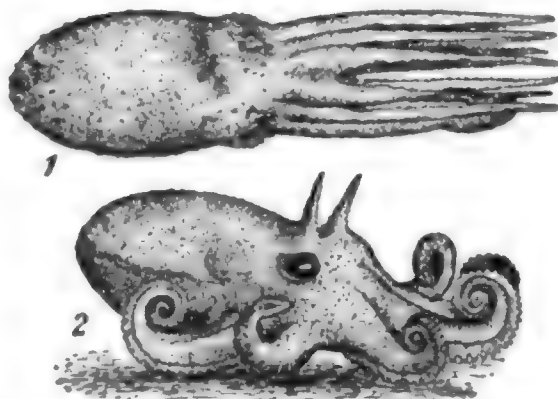
the dorsal mantle are said by Owen to represent the shell. The body of the 'poulpe,' 'devilfish,' or octopus, is baggy, short, soft, with no fins. It lives in interstices of coral reefs, among rocks, and the like. The right arm of the third pair is hectocotylized in the male, i.e. the arm is modified in various ways, but is never detached and



A HECTOCOTYLIZED ARM.

left within the female, as in the argonauts. The best known species is *Octopus vulgaris*, of the Mediterranean and West Indies, which may reach a length of nine feet and weigh upward of 60 pounds. A tropical species (*Octopus granulatus*) is shown on the Colored Plate of OCTAPODS AND DECAPODS, under DECAPODA.

Octopus Bairdii inhabits the Gulf of Maine at a depth of from 50 to 100 fathoms. On the



OCTOPUS BAIRDII.

1. Attitude in swimming (toward the left). 2. Attitude when at rest.

southern coast of the Eastern United States from Cape Hatteras down is an octopus whose arms expand nearly four feet. The Pacific coast species is *Octopus punctatus*, which is known to expand 14 feet from tip to tip of the outstretched arms. It lives just below low-water mark and is caught and impaled by means of a pointed stick by Chinese and Italians, who use it as an article of food. At times pearl-divers and shell-collectors on the coral reefs may be attacked and hurt by octopods, as they are armed with formidable teeth; the difficulty of tearing away their arms and the fright caused by their hideous appearance are said to have resulted in death. The ordinary food of this animal is shellfish and other invertebrates. Consult: *The Standard Natural History* (Boston, 1885); Packard, *Zoology* (New York, 1897); Cooke, *Cambridge Natural History*, vol. iii. (London, 1899).

OCTOSTYLE (Lat. *octastylus*, from Gk. *ὀκτάστυλος*, *oktastylōs*, having eight columns, from *ὀκτώ*, *oktō*, eight + *στυλος*, *stylōs*, column). The name given in classic architecture to a temple or other building with eight columns across the front.

OCTROI, *ok'trwa'* (Fr., grant). The term applied to the toll or tax in kind levied from a very early period in France, and other countries

of Europe, on articles of food which were brought past the barrier or entrance of a city or town. The octroi came eventually to be levied in money, and was abolished in France at the Revolution. In 1799, however, it was reëstablished, under the pretext that it was required for purposes of charity, and since then it has been successively changed and modified. The proceeds of the octroi duty which is at present levied at the gates of the French towns are divided so that one-tenth goes to the national treasury, and the rest to local expenses. These duties are allowed on drinks, eatables, fuel, fodder, and building materials. A new octroi must be established by statute, and every increase in the rates requires the approval of the higher authorities. The octroi duties are not popular, since they increase considerably the cost of living in towns and cities; but it would be difficult to abolish them, since the towns depend upon them very largely for revenue. Outside of France they are found also in Italy, and in a few towns of Bavaria and Austria.

O'CURRY, EUGENE (1796-1862). One of the most distinguished of Gaelic scholars. He was born at Dunaba in 1796, and worked as a boy on his father's farm. From 1834 to 1837 he was employed in the topographical and historical section of the Ordnance Survey. Then for many years he was chiefly occupied in copying important Irish manuscripts for the Royal Irish Academy, Trinity College, Dublin, the British Museum, and other institutions. In this way O'Curry acquired a knowledge of the contents of Irish manuscripts that has been seldom equaled. He published nothing, however, till he was well past middle life. In 1851 he contributed to a work by Dr. Reeves, a translation of some Irish poems in the *Codex Maelbrihte*. In 1853 he became a member of the council of the newly organized Celtic Society, which two years later published an edition by him of the *Battle of Magh Leana and Tochmare Momera*. In 1855-56 he gave his first course of lectures as professor of Irish history and archæology in the Catholic University at Dublin. The lectures were published in 1860 under the title, *The Manuscript Materials of Irish History*. From 1857 till 1862, the year of his death, he continued to lecture at the university, and the material of his courses was afterwards gathered together in two volumes, *On the Manners and Customs of the Ancient Irish People*, edited by W. K. Sullivan and published in 1873.

O'CYDROME. A form of rail. See **WEKA**.

ODAL, or **UDAL** (from Icel. *adal*, AS. *æpel*, OHG. *uodil*, hereditary possession; connected with Icel. *adal*, OHG. *adal*, Ger. *Adel*, race, nobility). The name of a system of land tenure, in which the land was held absolutely, and not from a superior, as was the case where feudalism prevailed. The odal tenure prevails to this day to a large extent in the Orkney and Shetland islands, the right to land being complete, without writing, by undisturbed possession proved by witnesses before an inquest. Consult Stubbs, *Constitutional History of England*, vol. i. (6th ed., Oxford, 1897).

ODD FELLOWS, INDEPENDENT ORDER OF. A fraternal benevolent order, probably founded in England early in the eighteenth century, but in what precise year the records do not show.

The ancient guilds had degenerated into social and convivial clubs, and were replaced by workmen's beneficial societies, out of which were later evolved the Odd Fellows, or Friendly Societies. The earliest record of any of these societies available is that of Aristarchus Lodge No. 9 of the Order of Odd Fellows, which met in 1748 at the Globe Tavern, London. There were many orders of Odd Fellows in England at the beginning of the nineteenth century, of which the Imperial Odd Fellows of Nottingham; the Ancient Noble Odd Fellows, Bolton; the Grand United Odd Fellows, Sheffield; Economical Odd Fellows, Leeds; National Odd Fellows, Salford; and the London United Odd Fellows were the principal ones. Between these there were no official or friendly relations existing. The enactment of severe laws by the English Parliament against secret associations in the last years of the eighteenth century tended to retard the progress of friendly societies, and the Odd Fellows accordingly suspended public operations.

In 1803 the London Union Odd Fellows Society was organized by some of the city lodges under the title of the Grand Lodge of England, and it succeeded in establishing its authority over the greater part of the Odd Fellow societies in the United Kingdom. A member of one of the city lodges had meantime, in 1809, removed to Manchester, and, having received a dispensation to form a lodge in the latter city, the first Victory Lodge was created, and it immediately declared its independence of the Grand Lodge of England. This was the beginning of the movement for independence. In 1810 a union was effected at Salford between a social club and the Prince Regent Lodge of Odd Fellows, and out of it arose the Lord Abercrombie Lodge, based on the principles of mutual relief to the members, an improved financial system, and other new features. Several of the existing lodges, including Victory Lodge of Manchester, gave in their adherence to the new movement, and in 1811 the Lord Abercrombie Lodge assumed supremacy over the lodges working on the new system, proclaiming itself as the 'Lord Abercrombie Grand Lodge of Independent Odd Fellows,' a step which led to considerable opposition among the older lodges of the order. In 1813 a convention was called of the lodges in and around Manchester in sympathy with the new movement. An organization of the lodges was effected, and the title 'The Manchester Unity of the Independent Order of Odd Fellows' adopted. In 1814 a formal organization was effected, a grand committee or district grand lodge was provided, a form of government adopted, and a grand master and a deputy grand master appointed. The formation of provincial districts with a provincial district grand master for each was the most important act of the session of the grand convention of 1815. The adoption of a funeral fund system was part of the work of the annual session of 1816. The question of adopting degrees into the order was also discussed, the degrees of White, Royal Blue, and Scarlet being established. The Patriarchal, the Covenant, and Remembrance degrees were added later. In 1819 the question of a site for the central government of the order was settled by the establishment of a movable committee to hold annual sessions at points agreed upon at a preceding session. In 1822 the first grand movable committee con-

vened; it was composed of past and present officers of districts and lodges, and had the power to adopt or reject laws proposed by districts. In the same year the Loyal Saint Olive's Lodge, in affiliation with the Manchester Unity, was opened in London. In Liverpool considerable discord marked the early operations of the various Odd Fellow lodges until about 1820, when they came under the authority of the Manchester Unity. The order was introduced into Wales in 1820, and into Scotland in 1838. The formation of lodges in Ireland, Germany, and Australia was effected in 1840, and the following year in the Isle of Man.

The first lodge of the Independent Order of Odd Fellows in the United States was formed in 1819. Thomas Wildey and another, both English Odd Fellows, arrived in Baltimore in 1818, and in the spring of the following year associated with three others to form Washington Lodge No. 1 in Baltimore. Wildey was elected Noble Grand. Franklin Lodge No. 2 was created in the same year, also in Baltimore. On February 1, 1820, Wildey and his companions received a charter from one of the English lodges, the Duke of Preston Lodge, constituting it the 'Washington Lodge, the Grand Lodge of Maryland and of the United States of America of the Independent Order of Odd Fellowship.' It thus bore the character of both a subordinate and a grand lodge. The dual character of this charter did not commend itself to the order, and in 1821 it was surrendered, and Washington Lodge became merely a local lodge. Steps were taken to model the government of the order in America after the political system of the United States. The management was to be vested in the representatives of each State Grand Lodge, who together with the past grand masters of the Maryland Grand Lodge were to constitute the governing body of the order. Five of these latter were authorized by charter, dated February 22, 1825, to form a grand lodge for Maryland to take the place vacated by Washington Lodge in 1821. The titles of the chief officers were changed from grand master and deputy grand master to grand sire and deputy grand sire in 1829. A German lodge, William Tell Lodge, chartered in 1827, was the first lodge formed for work in the German language, and became the mother German lodge. The order was incorporated by the Maryland Legislature in 1833. In 1843 all connections with the Manchester Unity were severed, and it was resolved "that to the Grand Lodge of the United States belonged the exclusive authority to erect lodges and encampments of Odd Fellows upon any part or section of the globe."

Meanwhile Odd Fellowship was being established in New York without any knowledge of the previous establishment of the order in America. Solomon Chambers and his two sons, members of the Loyal Westminster Independent Lodge of Odd Fellows, England, came to New York in 1806, and, meeting two other Odd Fellows, organized Shakespeare Lodge of Odd Fellows in New York. This lodge lasted only about four years, when it dissolved. Several other self-instituted lodges sprang into existence during the next ten or twelve years, when Shakespeare Lodge was revived. A lodge was established in Brooklyn—Columbia Lodge—which held a dis-

pensation from an English lodge, the Duke of Sussex, and for some years there was a struggle for the mastery between the New York and Brooklyn lodges, which were in affiliation with the Manchester Unity. The contesting lodges were finally brought to acknowledge the authority of the Grand Lodge of the United States, from which a charter for a New York Grand Lodge was subsequently obtained. Dissension and division, however, did not cease until 1865.

There is no record of Odd Fellowship in Canada before 1815, although it is stated that what are known as 'Prehistoric' lodges were to be found at various points. In September, 1843, Prince of Wales Lodge No. 1 of British North America was instituted at Montreal under a charter issued by the Grand Lodge of the United States. The following year a Canadian Grand Lodge was created, and in September, 1846, the Canadian branch of the order was declared free and independent by the Grand Lodge of the United States, which issued to the Canadian lodges a charter under the title of the Grand Lodges of British North America. By 1852, however, this Grand Lodge had practically died of inanition, and in 1853, the Montreal lodges having formally disbanded, the Grand Lodge of the United States recalled the Canadian charter and resumed jurisdiction over the order in Montreal.

In 1868 Australia was added to the domain of the Grand Lodge of the United States, and from time to time other countries have been entered with more or less success. Mexico, the West Indies, Chile, Cuba, Peru, Japan, Denmark, Germany, England, France, Italy, Holland, etc., have been admitted, but the continent of North America has proved the best field for cultivation. In 1879 the Grand Lodge of the United States, recognizing its undisputed sway in the world of Odd Fellowship, changed its title, and is now known as the Sovereign Grand Lodge of the Independent Order of Odd Fellows.

Three degrees are conferred in the subordinate lodge, and any Odd Fellow who has attained the third degree is eligible for membership in an encampment, a branch or department chartered within the order by the Grand Lodge of Maryland in 1827. The encampment confers three degrees, the Patriarchal, the Golden Rule, and the Royal Purple. The Patriarchal is an English degree, and the others are American. The first Right Worthy Grand Encampment was created and officers installed in Baltimore in 1831. Membership in an encampment is dependent on good standing in a lodge, but otherwise the two are independent.

The Patriarchs Militant, a uniformed degree of the order, came into existence in 1884. For many years the desire for greater display had been manifest throughout the order, although the more conservative element had opposed it. A resolution was adopted at the annual convention in 1874 delegating to grand encampments the power to permit encampment members who had taken the Royal Purple degree to wear a uniform for street parades. The wearing of the uniform was optional with the members. The agitation was continued until 1880, when the Sovereign Grand Lodge finally refused to permit the organization of regular uniformed encampments. This refusal resulted in the establishment, a year later, of the Patriarchal Circle, a body composed of Odd Fellows who had taken the Royal Purple degree. This body was inde-

pendent of the Sovereign Grand Lodge and conferred its own degrees. The local organizations were known as 'temples.' The movement spread, and the danger of a schism impelled the Sovereign Grand Lodge in 1884 to yield to the demand for a recognized military degree. The Patriarchs Militant were then organized and the new military degree was approved. Only encampment members who have taken the Royal Purple degree are eligible. The patriarchs have a complete military organization. The subordinate bodies are known as 'cantons,' and each is commanded by a captain. The cantons are organized into battalions, the battalions into regiments, the regiments into brigades, and the brigades into divisions, with officers of corresponding rank. The whole 'army' is commanded by a lieutenant-general, and the grand sire of the Sovereign Grand Lodge is ex-officio general-in-chief.

The Rebekah degree for women members is an important branch of the order. It was established in 1851, and is intended to bring the social benefits of Odd Fellowship within the reach of the female members of the families of living or deceased members of the order. Males are also admitted under the Rebekah degree into the encampment branch of the order.

The symbols in use in the lodges for the purpose of imparting instruction are: the *All-Seeing Eye*, representing the omniscience of God; the *Skull and Cross Bones*, a reminder of mortality; the *Three Links*, representing Friendship, Love, and Truth; the *Scythe*, denoting man's fading character; the *Bow and Arrow and Quiver*, designating the feeling of mutual defense to be cultivated; the *Bundle of Rods*, emblem of strength in union; the *Heart and Hand*, incentives to love and mercy; the *Globe*, man's earthly home; the *Ark of the Covenant*, the repository of God's grace and His goodness to man; the *Serpent*, teaching the wisdom of prudence; the *Scales and Sord*, emblematic of justice; the *Bible*, the source of truth; the *Hour-glass*, the flight of time; and the *Coffin*, emblematic of death.

The emblems in use in the Encampment and Patriarchs Militant are as follows: the *Three Pillars*, representative of Faith, Hope, and Charity; the *Tent*, hospitality; the *Altar of Sacrifice*, reminder of the simple worship offered by the Patriarchs; the *Tables of Stone*, the Ten Commandments; the *Pilgrim's Scrip, Sandals, and Staff*, representing the journey of life; the *Crown*, the Patriarch's power and dignity; and the *Shepherd's Crook and Warrior's Sord*, defense of the helpless.

The emblems of the Rebekah degree are the *Bee Hive*, representing order and industry; the *Dove*, constancy; the *Moon and Seven Stars*, denoting national truth; and the *Lily*, emblem of purity.

The results shown by the records of the order in the fulfillment of the objects of its existence, viz. the visitation of the sick, the relief of the distressed, the burial of the dead, and the education of the orphan, from 1830 to the close of the year 1901, are as follows: There were, besides the Sovereign Grand Lodge, 6 quasi-independent Grand Lodges in foreign countries; 66 Grand Lodges in the United States and Canada; 55 Grand Encampments; 12,792 subordinate lodges; 2780 subordinate encampments; 1,002,272 lodge members; 145,138 encampment members; 40

Rebekah assemblies; 5756 Rebekah lodges; 373,653 Rebekah lodge members; number of members relieved, 2,565,904; and widowed families succored, 256,606. The total revenue for the period was \$240,430,422, and the total expenditure for relief \$92,665,214. The chief officer of the order is known as the Grand Sire.

ODE (Lat. *oda*, ode, from Gk. *ὕδῃ*, song, from *ἄειδεν*, *acdein*, *ᾄδεν*, *adein*, to sing). Originally, a poem to be sung to the accompaniment of some musical instrument, as the lyre. The poem and the music were inseparable. The simpler form of the Greek ode for a single voice was cultivated by Sappho, Alcæus, Anacreon, and other Æolian poets. The choral ode to be sung, not by a single voice, but by a group, was invented by the Dorians. To Alcman of Sparta belongs the innovation of dividing the chorus into two parts, called the strophe (the turn) and the antistrophe (the counter-turn), in which the performers turn to the right and to the left, the one group answering the other. Stesichorus of Sicily added a third part called the epode (after-song), which was sung by the entire chorus after their movements to the right and to the left. The choral ode, consisting thus of the strophe, the antistrophe, and the epode, was adapted by Simonides of Ceos to the warlike Dorian music. He was followed by Pindar, the greatest lyric poet of Greece. Of Pindar's work there are extant, besides several fragments, forty-four odes of victory, composed for the national games. Each ode has its own complicated metrical structure, corresponding to its own music. The simpler Greek measures were imitated in Latin by Catullus and Horace. See GREEK MUSIC.

The modern ode, dating from the Renaissance, was inspired by Horace and Pindar. It has, of course, undergone many modifications, consequent upon the divorce of verse and musical accompaniment. But it generally shows whence it came by its stanzaic structure and its direct address to some person or object. It is lofty in theme, and more impersonal than the ordinary lyric. Among the first English writers of odes, in imitation of Horace or Pindar, or of both, are Ben Jonson, Crashaw, Milton, Cowley, Marvell, Dryden, Collins, and Gray. Marvell's ode on the return of Cromwell from Ireland is one of the best in the Horatian manner; but Gray best understood Pindar. Gray divides his *Progress of Poesy* into three stanzas, each having forty-one lines; each stanza is further divided into strophe, antistrophe, and epode; and the three parts of each stanza are identical in form. Collins, with admirable art, employed a less elaborate structure, and most English poets have followed him rather than Gray. Indeed, the ode as now written is only a succession of stanzas in lines of varying length and metre. These stanzas, in verse and rhyme, may pursue either a regular or an irregular order, so falling into one or the other of the two great classes into which modern odes are divided. Each type creates its own specific forms, which in either case may be of an almost endless variety; but in the regular ode the stanzaic form is either the same from stanza to stanza, or varies according to a fixed principle, while in the irregular ode the form is determined solely by the poet's varying mood and alters in the freest manner

from verse to verse and from stanza to stanza. The irregular ode is thus the most purely subjective of lyric forms and capable of the most delicate adjustments of music and mood; but, because of its very pliancy, it is also perhaps the one form in which success is least often attained. Of musical settings for odes the most famous are those of Purcell, twenty-eight in number, and the four by Handel (q.v.).

Among the great English odes of the nineteenth century are Wordsworth's *To Duty and Intimations of Immortality*; Coleridge's *To France*; Shelley's *To the West Wind*, *To Liberty*, *To Naples*, and *To a Skylark*; Keats's *To a Nightingale*, *To Autumn*, and *On a Grecian Urn*; Tennyson's *On the Death of the Duke of Wellington*; and Swinburne's *To Victor Hugo*. Among those produced in the United States there are Bryant's *To a Waterfowl*, *The Winds*, and *Hymn of a City*; and Lowell's great *Commemoration Ode* to those who fell in the Civil War. As an occasional poem addressed to a friend, the ode is cultivated by many poets on both sides of the Atlantic. Consult: *English Odes*, selected (London, 1881); *Great Odes, English and American*, selected by Sharp (Canterbury Poets); and for more recent odes, the poems of Coventry Patmore and William Watson. See also the various poets mentioned in this article, and LYRIC POETRY.

ODELL, BENJAMIN B., Jr. (1854—). An American political leader, born at Newburg, N. Y. He studied at Bethany College, W. Va., spent three years at Columbia, and then entered business and politics almost simultaneously. He became a member of the New York State Republican Committee in 1887, and chairman of the Executive Committee in 1896. From 1895 to 1901 he was a member of Congress, and was chairman of the Committee on Accounts during the Fifty-fifth Congress. In 1900 he was elected Governor of New York, and signalized his administration by cutting down the expenses of government through the application of 'business principles.' This and his attitude toward Senator Thomas C. Platt, head of the New York Republican organization, made Odell a conspicuous national figure. In 1902 he was reelected Governor.

ODELL, JONATHAN (1737-1818). An American loyalist poet, born in Newark, N. J., September 25, 1737. After graduating in 1754 at the College of New Jersey in Newark, he studied medicine, and was a surgeon in the British Army. In 1766 he took orders and shortly after became rector of the church at Burlington, N. J. He was devoted to the loyalist cause during the Revolution, was driven out, and on the evacuation of New York went to England; but he returned to America and filled positions in the Council of the Province of New Brunswick. He died in Fredericton, N. B., November 25, 1818. Odell is chiefly known as the most effective satirist on the Tory side and also for strong odes and other lyrics. He shares the honors of Tory laureate with Joseph Stansbury (q.v.), with whose verses his own were collected in 1860 by Winthrop Sargent.

ODENATHUS. King of Palmyra and husband of the celebrated Zenobia. See PALMYRA; LONGINUS; ZENOBIA.

ÖDENBURG, ʔ'den-böörk (Hung. *Soprony*). A royal free city and capital of the county of the same name in Hungary, situated a short distance from the Neusiedler See and 53 miles by rail southeast of Vienna (Map: Hungary, E 3). It is a fine town with a number of interesting churches and monasteries, a theatre, a casino, a higher gymnasium and *Realschule*, a Protestant lyceum, and a number of other educational establishments. The vicinity of Oedenburg has long been famous for its wine and fruit. The manufactures of the town include sugar, spirits, preserved fruit, agricultural implements, wagons, etc. The trade is mostly in agricultural products. Oedenburg is identified with the Roman *Scarabantia*. Population, in 1900, 33,478, mostly German Catholics.

ODENHEIMER, ʔ'den-hi'mēr, WILLIAM HENRY (1817-79). A bishop of the Protestant Episcopal Church. He was born in Philadelphia, graduated from the University of Pennsylvania in 1835, and was ordained priest in 1841. His sole ministerial charge was Saint Peter's, Philadelphia, where he was considered one of the model parish priests of the United States. In 1859 he was consecrated third Bishop of New Jersey. At the division of the State into two dioceses he chose that of Northern New Jersey. He was the author of *The Origin and Compilation of the Prayer-Book* (1841); *The True Catholic No Romanist* (1842); and *Canon Law* (1847). He died at Burlington, N. J. Consult the volume of his sermons with introductory memoir by his widow (New York, 1881).

ODENKIRCHEN, ʔ'den-kêrk'en. A town in the Rhine Province, Prussia, on the Niers, 25 miles northwest of Cologne (Map: Prussia, B 3). It has manufactures of velvets, silks, leather, harness, and sealskin. Population, in 1900, 14,745.

ODENSE, ʔ'den-så. The largest city on the island of Fünen, Denmark, capital of Odense Amt, constituting the northern half of the island, and the third city in population in the Kingdom. It is situated on the Odense River near its mouth in the Odense Fiord (Map: Denmark, D 3). Its streets are well paved, and the city has many handsome modern houses. It is lighted by gas and electricity, and was the first city in Denmark to have water distributed to the houses through pipes. The most notable building is the Cathedral of Saint Canute, built in the thirteenth century, the best example of Gothic architecture in Denmark. Here are buried several distinguished Danish monarchs. The Church of Our Lady, built in the twelfth century, is the oldest edifice in the town. Other buildings worthy of note are the Odense Castle, erected by Frederick IV., and surrounded by a beautiful park, the large monumental city hall, and the new post-office. The chief educational institutions are a seminary, a technical and an agricultural school, two libraries of 36,000 volumes each, and an archaeological museum.

The city is of great industrial and commercial importance. The chief industrial establishments are breweries, distilleries, glass, chemical, and tobacco factories, machine shops, textile mills, and sugar refineries. The harbor consists of two elongated basins forming the forked extremity of the Odense Ship Canal, opening into the fiord. Further improvements and extensions are now

being made, and the town is the chief railroad and commercial centre of Fünen, exporting butter, cheese, hides, and bacon in considerable quantities. The population has increased sevenfold during the past century. In 1890 it was 30,277, and in 1901, 40,138.

Odense dates from the legendary period of Danish history. It became a bishop's see early in the eleventh century, and several councils of archbishops were held here. In the sixteenth century the city was the meeting place of several parliaments. It suffered severely during the Swedish occupation in 1658-60. Odense is the birthplace of Hans Christian Andersen.

ODENWALD, *ö'den-vält*. A mountain region in Southern Germany, covering parts of Hesse and Northern Baden. It lies east of the Rhine, between the Main and the Neckar, the latter separating it from the northern extension of the Black Forest, and the former from the Taunus Range (Map: Germany, C 4). The eastern part, which consists mainly of sandstones, is the more level, and slopes gradually toward the plain. The western part consists of granite, gneiss, and crystalline slate, and falls abruptly toward the Rhine Valley. There are many beautiful valleys, and several peaks reaching a height of about 2000 feet. Large portions are covered with magnificent beech and oak as well as pine forests, and the region is dotted with castles and ruins possessing historical and legendary associations.

ODÉON, *ô'da'ôn'*. A theatre in Paris, opposite the gardens of the Luxembourg Palace, ranking next to the Théâtre Français, and receiving an annual Government subvention of 100,000 francs. It is given over chiefly to classical dramas. The theatre was erected in 1782 and has been several times destroyed by fire and restored under various names.

ODER, *ö'dër*. One of the principal rivers of Germany (Map: Germany, F 2). It rises on a southern extension of the Sudetic Mountains, near Olmütz, in Moravia, and flows in a general northwest direction through Prussian Silesia, Brandenburg, and Pomerania. It empties into the Stettiner Haff, from which its waters flow into the Baltic Sea through three arms which form the islands of Usedom and Wollin. Its length is 562 miles. Only in its extreme upper course does it flow through a hilly and forested country; for the greater part of its length its banks are low and flat, often marshy, and in some places diversified with sand dunes. In its lower course it divides repeatedly into parallel arms, which in the last twenty miles form a long, narrow delta. The river is in general shallow, and the current is very swift and there are sudden and great variations in volume. Extensive and costly engineering works have been necessary to confine it to its bed and render it navigable, but in dry summers navigation is still uncertain. The total navigable length for small vessels is 445 miles, ending at Ratibor, in Southern Silesia. Sea-going vessels can ascend as far as Stettin, at the head of the Stettiner Haff, but the chief port used by ocean commerce is Swinemünde, on the central outlet into the Baltic. The principal tributary of the Oder is the Warthe, which rises in Poland and nearly equals the main river in size. The chief cities on the Oder are Stettin, Frankfurt (Brandenburg), Breslau, and Oppeln. Consult: *Der Oderstrom, sein Stromgebiet und*

seine wichtigsten Nebenflüsse (Berlin, 1896); Brämer, "Der Oderstrom und sein Gebiet," in *Zeitschrift des königlich preussischen statistischen Bureaus* (Berlin, 1899).

ODESSA. The most important city and seaport of Southern Russia and the fourth city of the Empire in population, situated in the Government of Kherson, on an elevation sloping toward an inlet of the Black Sea (Map: Russia, D 5). It lies about 32 miles northeast of the mouth of the Dniester and 938 miles by rail southwest of Moscow. The general appearance and atmosphere of Odessa are rather European than Russian. The climate is temperate, the annual temperature being about 50° F., ranging from 70° in July to about 26° in January. The city was built up during the nineteenth century, and is therefore one of the youngest among the large cities of Russia. It is regularly laid out around the bay and has a number of fine streets and squares, from which a magnificent view of the sea is obtained. The most popular boulevard is the Nikolayevsky Boulevard, from which a grand stairway leads to the bay. At the head of the stairway is the bronze statue of the Due de Richelieu, the first Governor of the district, to whom Odessa owes much of its progress and architectural beauty.

There are many fine buildings, both ecclesiastical and secular. The chief among them are the cathedral, the exchange, the theatre, the Governor's palace, the city hall, the municipal library, containing 80,000 volumes, and the university building. Monuments to Alexander II., Catharine II., and Pushkin adorn various sections of the town. There are about twenty-five orthodox churches, a number of monasteries, synagogues, and a few reformed churches. In the southern and eastern parts of the city are situated a number of parks, among which the chief are the Alexandrovsk Park and the Botanical Garden. At the head of the educational institutions is the university ('Novo-Rossisky Universitet'), founded in 1864, and having faculties of medicine, philosophy, law, history and philology, physics and mathematics. The number of its students is about 700. It has a library of over 430,000 volumes, a museum, and an observatory. There are a number of gymnasia and preparatory, commercial, art, and industrial schools. Odessa has various learned societies, four theatres, and a number of philanthropic institutions. The city is lighted by gas, and the port mainly by electricity. Water is conducted from the Dniester, a distance of over 26 miles. The harbor is modern and very extensive. It is of sufficient depth for the admission of deep draught vessels. It is divided by large moles into several ports.

While Odessa is primarily a commercial place, it is also of considerable industrial importance. In 1899 it had over 500 large industrial establishments, employing about 21,000 persons, and with an output of over \$30,000,000. The chief establishments are flour mills, sugar refineries, match factories, breweries, tanneries, soap factories, iron works, etc. Situated on the coast of one of the largest grain-producing areas of Russia and in close proximity to the estuaries of the Dnieper and the Dniester, the city is naturally well equipped for its position as the chief grain-exporting centre of Russia, and the first

port of Russia in regard to exports in general. Of the annual exports of over \$50,000,000, grain, mainly wheat, forms from 65 to 75 per cent. The remainder consists of animals and animal products, sugar, and lumber. The imports, valued at about \$25,000,000, consist of machinery, coal, chemicals, and various manufactured products. In its imports Odessa is exceeded only by Saint Petersburg and Reval. At the head of the administration of the city is the prefect, or gradonatchalnik, appointed by the central Government. The municipal assembly, or дума, consists of 60 members, elected by all citizens owning real estate. The mayor is elected by the city council. The budget of the city balances at about \$2,000,000. For further details as to municipal government, see article RUSSIA, section on *Local and Municipal Government*.

The environs of Odessa are very picturesque and offer numerous seacoast resorts. The three salt-water lakes, or limans, Kuyalnik, Khadji-Bey, and Klein Liebenthal, are much frequented by invalids.

The population increased with remarkable rapidity during the last century. The first settlers were mostly Greeks, Italians, and Albanians, and in 1802 numbered 9000. In 1901 the population was 450,218, of whom nearly one-third were Jews. The foreign population is about 30,000.

Odessa takes its name from the Greek settlement, Odessus, which existed here in ancient times. In the fifteenth century the Turks constructed on the present site the fortress of Khadji-Bey, which was taken by the Russians in 1789. In 1793 the place was fortified by the Russians and a year later received its present name. The growth of the town was fostered by Paul I. and by the wise and beneficent administration of the Duc de Richelieu. In 1817 it was declared a free port, and this decree, remaining in force till 1859, made possible Odessa's commercial supremacy in Southern Russia. In 1854 it was bombarded by the allied English and French naval forces.

ODE'UM (Lat., from Gk. ὀδεῖον, *ōdeion*, from ὀδή, *ōdē*, song). The Greek name for a public building devoted to musical performances. The earliest Odeum in Athens seems to have been built by Pericles, and was a circular building with a conical roof in imitation of the tent of Xerxes. It had many pillars within, and thus did not resemble the theatre. It was intended for the musical competitions at the Panathenæa, but was later used for other purposes. It was burned during Sulla's siege of Athens (B.C. 86), but was soon rebuilt by Ariobarzanes II., King of Cappadocia. In Roman times the name was employed to designate a small theatre, with a roof, and such buildings became common in Grecian cities. In Athens there were two: one erected by Agrippa, near the market; the other, of which the walls still remain, at the southwest of the Acropolis, built by Herodes Atticus shortly after A.D. 160 in memory of his wife, Regilla. Consult Dörpfeld, "Die verschiedenen Odeen in Athen," in *Mittheilungen des deutschen archäologischen Instituts in Athen*, vol. xvii. (Athens, 1892).

O'DIN (Icel. *Ópenn*, AS. *Wōden*, OHG. *Wuotan*; probably connected with Goth. *wōds*, possessed, AS. *wōd*, OHG. *wuot*, frenzied, Ger. *Wut*, frenzy, OIr. *fáith*, Lat. *vates*, poet). The chief

god of Northern mythology. According to the sagas, Odin and his brothers, Veli and Ve, the sons of Boer, or the first-born, slew Ymir or Chaos, and from his body created the world, converting his flesh into dry land; his blood, which at first occasioned a flood, into the sea; his bones into mountains; his skull into the vault of heaven; and his brows into the spot known as *Midgard*, the middle part of the earth, intended for the habitation of men. Odin rules heaven and earth, and is omniscient. His seat is Valaskjalf, from whence his two black ravens, Hugin (Thought) and Munin (Memory), fly daily to gather tidings of all that is being done throughout the world. As god of war, he holds his court in Valhalla, whither come all brave warriors after death to revel in the tumultuous joys in which they took most pleasure while on earth. His greatest treasures are his eight-footed steed Sleipner, his spear Gungner, and his ring Draupner. By drinking from Mimir's fountain he became the wisest of gods and men, but he purchased the distinction at the cost of one eye. Frigga is his queen, and the mother of Balder, but he has other wives and favorites, and numerous sons and daughters.

O'DO, or **EUDES**, 8d, OF BAYEUX (c.1036-97). The half-brother of William I. of England. He was made Bishop of Bayeux about 1049. He took part in the Norman conquest of England in 1066, and received the earldom of Kent; but it is possible that he never received the title of earl. During William's absence from England in 1067 he was one of the two regents and seems to have ruled very tyrannically. Later he fell under William's displeasure and was imprisoned for over four years. He was released by William Rufus, against whom he rebelled in 1088 and was consequently banished from England. He died at Palermo in 1097, while on his way to join the crusading armies. Consult Freeman, *Norman Conquest*, vol. iv. (Oxford, 1871).

ODO, or **EUDES**, OF PARIS (c.857-798). King of France from 888 to 898. He was the son of Robert the Strong, progenitor of the Capetians. Odo was Duke of France, Count of Paris, and the defender of the city during the siege by the Northmen in 886. His father's popularity and his own valor caused him to be chosen King of the West Franks in 888, after the deposition of Charles the Fat. His reign was troubled by rebellions on the part of the supporters of Charles the Simple, the Carolingian heir. Odo kept the kingdom, but before his death, January 1, 898, recommended his followers to recognize Charles as his successor.

OD'OA'CER, or **OD'OVA'CER** (?-493). Ruler of Italy from 476 to 493. He was the son of Edico, a noble of the race of the Scyrii, and saw his first military service probably in the army of Orestes, father of the young Romulus Augustulus, last Emperor of the West. Odoacer perceived the weakness of the new ruler, and resolved to profit by it. He had little difficulty in persuading the barbarian soldiery that Italy belonged to them, and in their name demanded of Orestes the third part of the land as the reward of their help. Orestes refused; and Odoacer, at the head of his Scyrii, Herulians, Rugians, and Turcilingians, marched against Pavia, which Orestes had garrisoned, stormed the city, and put his opponent to death (476). Romulus abdi-

eated and withdrew into obscurity. Odoacer showed himself to be wise, moderate, and politic. He took the title of king only, and caused the Senate to dispatch to Constantinople a flattering letter, in which it declared one Emperor to be enough for both East and West, renounced its right of appointing the emperors, expressed its confidence in the civil and military talents of Odoacer, and begged Zeno to confer upon him the administration of Italy. After some hesitation the Byzantine Emperor yielded to the entreaties of the Senate, and Odoacer received the title of Patricius. This is commonly taken as the date for the fall of the Western Empire.

Odoacer fixed his residence at Ravenna. According to his promise, he divided among his companions the third part of the land of Italy—a measure far less unjust than at first sight may seem, for the peninsula was then almost depopulated, and many domains were lying waste. He maintained peace throughout the peninsula and conquered Dalmatia. In matters of religion, though an Arian himself, he acted with great impartiality; nevertheless he was intensely hated by the native Italians. The success of Odoacer excited the jealousy and alarm of Zeno, the Emperor of the East, who encouraged the Ostrogoth King, Theodoric (q.v.), to undertake an expedition against Italy, hoping at the same time to get rid of the Goths, who were a menace to Constantinople. The first battle was fought on the banks of the Isontius (the modern Isonzo) in 480. Odoacer was beaten, and retreated. During his retreat he hazarded another battle at Verona and was again beaten. He now hastened to Rome to rouse the inhabitants, but the gates of the city were closed against him. Returning northward to his capital, Ravenna, he reassembled the wrecks of his army, and in 490 once more marched against the Ostrogoths, whose advance guard he defeated and pursued to the walls of Pavia. Another great battle now took place on the banks of the Adda, when Odoacer was vanquished for the third time. He now shut himself up in Ravenna, where Theodoric besieged him for three years. Odoacer then capitulated, on condition that the Kingdom of Italy should be shared between him and Theodoric. This agreement was solemnly sworn to by both parties, February 27, 493; but on March 5th Odoacer, invited to a banquet by Theodoric, was killed by the Gothic King's own hand. Consult: Pallmann, *Geschichte der Völkerwanderung* (Gotha, 1863); Hodgkin, *Italy and Her Invaders*, vol. iii. (Oxford, 1885); and Dahn, *Könige der Germanen*, vol. ii. (Munich, 1861).

ODOMETER (from Gk. *ὁδός*, *hodos*, road + *μέτρον*, *metron*, measure). An instrument used in connection with a vehicle or other wheel for measuring lengths of road or other distances. The odometer consists of a series of gear wheels so arranged that the first and smallest wheel revolves either once or some definite fraction of a revolution for every revolution of the vehicle wheel to which it is attached. This is usually accomplished either by a star wheel with which a projection on or near the hub of the vehicle comes in contact, or some similar device. As the circumference of the wheel can readily be measured, it is, of course, possible to arrange the gear wheels so that there will be recorded finally and shown by dials or other indicators the distance in feet, yards, miles,

or kilometers. The odometer, which was at one time used but rarely except by road surveyors, especially in preparing county maps, is extensively employed with bicycles and automobiles, and in this form is known as a cyclometer. It is a very convenient instrument in a rough survey or reconnaissance where it is necessary to measure certain distances along a road, as it can be attached to the axle of a wagon or bicycle and readings made from time to time by the observer between points on the same line.

ODONATA (Neo-Lat., from *ὀδούς*, *odous*, tooth). An order of insects comprising the dragon-flies. See DRAGON-FLY.

O'DON'NELL, LEOPOLD (1809-67). Duke of Tetuan. A Marshal of Spain. He was born at Santa Cruz, Teneriffe, of an Irish family long in the service of Spain. He entered the army when young and embraced the cause of Isabella (q.v.) against Don Carlos, whose armies he fought bravely under Espartero, gaining the title of Count of Lucena. In 1840 he sided with Maria Christina, the Queen mother, went with her to France, and stirred up a number of unsuccessful revolts against Espartero, his old chief. In 1843 his intrigues were more fortunate, Espartero fell, and O'Donnell went to Cuba as Governor-General. Returning rich in 1848, he plotted against the Ministers, Bravo-Murillo and Narvaez. In 1854 he headed a military insurrection; defeated and driven into Andalusia, he suddenly turned Liberal, issued a radical manifesto, and gave his rising the aspect of a revolution. He won. The nation and Espartero joined him, the two men assumed the powers of government, and O'Donnell was made Marshal. Then by a *coup* O'Donnell ousted Espartero, July, 1856, but in three months was himself ousted by Narvaez. He resumed office in 1858, and in the following year led as Prime Minister and commander-in-chief a successful expedition against the Moors and was made the next year Duke of Tetuan. He resigned in 1863, but was recalled in 1865, and remained Prime Minister till 1866. He died the next year at Bayonne.

O'DONOGHUE, *o-dön'ô-hû*, DAVID J. (1866—). A British biographer and editor, born in Chelsea, London. He was educated in a Roman Catholic school, and began his journalistic work by writing for the Dublin papers upon subjects relating to Irish music, art, and literature. A founder of the Irish Literary Society in London, he was also vice-president of the National Literary Society, Dublin, and the compiler of a biographical dictionary called *The Poets of Ireland* (1891-93); also, *Humor of Ireland* (1894); *List of 1300 Irish Artists* (1894); *Traits and Stories of the Irish Peasantry* (4 vols., 1896-97); *Bibliographical Catalogue of Collections of Irish Music* (1899); and a *Treasury of Irish Poetry in the English Tongue* (1900). He edited the works of Samuel Lover (1898-99), and among his biographies are those of William Carleton (1896); Richard Pockrich, an *Irish Musical Genius* (1899); and Robert Emmet (1902).

O'DONOJU, *o-dön'ô-nô-jû*, JUAN (c.1755-1821). A Spanish soldier and viceroy, born in Spain. Already well known in his own country, he was made acting Viceroy of Mexico in 1821. When he arrived there he found that Iturbide was practically conqueror of the entire province and that there was little left for him to do but

make terms with the victorious revolutionist. He signed the Treaty of Córdoba, which made Mexico an empire, and surrendered the city itself (1821). Meanwhile he was elected one of the provisional agents, and died soon after.

O'DONOVAN, JOHN (1809-61). A distinguished Irish historian, archæologist, and Gaelic scholar. He was born in Attateemore, County Kilkenny. In 1826 he obtained work in the Irish Record Office, and in 1829 was appointed to a post in the historical department of the Ordnance Survey. In the discharge of his office he examined many Irish manuscripts and visited every part of the country, thus becoming an authority on Irish topography. In 1840 the Irish Archæological Society was formed, and in the following year O'Donovan contributed a map of ancient Ireland to its first volume of publications. From this time till the year of his death he was a prolific writer on Irish history and antiquities. He was called to the Irish bar in 1847, having entered at Gray's Inn three years before. O'Donovan's chief work was an edition of the so-called *Annals of the Four Masters*, a compilation made in the seventeenth century by Michael O'Clery and a company of Irish Franciscans. This was finished in 1851, and the next year O'Donovan was employed by the commission for the publication of the ancient laws of Ireland. He made extensive manuscript collections for an edition of the *Seanchus Mor*, but did not live to prepare them for publication. In 1845 he published a *Grammar of the Irish Language* which was long regarded as the chief authority on the subject. Of O'Donovan's remaining works the most important were issued by the Irish Archæological Society or the Celtic Society.

ODONTOLCÆ. See BIRD; FOSSIL.

ODONTOLOGY. See DENTISTRY; TEETH.

O'DONTOR/NITHES. A group-name for all those primitive birds which had teeth in the jaws (bill). See BIRDS, FOSSIL.

O'DWYER, JOSEPH (1841—). An American physician, specialist in the diseases of children. He was born in Summit County, Ohio; graduated at the New York College of Physicians and Surgeons; and became a practicing pediatricist in New York City. O'Dwyer invented, in 1885, intubation of the larynx to take the place of tracheotomy. The method was very successful, especially in croup and diphtheria.

ODYNIEC, ȯ'dy'né-ěts, ANTONI EDWARD (1804-85). A Polish poet and critic, best known for his close relations with Mickiewicz. He was born in Lithuania; studied at Vilna; and, settling at Warsaw, became editor of *Melitele*, a periodical which reflected the aims of the young Romantics of the time. He had already written translations from the German, especially Bürger, and the two volumes of romantic verse entitled *Poezye* (1825). After several years in Dresden and Leipzig, he returned to Vilna in 1837 and for twenty years was editor of *Kurjer Wileński*, an official journal. His dramas include: *Felicyta* (1849), dealing with the early Christian martyrs; and *Barbara Radziwiłówna* (1858), an historic piece of the time of Sigismund Augustus. *Listy z podróży* (1875-78) tells of his travels with Mickiewicz.

ODYS'SEUS. See ULYSSES.

ECOLAMPA'DIUS, JOANNES (1482-1531). One of the most eminent of the coadjutors of Zwingli in the Swiss Reformation. The name (Ecolampadius is a Græcized form), after the fashion of the time. His real name is variously given as Heussgen, Hüssgen, Hausch, and Huschke; at any rate it was not Hausschein, as has been inferred from the meaning of (Ecolampadius. He was born in 1482 at Weinsberg, Württemberg. He first studied at Heilbronn, then at Heidelberg, where he took his B.A. and M.A. (1501), and altered his name as many scholars of the age did. His father desiring him to study law, he repaired to Bologna to hear a certain famous professor, but, the climate not agreeing with him, he returned in six months to Heidelberg and studied theology, which was his personal preference. After a while he returned home, but, again in pursuit of knowledge, he went to Tübingen (1512) and studied Greek at Stuttgart under Reuchlin, and Hebrew under the Spanish physician Matthew Adrian, at Heidelberg. In 1516 he began preaching at Basel, where he formed the acquaintance of Erasmus, who highly appreciated his classical attainments, and secured his assistance in his edition of the New Testament. In 1518 he was preaching at Augsburg, and in 1520 entered the Brigittine convent at Altmünster, near Basel. But Luther's publications exercised so great an influence on him that he left the convent in 1522 and became chaplain to Franz von Sickingen, after whose death he returned to Basel in November, 1522, and, in the capacity of preacher and professor of theology, commenced his career as a reformer. In the controversy concerning the Lord's Supper, he gradually adopted more and more the views of Zwingli, and at last maintained them in 1525, in a treatise, to which the Swabian ministers replied in the *Syngramma Suevicum*. In 1529 he disputed with Luther at Marburg. He died at Basel, November 24, 1531. There is no collected edition of his writings. Consult his *Life* by Herzog (Basel, 1843), and by Hagenbach (Elberfeld, 1859).

ECOLOGY. See ECOLOGY.

ECUMENIUS, ək'ū-mē'nī-ūs. A theological author of the tenth century. He was for some time Bishop of Tricca, in Thessalia, and is supposed to have written the following Greek commentaries to the New Testament: *Ἐξηγήσεις εἰς τὰς Πάβλου ἐπιστολὰς πάσας* (a commentary on all the Epistles of Saint Paul); *Ἐξηγήσεις εἰς τὰς πράξεις τῶν Ἀποστόλων* (a commentary on the Acts of the Apostles); *Ἐξηγήσεις εἰς τὰς ἐν τῷ καθολικῷ λεγομένας ἐπιστολὰς* (a commentary on the seven Epistles termed Catholic); and *Commentaria in Sacrosancta Quatuor Christi Evangelia*. . . . *Auctore quidem (ut Plurimi Sentiunt) Occumenio Interpretato vero Johanne Hentenio*. The Greek text of this last commentary was published by C. F. Matthæi (Leipzig, 1792), and a complete edition of all Ecumenius's writing was published, both in Latin and Greek, in Paris in 1631.

CEDEMA (Neo-Lat., from Gk. οἰδημα, *oidēma*, swelling, from οἰδεῖν, *oidein*, to swell, from οἶδος, *oidos*, swelling). The term applied in medicine to the swelling occasioned by the effusion or infiltration of serum into cellular or areolar structures. The subcutaneous cellular tissue is the most common, but is not the only

seat of this affection. It is occasionally observed in the submucous and subserous cellular tissue, and in the cellular tissue of the parenchymatous viscera; and in some of these cases it gives rise to symptoms which admit of easy recognition during life. Thus œdema of the glottis (see LARYNX) and œdema of the lungs constitute well-marked and serious forms of disease; while œdema of the brain, though not easily recognized during life, is not uncommonly met with in the post-mortem examination of insane patients. A general œdema is called *anasarca*.

Edema may be either passive or active, the former being by far the most common. *Passive œdema* arises from impeded venous circulation (as from obstruction or obliteration of one or more veins; from varicose veins; from standing continuously for long periods, till the force of the circulation is partly overcome by the physical action of gravitation; from deficiency in the action of the adjacent muscles, which in health materially aids the venous circulation, etc.); from too weak action of the heart (as in dilatation or certain forms of valvular diseases of that organ); or from an impoverished or toxic state of the blood (as in chlorosis, scurvy, Bright's disease, etc.). By means of the knowledge derived from pathological anatomy, we can often infer the cause from the seat of the swelling; for example, œdema of the face, usually commencing with the eyelids, is commonly caused by obstruction to the circulation through the left side of the heart, or by the diseased state of the blood in Bright's disease; and œdema of the lower extremities most commonly arises from obstruction in the right side of the heart, unless it can be traced to the pressure of the gravid uterus, or of accumulated feces in the colon, or to some other local cause.

Active œdema is associated with an inflammatory action of the cellular tissue, and is most marked in certain forms of erysipelas. It is firmer to the touch, and pressure with the finger produces less pitting than in the passive form.

Angio-neurotic œdema is an affection of neurotic origin characterized by transient, circumscribed swellings in different parts of the body, which come and go suddenly. They may appear on the face and involve a single eyelid or the nose. The larynx may become swollen and cause death.

Malignant œdema is due to a specific infection, the bacillus of which is found in earth. It is rapidly fatal. See ANTHRAX.

From the preceding remarks, it will be seen that œdema is not a disease, but a symptom, and often a symptom indicating great danger to life. The means of removing it must be directed to the morbid condition or cause of which it is the symptom. See DROPSY.

ŒDENBURG, *Œden-böörk*. A royal free city of Hungary. See ÖDENBURG.

ŒDIPUS (Lat., from Gk. *Oidipous*, *Oidipous*, *Oidipódēs*; according to the popular etymology from *oidein*, to swell + *πους*, *pous*, foot). The hero of one of the most famous Theban legends. The story was certainly told in the early epics, one of which bore the title *Œdipodea*, and it is briefly indicated in the *Odyssey*, but for us it is known chiefly through the plays of the Athenian tragedians, especially Sophocles. The earlier versions, which

seem to have varied in many and not unimportant details, are all lost, and though many hints can be obtained by careful analysis of later chronicles and commentators, any complete reconstruction of the lost poems is in the highest degree conjectural. After passing through the hands of the dramatists, it assumed the following form: Laius, son of Labdacus, King of Thebes, was warned by Apollo's oracle at Delphi that he was to die at the hands of his son. In spite of this warning, Laius became by his wife Jocasta the father of a boy. No sooner was the child born than he fastened its ankles with a pin (whence the name 'swell-foot') and gave it to a faithful herdsman to expose on Mount Cithæron. Ignorant of the oracle, the man in pity gave the child to the shepherd of Polybus, King of Corinth, and that ruler, who was childless, reared him as his own son. The young man, Œdipus, never doubted his Corinthian origin till the taunt of a drunken companion roused his suspicions, and, unable to obtain satisfaction from his supposed parents, he sought the oracle at Delphi, which did not answer his question, but warned him that he was doomed to slay his father and wed his mother. Horrified, Œdipus fled away from Corinth, and shortly after met Laius with his servants. They endeavored to force him from the road, and in the quarrel he slew them all, as he supposed. Pursuing his journey, he found Thebes harassed by the Sphinx, who propounded a riddle to every passer-by and devoured all who failed to solve it. Creon, the brother of Jocasta, who had become King on the death of Laius, had offered the hand of his sister and the kingdom to him who, by solving the riddle, should free the city from the monster. Œdipus answered the riddle and thus slew the Sphinx. He then married Jocasta, his mother, and became King of Thebes. At first he prospered greatly, and four children were born to him, two sons, Eteocles and Polynices (q.v.), and two daughters, Antigone (q.v.) and Ismene. At length a terrible pestilence visited Thebes, and the oracle declared that the murderer of Laius must be expelled from the country. Œdipus began the search, and by degrees the truth became known. Jocasta hanged herself and Œdipus put out his eyes. The later fate of the King was told in varied form. His sons by their deeds brought upon themselves his curse, and ultimately fell by each other's hand. Œdipus himself was driven from Thebes, and, attended by his faithful daughter, Antigone, wandered over the earth, till he reached the grove of the Eumenides (q.v.), at Colonus, near Athens. Chastened by his sufferings, he was received by these dread goddesses, and conducted without death to the other world.

For the legend in its varied forms, consult the Introductions in Jebb's editions of the *Œdipus Tyrannus* and *Œdipus Coloneus* of Sophocles (Cambridge, 1893-99); also U. von Wilamowitz-Möllendorf, *Griechische Tragödien*, vol. I. (Berlin, 1899). For the epic forms, see Bethe, *Thebanische Heldenlieder* (Leipzig, 1891). The other extant Greek plays which touch upon the general subject are Æschylus, *Seven Against Thebes*; Sophocles, *Antigone*; Euripides, *Phænisææ*.

ŒDIPUS COLONEUS (Lat., from Gk. *Oidipous Kolōneios*, *Oidipous Kolōneios*, Œdipus of

Colonus). A tragedy by Sophocles, produced in B.C. 401 after the author's death. The action takes place in the grove of the Eumenides at Colonus, whither the blind Œdipus is led by his daughter Antigone, and where he is to die. Creon attempts to induce Œdipus to go with him, and, failing, carries off Antigone and Ismene, who are rescued by Theseus, King of Athens. Polynices appears and is cursed by his father. Finally Œdipus withdraws into the grove and his death is announced. The tragedy is simple in plot and filled with an atmosphere of peace and dignity, except in the scenes with Creon and Polynices.

ŒDIPUS TYRANNUS (Lat., from Gk. *Οἰδίπους τύραννος*, *Oidipous tyrannos*, Œdipus the King). The greatest drama of Sophocles and the most representative of Greek tragedies. The scene is Thebes, which has been visited by a pestilence, and can be cleansed only by the punishment of the murderer of Laius, on whom Œdipus invokes curses. The plot consists in the gradual bringing home to Œdipus that he is the unwilling murderer of his father and the husband of his own mother. In the horror of the enlightenment, Jocasta kills herself and Œdipus in frenzy blinds himself and begs of Creon to banish him. The dialogue is full of life, the interest of the action is sustained throughout, and the choral portions are of notable beauty.

OEHLENSCHLÄGER, ɔ'len-shlä'gër, ADAM GOTTLÖB (1779-1850). A great Danish poet and dramatist, born of German ancestry at Vesterbro, near Copenhagen. He was irregularly educated; was destined first for trade, then for the university, and then went on the stage. After failure as an actor he studied law, but in 1802 he quitted law to devote himself to literature. In the symbolic poem *Guldhornene* he declared his new faith, destroyed older verses then in the printer's hands, and composed in haste new ones in their place that made him undisputed head of the new Romanticists. From 1805 to 1809 he traveled on a Government stipend, visiting Goethe, Madame de Staël, and other noted writers. In 1810 he was made professor of æsthetics at Copenhagen, but did not long retain this position. In 1829 he was crowned by Tegnér as King of the Singers of the North. He was similarly honored at the royal palace in Copenhagen in 1849, and his funeral, two months later, was made a national solemnity. Oehlenschläger's importance lies in drama, beginning with *Sanct Hans Aften-Spil* (1803), followed by a series of national tragedies, *Hakon Jarl* (1807; English trans. 1875), *Baldur hin Gode*, *Karl den Store*, *Palnatoke*, *Åxel og Yalborg*, *Væringerne i Miklagård*, and thirteen others, together with five of a more general character, of which the first, *Correggio* (German, 1807; Danish, 1811; English trans., 1854), is typical. Oehlenschläger's dramas, like those of other Romanticists, show epic and lyric rather than dramatic qualities. They are genuinely national, most of them rooted in the popular sagas, and they show unrivaled command of language. Through them he gave the *Eddas* new life. By his youthful *Poems* (1805) he revealed unexpected lyric possibilities in the Danish language. Of these poems perhaps the dramatic fairy tale *Aladdin* is most significant. His later lyric and epic work is not of great value, except *Nordens Guder* (*Gods of the North*, 1819), a last effort to utilize Norse myth-

ology for modern poetry. Oehlenschläger's *Works* are in 26 volumes, comprising dramas, memoirs, miscellaneous prose and verse (Copenhagen, 1851-54). For his life consult Arentzen (Copenhagen, 1879) and Nielson (ib., 1879).

OEHLER, ɔ'lër, GUSTAV FRIEDRICH (1812-72). A German theologian. He was born at Ebingen, Württemberg. In 1834 he became teacher in the Missionary Institution of Basel, which he left in 1837 to study Oriental languages at Berlin. The same year he went to Tübingen as *repetent*. In 1840 he became professor in the seminary at Schöndal and remained until 1845, when he accepted a call to Breslau. He opposed the union of the Lutheran and Reformed churches, and while declaring in favor of confessional Lutheranism, he held aloof from the old Lutheran party. In 1852 he returned to Tübingen as director of the seminary and professor of Old Testament theology in the university. Here he produced his principal work, *Theologie des Alten Testaments* (2 vols., 1873-74; English trans., Edinburgh, 1874-75; New York, 1883). Oehler was one of the foremost Old Testament scholars of his time of the conservative school. He contributed many articles to Herzog's *Encyclopædic*, and wrote a *Lehrbuch der Symbolik* (1876, edited by Johann Delitzsch). Consult Josef Knapp, *Ein Lebensbild von Oehler* (Tübingen, 1876).

OEHME, ɔ'me, ERWIN (1831—). A German landscape and genre painter, born in Dresden. He was a son and pupil of the landscape painter Ernst F. Oehme (1797-1855), and also pupil of Ludwig Richter and of the Dresden Academy, but formed his style mainly by studying nature on his travels through Germany, Switzerland, France, and England. A fine specimen of his landscapes is the "Stone Quarry in Saxon Switzerland" (1860, Dresden Gallery). In 1877 he executed in the banquet hall of the Albrechtsburg at Meissen three mural paintings representing the "Rape of the Saxon Princes in 1415," and in 1887-89 a picture in heroic size of the "Declaration of Venezuela's Independence by Bolivar," for the House of Parliament at Caracas. He also did excellent decorative work, especially in imitation of old Gobelins for several royal palaces.

ŒIL DE BŒUF, ɔ'y' de bœf (Fr., ox-eye). A term applied in architecture to those small round or oval openings in the frieze or roof of large buildings which serve to give light to spaces otherwise dark. The most famous is in the ante-room of the royal chamber at Versailles, which gave name to the apartment.

OELAND, ɔ'lant. An island in the Baltic Sea. See ÖLAND.

OELS, ɔls. A city of Prussia. See ÖLS.

OELWEIN, ɔl'win. A city in Fayette County, Iowa, 53 miles north of Cedar Rapids; on the Rock Island system, and at the junction of four branches of the Chicago Great Western Railroad (Map: Iowa, F 2). The latter maintains large repair shops here, and there is also a foundry. The government, under a charter of 1888, revised in 1897, is vested in a mayor, elected every two years, and a unicameral council. The water-works are owned and operated by the municipality. Settled in 1875, Oelwein was incorporated first in 1888. Its growth during the decade 1890-1900 was extraordinarily rapid, a popula-

tion in 1890 of 830 having increased to 5142 in 1900.

ÆNANTHYLIC ACID from *ænanthyl*, from Lat. *ananthe*, from Gk. *οἰανθή*, *oinanthē*, first shoot of the vine, vine, from *οἶνος*, *oinos*, wine + *άνθος*, *anthos*, flower), NORMAL, $\text{CH}_3(\text{CH}_2)_7\text{COOH}$. One of the volatile fatty acids. It was formerly believed to be the acid component of an aster to which the characteristic odor of wine is due; it has, however, been shown that that odor is really due to a mixture of esters of the acids called capric and caprylic. Ænanthylic acid may be prepared best by the oxidation of *ænanthol*, $\text{C}_8\text{H}_{17}\text{CHO}$, a product of the distillation of castor-oil.

ÆNEUS, *Ἐνῆς* (Lat., from Gk. *Οἰνέε*, *Oineus*). King of Calydon, the father, by Althæa, of Meleager and Deianira, and, by Melanippe, of Tydeus. The famous Calydonian boar, afterwards slain by Meleager, was sent to devastate his territory as a punishment for his omission of Artemis in sacrificing to all the gods upon reaping the produce of his fields. Æneus was dethroned by the sons of his brother Agrius, and rescued by Diomedes, who took him to Argolis, where he was afterwards slain by the two surviving sons of Agrius. The city of Enoe was built upon the site of his burial place. He was the first to receive the vine from Bacchus, who taught him its cultivation, and the juice of the grape was from his name called *olvos*, wine.

ÆNOMA'US (Lat., from Gk. *οἰνόμαος*, *Oinomaios*). The son of Ares and King of Pisa in Elis. Having been warned that he would perish if his daughter married, he made it a condition that all suitors of Hippodamia should strive with him in a chariot race from Pisa to the altar of Poseidon on the Isthmus of Corinth, and if conquered should be slain. Pelops, son of Tantalus, on entering the contest, bribed Myrtilus, the charioteer of Enomaus, to disable the latter's chariot, and with a chariot and horses given him by Poseidon was victorious in the race. Enomaus was killed, and when dying cursed Myrtilus, to whom Pelops refused the promised reward and cast him down from Cape Geræstus. The curse uttered by the dying Myrtilus on Pelops brought in its train the misfortunes which pursued the latter's family.

ÆNONE, *Ἄνω* (Lat., from Gk. *Οἰνώνη*, *Oinōnē*). A nymph, who became the wife of Paris while he was still a shepherd on Mount Ida. She warned him of the results of his journey to Greece, and told him that she only could cure him if he should be wounded. When Paris was wounded by the arrow of Philoctetes, he sought the aid of Ænone, who, angered by his desertion, declined to assist him, but repented and in grief at coming too late cast herself on his funeral pile. The story is told in Tennyson's poem (*Enone* (1832)).

ÆNOPIDES, *Ἀνόπιδης* (Lat., from Gk. *Οἰνοπίδης*, *Oinopidēs*). A Greek astronomer, born in Chios, possibly a contemporary of Anaxagoras. He learned astronomy in Egypt and there, no doubt, got his knowledge of the obliquity of the ecliptic, the discovery of which is often ascribed to him. Ælian attributes to Enopides the fifty-nine-year cycle intended to harmonize the lunar and solar years, and the determination of the length of the solar year as 365 $\frac{1}{4}$ days. He

had a strange theory of the rise and fall of the Nile that subterranean waters are warmer in winter and colder in summer than surface waters, so the winter heat carries the moisture into the earth. Several geometrical propositions are said to have been discovered by him, and he held the theory that the Milky Way was the original path of the sun, which it had left in fright.

ÆNOTH'ERA (Neo-Lat., from Gk. *οἰνοθήρας*, *oinothēras*, plant whose root smells like wine, from *olvos*, *oinos*, wine, + *θηρᾶν*, *theran*, to seek). A genus of plants of the natural order *Ænothraceæ* having four petals and eight stamens, the calyx-limb 4-cleft, the segments reflexed; the capsule 4-valved, with many naked seeds. The evening primrose (*Ænothera biennis*), a beautiful plant native of the United States, has been known in Europe since 1614, and is now naturalized in many parts of Europe, on the banks of rivers, in thickets, on sandy grounds, etc. The plant is often cultivated for its fragrant flowers, which expand in the evening and at the summit of a leafy spike in the second year. The root somewhat resembles a carrot in shape, but is short; it is usually red, fleshy and tender; it is sometimes eaten in salads or in soups, and as a boiled vegetable. Several other species of *Ænothera*, natives of North America, are cultivated in gardens.

OERSTED, *ør'stød*, ANDERS SANDØE (1778-1860). An eminent Danish jurist, brother of Hans Christian Oersted (q.v.), born in Rudkjøbing. He was educated at the University of Copenhagen, embraced the profession of law, and rose to eminence as a practitioner and as editor of legal periodicals; he also wrote several treatises on the philosophy of Kant and Hegel. He became a judge of the highest court of Denmark in 1810. In 1825 he was intrusted with the drawing up of the ordinances of the Danish law, and in 1831 had an important share in forming the provincial constitutions granted by Frederick VI. to the Estates. For several years he was high commissioner, or King's representative at the Assembly of the Estates, and from 1842 to 1848 was a member of the Danish Cabinet. In 1853 he became Premier, and acted successively as Minister of Public Worship, of the Interior, and of Public Instruction and Justice. He now showed himself a decided Conservative. At the close of 1854 the King dismissed the Oersted Cabinet. In 1855 Oersted and his colleagues in the Cabinet were impeached by the Diet; the trial lasted for a year and resulted in acquittal. An autobiography of Oersted, *Af mit Lirs og min Tids Historie* (1851-57), contains valuable material for Danish historians. Among his other works is a manual of Danish and Norwegian law, *Haandbog over den danske og norske Lovkyndighed* (6 vols., 1822-23).

OERSTED, HANS CHRISTIAN (1777-1851). A distinguished Danish physicist, brother of the preceding. He was born at Rudkjøbing, on the Danish island of Langeland, and studied at the University of Copenhagen, where he took the degree of doctor of philosophy in 1799. Soon after becoming assistant to a professor of medicine, he gave lectures on chemistry and natural philosophy. In 1806, after having enjoyed a traveling scholarship for several years, in the course of which he visited Holland, Germany, and Paris, he was appointed professor of natural philosophy in the

University of Copenhagen. In 1812 he again visited Germany and France, after having published a manual under the title of *Videnskaben om Naturens Almindelige Love*, and *Forste Indledning til den Almindelige Naturlære* (1811). During his residence in Berlin he wrote his famous essay on the identity of chemical and electrical forces, in which he first developed the ideas on which were based his great discovery of the intimate connection existing between magnetism and electricity and galvanism—a treatise which, during his residence in Paris, he translated into French, in conjunction with Marcel de Serres. Oersted's great discovery, made in 1819, was that a magnetic needle was deflected by a current in a wire passing over or below it. This is the earliest experiment in electric magnetism, and at once paved the way for the work of Ampère and made possible the galvanometer, the electromagnet, and other apparatus soon to be devised. This discovery was announced shortly afterwards in a Latin essay, entitled *Experimenta Circa Effectum Conflictus Electrici in Acum Magneticam*. This memorable experiment obtained for Oersted the Copley medal from the Royal Society of England, and the principal mathematical prize of the Institute of Paris. Oersted endeavored to make science popular among all classes; with this object he wrote numerous works, contributed scientific papers to the newspapers and magazines of his own country and Germany, and, in addition to his regular lectures in the university, gave courses of popular scientific lectures. Among the works specially written to promote the diffusion of scientific knowledge, those best known are *Aanden i Naturen* (Copenhagen, 1845), and *Naturlærens Mechaniske Deel* (Copenhagen, 1847). The majority of his more important physical and chemical papers are contained in Poggendorff's *Annalen*.

OERTEL, őr'tel, MAX JOSEPH (1835-97). A German physician, specialist in diseases of the lungs and heart. He was born at Dillingen, studied at Munich, and in 1867 became docent of laryngology there, from which post he was promoted to a professorship in 1876. Oertel discovered the bacillus of diphtheritis in 1868, but is better known for his system of hill-climbing as a cure for faulty respiration or circulation. A device for examining the larynx, the laryngostroboscope, is one of his inventions. He contributed to Ziemssen's *Handbuch der speziellen Pathologie und Therapie*, Liebreich's *Encyclopädie der Therapie*, and other encyclopædic works. His most famous work is *Allgemeine Therapie der Kreislaufstörungen* (1884). Besides he wrote: *Ueber den laryngologischen Unterricht* (1878); *Ueber Terrainkurorte zur Behandlung der Kreislaufstörungen* (1887); *Pathogenese der epidemischen Diphtherie* (1887); *Massage des Herzens* (1889); and *Das Laryngostroboskop und seine Verwendung in der Physik, Physiologie und Medizin* (1895).

OESEL, ȳzel. A Russian island. See **ÖSEL**.

OESER, ȳzër, ADAM FRIEDRICH (1717-99). A German painter, etcher, and sculptor, born at Pressburg, Hungary. He was a pupil, in Vienna, of Van Schuppen and Daniel Graun at the Academy, where he was awarded the first prize in 1735, and of Raphael Donner in sculpture. In 1739 he went to Dresden, won reputation with portraits, executed mural paintings in Castle

Hubertsburg in 1749, and removed to Leipzig in 1759. Appointed director of the newly founded Academy there in 1764, he zealously opposed mannerism in art and was a stout champion of Winckelmann's advocacy of reform on antique lines. Among the numerous pupils he educated was Goethe, with whom he kept up friendly relations afterwards at Weimar. As specimens of Oeser's paintings may be mentioned "The Artist's Children" (1766, Dresden Gallery); "Marriage at Cana" (1777), and four others (Leipzig Museum); and "The Painter's Studio" (Weimar Museum). His best effort in sculpture is the monument of Elector Frederick Augustus (1780) on the Königsplatz in Leipzig. For his biography consult Dürr (Leipzig, 1879).

ŒSOPH'AGUS (Neo-Lat., from Gk. οἰσophάγος, *oisophagos*, gullet, from *οἶσιν*, *oiscin*, to be about to carry + *φαγέιν*, *phagein*, to eat), or **GULLET**. A membranous canal, about 9 inches in length, extending from the pharynx to the stomach, and thus forming a part of the alimentary canal. It commences at the lower border of the cricoid cartilage of the larynx, descends in a nearly vertical direction along the front of the spine, passes through an opening in the diaphragm, and thus enters the abdomen, and terminates in the cardiac orifice of the stomach opposite the ninth dorsal vertebra. It has three coats—viz. an external or muscular coat (consisting of two strata of fibres of considerable thickness—an external, longitudinal, and an internal, circular); an internal or mucous coat, which is covered with a thick layer of squamous epithelium; and an intermediate cellular coat, uniting the muscular and mucous coats. In this tissue are a large number of œsophageal glands, which open upon the surface by a long excretory duct, and are most numerous round the cardiac orifice, where they form a complete ring.

The œsophagus is liable to a considerable number of morbid changes, none of which are, however, of very common occurrence.

The most prominent symptom of *œsophagitis*, or inflammation of the œsophagus, is pain between the shoulders, or behind the trachea or sternum, augmented in deglutition, which is usually more or less difficult, and sometimes impossible. The affection is regarded as a very rare one, unless when it originates from the direct application of irritating or very hot substances, or from mechanical violence.

Spasm of the œsophagus—a morbid muscular contraction of the tube, producing more or less difficulty of swallowing—is a much more common affection than inflammation. The spasm generally comes on suddenly during a meal. Upon an attempt to swallow, the food is arrested, and is either immediately rejected with considerable force, or is retained for a time, and then brought up by regurgitation; the former happening when the contraction takes place in the upper part of the canal, and the latter when it is near the lower part. In some cases solids can be swallowed, while liquids excite spasm; while in other cases the opposite is observed; but in general either solids or liquids suffice to excite the contraction, when a predisposition to it exists. The predisposition usually consists in an excitable state of the nervous system, such as exists in hysteria, hypochondriasis, and especially in hydrophobia. An attack may consist of a single

paroxysm, lasting only a few hours, or it may be more or less persistent for months or even years. The treatment must be directed to the establishment of the general health. A temporary cure often follows the passage of a bougie.

Paralysis of the œsophagus is present in certain forms of organic disease of the brain or spinal cord which are seldom amenable to treatment. In this affection there is inability to swallow, but no pain or other symptom of spasm; and a bougie may be passed without obstruction. The patient must be fed by the stomach-pump.

Permanent or organic stricture of the œsophagus may arise from inflammatory thickening and induration of its coats. The most common seat of this affection is at its upper part. The symptoms are persistent and gradually increasing difficulty of swallowing, occasionally aggravated by spasm; and a bougie, when passed, always meets with resistance at the same spot. When the contraction is due to inflammatory thickening, it may arise from the abuse of alcoholic drinks or from swallowing boiling or corrosive fluids. If unrelieved, the disease must prove fatal, either by ulceration of the tube around the seat of the stricture, or by sheer starvation. When the affection is due to chronic inflammatory thickening, some advantage may be derived from dilatation by means of the œsophageal bougie. If it is dependent upon malignant disease, and the tissues have become softened by the infiltration of the morbid deposit, the bougie must be directed with the greatest care through the stricture, as a false passage may be easily made into important adjacent cavities.

Foreign bodies not very infrequently pass into the œsophagus, and become impacted there, giving rise to a sense of choking and fits of suffocative cough, especially when they are seated in its upper part. If the body is small and sharp (a fish-bone, for example), it may often be got rid of by making the patient swallow a large mouthful of bread; if it is large and soft (such as too large a mouthful of meat), it may generally be pushed down into the stomach with the probang; while large hard bodies (such as pieces of bone) should be brought up either by the action of an emetic or by long curved forceps. If the offending body can neither be brought up nor pushed down, it must be extracted by the operation of *œsophagotomy*—an operation which can only be performed when the impacted body is not very low down, and which it is unnecessary to describe in these pages.

Rupture of the œsophagus has occurred from violent vomiting during a state of intoxication and following a heavy meal. It is a fatal, but exceedingly rare accident.

ŒSOPHAGUS, COMPARATIVE ANATOMY OF THE. In length, structure, and appearance in cross-section, there is the greatest variety in different groups of animals, and, indeed, an œsophagus may be entirely wanting, as, for example, in Hydra, where the mouth opens directly into the digestive cavity. The cœlenterates are divided into two great classes according to the origin of the œsophagus: in one, the Hydrozoa, the œsophagus, when present, has arisen from the endoderm, while in the other, the Scyphozoa, it has been formed by an invagination of the ectoderm. In all animals above cœlenterates, where

a mouth is present, there is more or less of an œsophagus, but its appearance varies widely, with the form of the body. Long-necked animals have long œsophaguses as a rule, while in animals with little or no neck the œsophagus may be very short. In mammals its upper part is closely associated with the pharynx, and its muscles are striated (voluntary), but lower down the muscles are unstriated (involuntary). In birds the œsophagus is very extensible and capable of holding a considerable amount of food in storage, and this ability is greatly increased by the development of a special pouch or pair of pouches on the ventral side of its lower part, known as the 'crop.' This crop may be simply a sac for receiving the food or it may be an accessory digestive organ, the juices which it secretes serving to soften and macerate food stored in it. In pigeons during the breeding season this secretion becomes very abundant and milky in character, and is regurgitated into the mouths of the young along with macerated grain. Such food is popularly called 'pigeon's milk.' Regurgitation is very easy for all birds and is habitual with many as a means of defense, or (by lightening their weight) of escape. In both birds and mammals the œsophagus is a musculo-membranous tube, made up of an outer layer of longitudinal (contractor) muscle-fibres, then a layer of circular (constrictor) muscle-fibres, then loose connective tissue containing a thin layer of longitudinal fibres, and finally the glandular mucous membrane, which forms a lining, and is generally folded and plaited, often papillose, unless fully distended.

OESTERLEY, Ț'stēr-lt, KARL WILHELM (1805-91). A German historical painter, born at Göttingen, where he studied art-history at the university, before taking up painting in Dresden under Matthäi. After a sojourn in Rome (1825-29), he established himself as a lecturer at Göttingen, and in 1831 was appointed professor of art-history. He supplemented his studies in painting under Schadow at Düsseldorf (1835-38), then in Munich, where he gave his attention to the frescoes of Cornelius, and 1842 in Paris. In 1845, he became Court painter at Hanover. His best works include: "Jephtha's Daughter" (1835); "Leonore with Her Mother" (1847), after Bürger's ballad; "Memling Nursed by the Nuns at Bruges" (1866), all in the Hanover Museum. He also painted altarpieces and several portraits, and in fresco an "Ascension" (1838), in the Royal Chapel, Hanover. With Otfried Müller he edited at Göttingen *Denkmäler der alten Kunst* (1834-39). His son KARL (1839—), born at Göttingen, became a successful landscape painter. First instructed by his father, he studied afterwards under Bendemann and Deger at the Düsseldorf Academy, but turned from religious subjects, which he essayed originally, to landscape. His frequent study trips to Norway after 1870 resulted in the depiction of such scenes from those regions as "Raft Sound" (1879, Breslau Museum); "View on Salten Fjord" (1882, Hamburg Gallery); "Oldenvand on North Fjord" (1885, National Gallery, Berlin); and "Romsdal Fjord" (1891, Leipzig, Museum); all distinguished by lofty conception, brilliant coloring, and exquisite light effects.

OETINGER, Ț'ting-Țr, FRIEDRICH CHRISTOPH (1702-82). A German theologian. He was born

at Göttingen, in Württemberg, and studied at the University of Tübingen, where he devoted himself to the philosophy of Leibnitz and Wolf. He also became intimate with Bengel, Francke, Spangenberg, and Zinzendorf. After traveling extensively he was appointed reader of theology in the University of Halle. In 1738 he was appointed pastor at Hirschau and became the leader of the Pietists in that part of Germany. About this time he became an earnest student of the writings of the mystic Böhme, and also an ardent disciple of Emanuel Swedenborg, some of whose writings he translated into German. In 1765 he published a treatise entitled *Earthly and Heavenly Philosophy*, which, with his translation of the works of Swedenborg, brought upon him the reprehension of his ecclesiastical superiors. Yet he was protected by the Duke of Württemberg, and was nominated to the superintendence of the churches in the district of Weinsberg, afterwards in that of Herrenberg, and subsequently appointed prelate at Murrhardt. His works, about seventy in number, were edited by Ehmann (11 vols., Stuttgart, 1858-63), and his autobiography by Hamberger (ib., 1845). Consult his *Life* by Ehmann (Stuttgart, 1859), and Auberlen, *Die Theosophie F. C. Oetingers nach ihren Grundzügen* (Tübingen, 1847).

OETTINGEN, *O'ting-en*, ALEXANDER VON (1827—). A German theologian. He was born at Vissau, near Dorpat, and studied at Erlangen, Bonn, and Berlin. From 1854 to 1891 he was professor of theology at Dorpat. He published, among many other theological treatises, *Die Moralistik und die christliche Sittenlehre* (1868-74), which is his chief work; *Wahre und falsche Autorität* (1878); and *Theorie und Praxis des Heilrens* (1892).

O'FAR'RELL, MICHAEL JOSEPH (1832-94). A bishop of the Roman Catholic Church. He was born at Limerick, Ireland, educated at the Missionary College of All Hallows, and proceeded to the Seminary of Saint Sulpice, Paris, for his theological course. In 1855 he was ordained priest in Ireland. Intending to enter the Canadian mission, he returned to Saint Sulpice, but was retained at the institution for a year as professor of dogmatic theology, after which he went to Montreal, serving first as a member of the faculty of the Grand Seminary, afterwards as priest at Saint Patrick's and Saint Bridget's. In 1869 he went to New York as assistant at Saint Peter's, Barclay Street. He became pastor of the church in Rondout, N. Y., in 1872, but the following year returned to Saint Peter's as priest in charge. During his eight years' pastorate he established a school whose attendance numbered 700. On November 1, 1881, he was consecrated bishop of the newly created diocese of Trenton, N. J.

OFFA (?-796). A King of the Mercians in Anglo-Saxon England who succeeded the usurper Beornræd in 757. The kingdom was much weakened, and he probably spent the early years of his reign in restoring order at home. In 771 he began to conquer outlying territory; he defeated the Kentish forces in 775; and fought against the West Saxons (779) and the Welsh. (See **OFFA'S DYKE**.) Offa had cordial relations with the Roman See; won from the Pope the grant of a Mercian archbishopric; and sent yearly to Rome for charities 365 mancuses (ap-

parently the origin of 'Peter's Pence'), besides doing much for the benefit of the Church at home. He carried on a correspondence with Charlemagne, and promoted trade between England and the Continent.

OFFA'S DYKE. An ancient earthwork extending along the whole border between England and Wales and attributed to Offa, King of Mercia. Portions of this rampart still stand to a considerable height, though much of it has been almost obliterated by time and the elements. This structure, which represents a vast amount of labor, seems to have been intended as a line of demarcation between the Anglo-Saxon and Celtic populations of England and Wales respectively. On the eastern or English side of Offa's Dyke at varying distances from it is an inferior earth rampart called Watt's Dyke, and it is conjectured that the space between them may have been a neutral zone for trading purposes.

OFFENBACH, *öf'en-bäch*. The capital of a circle in the Grand Duchy of Hesse, Germany, on the Main, four miles east of Frankfort (Map: Germany, C 3). Its palace is the winter residence of the Isenburg-Birstein family, to whom the old castle, now in ruins, also belongs. Several churches and a Jewish synagogue are the only other edifices worthy of note. Offenbach is the principal manufacturing town in the grand duchy, its chief manufactures being leather goods, engines, tobacco, textiles and knit wares, chemicals, soap, jewelry, and carpets. Population, in 1890, 35,085; in 1900, 50,508. Offenbach was founded in the tenth century. In 1685 the Isenburg-Birstein family made it their residence. Its importance dates from the end of the seventeenth century, when many French Protestants took refuge within its walls. In 1815 it was united with the Grand Duchy of Hesse.

OFFENBACH, JACQUES (1819-80). A French operetta composer, born at Cologne, of Jewish parentage. He went to France in 1833, and studied the 'cello at the Paris Conservatory under Vaslin. Afterwards he played that instrument in the orchestra of the Opéra Comique and then became music director at the Théâtre Français. While at the latter theatre he wrote the *Chanson de Fortunio* for the *Chandelier* of Musset. He became director of the Bouffes-Parisiens in 1855 and produced his operas there until 1866, after which date they were brought out at different houses. In 1876 he made an unprofitable tour in America, which he described in *Notes d'un musicien en voyage* (1877). The libretto is an indispensable part of Offenbach's operettas. In the witty words and doubtful, if amusing, situations of Meilhac and Halévy lay the opportunities for his own best humor and most ironical caricature. For the rest his merry music, natural verve and extravagance, and the affluence of his ideas, made his operettas the highest form of the genre he created, and of which he remains the undisputed master. He died in Paris. His works include: *Les deux aveugles* (1855); *Le violoneux*, *le financier et le sacriste* (1856); *Croquer le dernier des paladins* (1857); *Le mariage aux lanternes* (1857); *La chatte métamorphosée en femme* (1858); *Orphée aux enfers* (1858); *Daphnis et Chloé* (1860); *Barkouf* (1860); *Monsieur et Madame Denis* (1862); *La belle Hélène* (1864); *Barbe-Bleue* (1866); *La grande-du-*

chasse de Gérolstein (1867); *La vie parisienne* (1866); *Robinson Crusoe* (1867); *Vert-Vert* (1869); *Les brigands* (1869); *La jolie parfumeuse* (1873); *Madame Favart* (1879); *La fille du tambour-major* (1879); *Belle Lurette* (1880); *Les contes d'Hoffmann* (1881); and many others. Consult Martinet, *Offenbach, sa vie et son œuvre* (Paris, 1892).

OFFENBURG, ôf'en-bōōrk. A town of Baden, Southern Germany, capital of the circle of the same name (Map: Germany, B 4). It is situated on a tributary of the Rhine, ten miles southeast of Strassburg. It contains ruins of old fortifications, numerous monuments, a town hall in the baroque style, and a gymnasium occupying an old Capuchin monastery. There are cotton and linen weaving and dyeing establishments, tanneries, breweries, and machine shops for the manufacture of agricultural machinery. The town has considerable trade in wine, timber, and cattle. Population, in 1890, 8576; in 1900, 13,664.

OFFERING (AS. *offrung*, *ofrung*, from *of-frian*, from Lat. *offerre*, to offer, from *ob*, toward, before + *ferre*, to bear; connected with Gk. *φέρω*, *pherein*, Skt. *bhar*, Goth. *bairan*, OHG., AS. *beran*, Eng. *bear*). A term primarily applied to the different forms of sacrifices in the Hebrew ritual. Offerings are of various kinds, as the burnt offering (*'ōlāh*), peace offering (*shelem*), thank offering (*tōdāh*), free-will offering (*nēdābāh*), meal offering (*minchāh*), sin offering (*chattāth*), guilt offering (*'āshām*), drink offering (*nesek*). The common Hebrew word for an offering in the sense of a ritualistic sacrifice is *qorbān*, which designates the sacrifice as something 'brought near' to the deity, or to the altar, and as such *qorbān* is occasionally used to designate a sacred gift in general. (See CORBAN.) Another term for offering in a more secular sense is *minchāh*, which is primarily a 'tribute' offered either by way of a compliment or for the purpose of retaining the good-will of an individual or a deity. In the Old Testament ritual *minchāh* has acquired the technical sense of a meal (or bloodless) sacrifice, in contrast to *zebach* (slaughter), which is invariably a 'bloody' sacrifice. Another specific form of religious offerings, though distinct from sacrifices, is the heave offering (*tērūmah*), denoting (a) that which is 'lifted off' or separated and used of the gifts taken from the soil (first-fruits, tithes, firstlings); (b) contributions of money and spoils of war offered for sacred purposes; (c) portions of the sacrifices and other dues belonging to the priests. See SACRIFICE; FIRST-FRUIT; OFFERTORY.

OFFERTORY (OF., Fr. *offertoire*, from Lat. *offertorium*, place where offerings are brought, from *offertor*, one who offers, from *offerre*, to offer). In the liturgical sense, an antiphon in the mass which introduces the more sacred part or *missa fidelium*, as the analogous introit (q.v.) does the *missa catechumenorum*. It is taken from the psalms (since the thirteenth century limited to a single verse, except in requiem masses), and varies with the season or festival. It is immediately followed by the oblation of the bread and wine: hence the name, which is incorrectly applied by many people to the collection sometimes taken up at this stage of the service. The name is also used for the musical composition which is rendered at that time, and which

may be an anthem, motet, or even a purely instrumental selection.

OFFICE (OF., Fr. *officier*, from ML. *officiarius*, officer, from Lat. *officium*, office, from *opus*, performance of work, from *opifex*, workman, from *opus*, work + *facere*, to do). In general, a delegated service or authority of a public or semi-public character. In practice the term is usually limited to positions of trust or authority under the Government or in a corporation or voluntary association. At the common law public office was not regarded as a public trust, but as a private emolument, and Blackstone in his book on property enumerates offices among incorporeal hereditaments. Thus conceived, a public office may, like other real property, be held in fee simple, in fee tail, for life, or for years, and it may even be made the subject of sale and be alienable by deed or will. Offices of this character have generally become obsolete or have been abolished, but in England certain honorary offices are still held by a species of tenure and descend to the heirs of the holder thereof. See CIVIL SERVICE.

An appointment to office carries with it, as an incident thereof, the right to its emoluments. Civil or public offices are usually classified as ministerial and judicial. An office is ministerial when its exercise depends on the command or direction of others; judicial, when the officer is called upon to employ his own discretion. An example of the first is a sheriff, of the second a judge of a court of law. The two are sometimes united in one. The office is held for the benefit of the public, and may be abolished by legislation, unless such action be expressly forbidden by the Constitution. When the office is in its nature judicial, the duties cannot be performed by deputy, as the personal skill and judgment of the officer are the reasons for his holding the office. With ministerial offices the reverse is the case. Thus a sheriff or other court officer may appoint deputies, and their acts are good in law; and the appointing officer remains responsible for such acts.

Statutes in most of the States provide that offices shall not be sold, and such a sale would be void anywhere as contrary to the policy of the common law. So any agreement between the officer and one who by influence procures his appointment, to divide the compensation received, would be altogether void. It was a principle of the common law that no term of office should be created so as to end at a certain time in the future, nor for a fixed term of years, but should be held for life or during good behavior. This was to prevent the holding of office after competency to perform the duties had ceased, and to render it impossible that the office should survive the officer. It is common in this country to limit the term to the life of the incumbent and to the attaining of a certain age, as seventy years. Two offices cannot be held by the same person where one is in the nature of its duties inconsistent with the other. This inconsistency may be patent from the nature of the offices or it may be declared to exist by act of legislation. Where an office is filled in common by several persons, it has been held that if the office is of a public character all the officers must meet for consultation, but that a majority may act, while if the office is private, all must concur; but this

is often governed by statute, and a decision by a majority, or even a majority of those present at any meeting, is made binding. Members of State or national legislatures are not usually termed officers, the word being confined in usage to those having executive or judicial authority. A *de facto* officer is one who is in possession of the authority and emoluments of an office without a good title thereto, while a *de jure* officer is one who has the legal right, but not necessarily actual possession. It is evident that it would make much confusion and cause great injustice if all official acts of a *de facto* officer were to be considered as of no effect. Thus, in the case of a judge who was wrongfully on the bench, it would be a great hardship if all judgments given by him, and all criminal convictions of his court, should be set aside. But if suit be brought by a *de facto* officer in his public capacity, he may be debarred from recovery on the ground of defect in title, and the *de jure* officer may test the question of title by bringing a writ of *quo warranto*. See **DE FACTO**.

Public officers are appointed in the United States, under the provisions of the Constitution, by the President with the advice and consent of the Senate, with the exception that to Congress is given the power to vest in the President alone, or in the heads of departments or courts of law, the appointment of 'inferior officers.' Ambassadors, public ministers and consuls, and Supreme Court judges are specified as not belonging to this 'inferior' class, but beyond that the distinction is not clearly defined. In the various States the appointment of public officers is regulated by statutes, and even in the case of Supreme Court judges election is common. The appointee in most cases is required to take an oath to perform faithfully the duties of the office. A bond is often required where the officer has charge of financial interests or his duties affect property rights. Where he performs official acts before giving bond or taking oath, such acts will be valid unless he has been specially prohibited by statute or Constitution from holding the office before the bond was filed or the oath administered.

Compensation of officers may be fixed by law or may be obtained from fees. It is provided in the United States statutes that no officer of the Government who holds an office with a salary of \$2500 or more shall receive extra compensation for performing the duties of any other office unless expressly authorized by law. Where an officer has been removed his salary will continue until proper notice of the appointment of his successor has been given him. Compensation does not begin until an officer is liable to duty.

The law will presume that a public officer is acting within the scope of his duty until the reverse has been shown. Where discretionary power is given, the officer is made the exclusive judge of the facts. The officer is liable for wrongful acts both to the injured party and to the State. In the first case remedy is by action, in the second by indictment or impeachment. The order of a superior is no bar to an action arising from an unlawful act of the inferior, nor is negligence on the part of a subordinate ground for holding the head officer responsible. Contracts made by public officers are governed by the general law of agency and they cannot bind the Government beyond the extent of their legal au-

thority. If an appropriation is exceeded, the officer is liable. A court officer cannot be held if acting under the proper order of a court having jurisdiction, but may be where there is no jurisdiction. If a sheriff seize property which is by law exempt, he is personally responsible.

The method of removing a public officer of the United States is not provided for in the Constitution, and the question arises whether the power belongs to the President alone or whether he must receive the consent of the Senate. The question has several times come before Congress, and the power of the President to act alone sustained by a very close vote. By statutes of 1867 and 1869 it was provided that a civil officer appointed by the advice and consent of the Senate shall hold his place until removed by the same authority, but that during a recess of the Senate the President may suspend such officer and appoint another to fill the duties of the position. The President is to make a nomination within thirty days after the beginning of the next session of the Senate; and in case the Senate directly refuse to confirm, he may nominate another person. These statutes are known as the tenure-of-office acts (q.v.). State officers may in many cases be removed by the Governor; the subject is governed by statutory enactments, which vary greatly in the different States. Elective offices cannot be vacated by an executive officer without showing cause, such as malfeasance or embezzlement. A term of office may be extended or reduced by action of the Legislature unless such action be prohibited by constitutional provision or the office be elective in its nature. Officers of the United States courts hold during good behavior, but those of the Territorial courts do not fall within the clause of the Constitution already referred to, and depend upon the action of Congress for the limitation of their terms. If neither State nor National Constitution prescribe the length of a term, the subject is under legislative control, and may be extended or shortened, or the office abolished altogether. See such titles as **DIRECTOR**; **SECRETARY**; **TREASURER**; **PRESIDENT**, etc.; and consult authorities under such titles as **CONTRACT**; **TORT**; **AGENT**; **ADMINISTRATIVE LAW**; **MUNICIPALITY**, etc.

OFFICE, HOLY, CONGREGATION OF THE. See **INQUISITION**.

OFFICE FOUND. In case of an inquest of office, a finding by the jury that the property which is the subject of the inquest is forfeited to the Crown or State. Such a finding, by which lands were formerly declared forfeited under the feudal laws, is now in the United States generally a necessary part of the proceedings that must be taken to enforce the forfeiture to the State of lands held by aliens who at common law are or become under a legal disability to hold lands vested in them, and also of the proceedings taken to vest in the State title to lands left by a person without any heir. The procedure, however, is rarely resorted to against an alien while living; and sometimes upon the death of an alien leaving no lawful heirs, and whose natural heirs are disqualified to take his lands, special statutes are passed waiving the forfeiture to the State and restoring the lands to the natural heirs. See **ALIEN**; **INQUEST** (of office); **FORFEITURE**.

OFFICER. In a general sense, a person who holds an office, or who is vested with authority to perform certain functions or do certain acts in the interest of, or in and about the management or direction of, a business or a government. As respects a private business the term is generally applied to certain members of a corporation who are specially intrusted with the management of its affairs, and upon whom service of papers is generally required to be made to be binding upon the company. Under this class are commonly included the president, directors, treasurer, secretary, and other persons similarly intrusted with an active participation in the affairs of the company by the constitution or by-laws. For further information as to the rights, duties, and liabilities of such officers, see such titles as CORPORATION; DIRECTOR; ULTRA VIRES; CONTRACT, etc.; and also consult the authorities referred to under CORPORATION; AGENT, etc.

With relation to governmental officers it has been said that the term 'office' "embraces the idea of tenure, duration, emolument, and duties." But it seems certain that emolument is not necessary to constitute one an officer, since there are numerous positions which are strictly termed 'offices,' but which carry no salary or emolument of any kind. It does appear necessary, however, that a Government position must have more than one of the characteristics mentioned to constitute the person holding it an officer. Thus, if a person simply performs such duties as are required of him by those employing him, and his responsibility is limited to these, and he receives no certificate of appointment, takes no oath, has no term of office, and exercises no powers and discharges no duties conferred upon him directly by law, he is not an officer, and he does not hold an office, although he is employed by public officers and is wholly engaged about public work.

An officer is to be distinguished from a mere employee. The most important basis of distinction is that an employee is such by virtue of a contract, while a person cannot be made an officer by virtue of a contract merely, but his position finds its source and limitations in some act of governmental power. The conception of an officer, however, does not depend in any way upon the character of the duties to be performed, nor is it essential that the officer should be invested with any power of compulsion, or that he should be permanently occupied in the discharge of official duties, or that his duties should or should not be discretionary. The only requirement that appears to be necessary is that the duties shall be discharged in the interest of the Government, and that the right to discharge them shall be based upon some provision of law, and not upon a contract. Governmental officers are commonly classified as *executive*, or those whose duties are mainly to enforce the execution of the laws; *legislative*, or those whose duties relate chiefly to the enactment of laws; *judicial*, or those whose duties relate chiefly to the interpretation and application of the laws; *ministerial*, or those whose duties are chiefly to carry out the lawful instructions of their superiors; *military*, or those having military commissions, and *naval*, or those having command in the navy. See such titles as EXECUTIVE DEPARTMENT; JUDGE, etc.

Another important classification is that of honorary officers and professional officers, *professional officers* being those who devote their entire

time to the discharge of public functions and are restricted by law from exercising any other occupation, and who receive a compensation sufficiently large to enable them to live without resorting to other means. *Honorary officers*, on the other hand, are those who do not devote their entire time to their public duties, but may at the same time carry on some regular business as a means of support, and receive a compensation which is insufficient for support, or merely nominal, or may receive no compensation at all. In the United States the legal distinction which most nearly corresponds to this is that between *lucrative* and *honorary* officers, the conception of professional officers being not yet fully worked out. The professional officer is characteristic of the bureaucratic administrative system, such as that which existed in Prussia from 1720 to 1808, and in France in 1800; the honorary officer is characteristic of the system of administration (called self-government) which existed in England in the eighteenth century. All existing systems of administration are formed by a combination of professional and honorary officers, the honorary-officer system predominating in the United States and the professional-officer system in Europe, especially upon the Continent.

Most officers become such by either appointment or election, the method of election being much more common in the United States and in England than in most other modern countries. The official relation is sometimes formed by drawing of lots, as in the case of the jury, or as a result of seniority, or sometimes by inheritance. In general it can be formed only in one of the ways recognized by law, and the acts of persons who assume to be officers without right are void both as against the public and third parties; but persons who, though not legally officers, are yet acting under cover of right are regarded as lawful officers for many purposes, and are called officers *de facto*. In England and in the United States, since the reign of Queen Anne, the rule has been that the title to an office is to be tried by the writ of quo warranto or an information in the nature of a quo warranto. One who is clearly entitled to an office may obtain possession of the insignia of office, the public buildings, records, etc., by mandamus.

The general obligations imposed upon officers are of two kinds: First, those which the law positively states that the officers must or must not do, and the violation of which is punished by penalties of criminal character. Second, those which arise from the very existence of the official relation, and which are maintained chiefly by the *esprit de corps* of the official body. When the *esprit de corps* is high the system of positive requirements is usually correspondingly weak.

For the rights and duties of various particular officers, and for further information, see the titles treating of various public officers, as BAILIFF, DEPUTY, NOTARY PUBLIC, etc.; also DE FACTO; ULTRA VIRES; CONSTITUTIONAL LAW, etc. Consult the authorities referred to under ADMINISTRATIVE LAW; GOVERNMENT.

OFFICER, PETTY. See PETTY OFFICER.

OFFICERS, MILITARY AND NAVAL, COMMISSIONED. See RANK AND COMMAND.

OFFICIAL PLANTS. See OFFICIAL PLANTS.

OFFICINAL PLANTS (ML. *officinalis*, relating to a shop, from Lat. *officina*, *opificina*, shop, from *opifex*, workman). Those medicinal plants which have a place in the pharmacopœias of different countries, and which are therefore sold—or some of their products or preparations of them—by apothecaries and druggists. The medicinal plants cultivated to any considerable extent are all official, but many are also officinal which are not cultivated. See **MEDICINAL PLANTS**.

A distinction should be made between officinal and official drugs. *Official drugs* include all those substances, whether vegetable, mineral, or animal, used as medicines, and recognized by the various pharmacopœias.

Official preparations are tinctures, syrups, fluids, extracts, emulsions, etc., made from official drugs, recognized by the pharmacopœia, and therein directed how to be prepared.

OFFSET, or **SET-OFF**. The splay or sloping part of a wall, etc., joining parallel surfaces when the upper face recedes from the lower. This frequently occurs on buttresses. The offset is usually protected with dressed stones, having a projection or drip on the lower edge to prevent the rain from running down the wall. In surveying an *offset* is a line perpendicular to a given straight line on which may be located at some measured distance a point. Such points on various offsets may determine the position of an irregular or inaccessible line and make it possible to map accurately a plot of land whose boundaries are unsymmetrical or difficult of access. See **SURVEYING**.

OFFSET. A lateral shoot, either a stolon or sucker, which strikes root and forms a new plant. Strawberries, multiplier onions, and black raspberries are familiar examples.

OFFSETS. See **SURVEYING**.

O'FLAHERTY, ó-flá'ér-tí, RODERIC (1629-1718). An Irish historiographer, born in Moycullen Castle, Galway. He was educated in his native county, made a special study of Irish history and literature, and published the results in *Ogygia, seu Rerum Hibernicarum Chronologia* (1685), the first scholarly work on the subject to reach England. His *Chorographical Description of West or H—Iar Connaught* was published by the Irish Archaeological Society in 1846, and his letters were edited by J. T. Gilbert (1895), but the author himself lost his property through revolutionary changes of government, and died in poverty.

OG, óg (Heb. 'Og, probably connected with 'Agag). An Amoritical King of Bashan, who is said to have lived at the time of the entrance of the Israelites into Canaan. The chief cities of his territory were Ashtaroth and Edrei, and he and his people were defeated at the latter place by the half-tribe of Manasseh which remained east of the Jordan (Deut. iii. 1-13; Josh. xiii. 12). Og is represented as the last of the Rephaim or giants. The story of his bedstead (Deut. iii. 11) may be based on the huge sarcophagi which Phœnician kings had made in imitation of Egyptian customs. Many other fables arose about Og, some of which found their way into the Jewish midrashic collections.

OGAM, óg'am (OIr. *ogam*, *ogum*, Ir. *ogham*, Gael. *oidheam*; perhaps connected with Gk. *ὄνομα*,

ogmos, row, Skt. *ajman*, course, from *aj*, Gk. *ἄγω*, *agein*, Lat. *agere*, to drive). The name of a script used in various ancient inscriptions in the British Isles. They are found chiefly in the southern parts of Ireland and Wales, and the earliest of them date from the fifth century. They number nearly three hundred in all. The language in almost every case is a primitive form of Gaelic, but some fourteen of them found in Scotland appear to be Pictish. The interpretation of these last is entirely doubtful, and scholars are not even agreed as to whether the Pictish language is Indo-European.

The invention of the ogams is assigned in Irish tradition to a god Ogma (one of the Tuatha de Danann), and this name corresponds very well to Ogmios, described by Lucian as a Gaulish Hercules. But the legend looks like an etymological afterthought; especially since the motive assigned to Ogma was the desire to invent a secret script which only the learned could use, whereas there appears to have been nothing cryptic about the old Ogam alphabet. There existed, to be sure, a kind of pedantic puzzle-speech, also called Ogam, some examples of which have been preserved in Middle Irish manuscripts. But this is to be carefully distinguished from the ancient Ogam alphabet used in inscriptions. The old alphabet was apparently known down to the Middle Irish period, and inscriptions or messages written in Ogam figure more or less frequently in the popular sagas.

The characters have been nearly all made out by recent investigation. They are usually cut along the edge of the stone and read from the bottom upward. In the alphabet which follows the horizontal line represents the edge upon which the notches and lines are graven:

||||| / / / / / ||| |||
bl.w.s.n. hdt.c. g.m.gn.f.n. a.u.e.i. p.or.e.

A few of the monuments are bi-lingual.

The inscriptions contain almost nothing besides proper names, but these are of great value for the light they throw upon primitive Celtic phonology and inflection. Compare the article on **IRISH LITERATURE**.

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OGASAWARA-SHIMA, ó-gil'sá-wü'rá-shé'má (Jap. islands (owned by) Ogasawara). The Japanese name of the Bonin Islands (q.v.).

OGDEN. A city and the county-seat of Weber County, Utah, 37 miles north of Salt Lake City; at the confluence of the Ogden and Weber rivers, and on the Union Pacific, Southern Pacific, Oregon Short Line, Ogden and North-

western, and Rio Grande Western railroads (Map: Utah, B 1). It is the seat of the State Industrial School (reformatory) and of State institutions for the deaf, dumb, and blind, of Sacred Heart Academy (Roman Catholic), and of Weber Stake Academy (Mormon). The principal buildings are the city hall, county courthouse, and several of the public school buildings. Union, Lester, and Liberty parks, respectively 5, 10, and 10 acres in area, are notable attractions. The Ogden Cañon, opening at the city limits, is noted for its wildly picturesque scenery and for its waterfall. A pipe line serves to convey an immense electrical energy supplying light, heat, and power for Ogden and Salt Lake City. The city has valuable natural advantages from its location in a productive agricultural, fruit-growing, and mineral region. An important railroad junction, it controls large commercial interests in an export trade in beet sugar, canned goods, grain, and fruit, and as a distributing centre for the surrounding country. Its industrial enterprises, also important, are represented by woolen mills, canning works, brick and tile works, a broom factory, pickle works, etc. Ogden was founded in 1848, was laid out as a city under the direction of Brigham Young in 1850, and was chartered in 1851. The original charter previously governing the city, dated 1861, was repealed by the Legislature of 1898, which enacted a general law for the government of cities and towns of the State. Under this statute, Ogden is governed by a mayor, elected every two years, a unicameral council, and administrative officials, of whom the clerk, auditor, treasurer, attorney, and police justice are chosen by popular vote, and all others appointed by the executive, subject to the consent of the council. Population, in 1890, 14,889; in 1900, 16,313.

OGDEN, AARON (1756-1839). An American soldier and lawyer, born at Elizabethtown, N. J. He graduated at Princeton in 1773, entered the Revolutionary army in 1777, and served until the close of the war, when he was discharged with the rank of major. In 1801 the Federalist Legislature of New Jersey chose him United States Senator, and in 1812 the same party elected him Governor of the State. He afterwards went into partnership with one Daniel Dod for the purpose of running a steamboat between Elizabethtown and New York, and this brought him into conflict with Livingston and Fulton, to whom the New York Legislature had granted the exclusive right to navigate the waters of that State with steamboats. This led to years of litigation and resulted in Ogden's financial ruin. From 1829 until his death he was president of the Society of the Cincinnati. Consult: Dayton, *Address Before the Whig and Philosophic Societies of the College of New Jersey* (Princeton, 1839); and *Collections of the New Jersey Historical Society*, vol. vii. (1872).

OGDEN, WILLIAM BUTLER (1805-77). An American railroad official. He was born at Walton, N. Y., and became a member of the New York Legislature in 1834. In 1835 he removed to Chicago, and upon its incorporation as a city in 1837 became the first mayor. He was instrumental in building the Galena and Chicago Railroad, of which he was made president in 1847. He advocated canal improvement, was president of the Chicago, Saint Paul and Fond du Lac

Railroad in 1855, and when, by the consolidation of smaller railroads, the Chicago and Northwestern was formed, he became its president. He was a strong advocate of the Pacific railroads, and was the first president of the Union Pacific Company. In addition to his railroad interests, he was largely engaged in lumbering in Wisconsin. He was also the promoter of many philanthropic and educational movements in Chicago.

OGDENSBURG. A city and port of entry in Saint Lawrence County, N. Y., 142 miles north by east of Syracuse. It is on the Saint Lawrence River, at its confluence with the Oswegatchie, and opposite Prescott, Ont., with which it is connected by steam ferry, and on the New York Central and Hudson River and the Rutland railroads (Map: New York, E 1). Among the prominent educational and charitable institutions are the Ogdensburg Free Academy, Saint Lawrence Hospital (State), city hospital, Saint John's Hospital, and United Helpers' Home. The city has also a fine United States custom-house and post-office, State armory, city hall, public library, Roman Catholic cathedral, and Riverside, Hamilton, Mansion, Crescent, and Grove parks. Ogdensburg, as the terminal of deep-water navigation on the Great Lakes, has regular steamship communication with the principal lake ports, and carries on an important trade in grain, lumber, and general produce, as well as manufactured products, principally lumber, brass curtain rods, silk, and skirts. Many of its industrial establishments utilize water power derived from the river. First settled in 1749, Ogdensburg was incorporated as a village in 1817 and received a city charter in 1868. The government, under the original charter as subsequently amended, the last revision in 1899, is vested in a mayor elected every two years; a unicameral council; and administrative officials, the majority of whom are either elected by the council or confirmed by that body upon nomination by the executive. The civil service commission is appointed by the mayor; and the board of education, one of whose members acts as president, is chosen by popular vote. The waterworks are owned and operated by the municipality. Population, in 1890, 11,662; in 1900, 12,633.

OGÉ, ô'zhâ', JACQUES VINCENT (c.1755-91). A Haitian revolutionist. He was born at Dondon, a free man, but a mulatto; served for several years in one of the German armies; and in 1789 was sent to the Constitutional Assembly as a representative of Haiti. When he returned to the island he petitioned the Assembly to free the slaves there. But he was unsuccessful and took up arms in the autumn of 1790, having organized a company in the United States. He won a few battles, then was defeated, and surrendered after receiving a promise that his life should be spared; but he was tried and sentenced to be broken on the wheel.

OGEE' (probably a corruption of *ogive*, on account of the form of the curve when viewed in perspective from below). A molding consisting of two curves, one concave and the other convex. It is called (in classic architecture) *cymatium* or *cyma reversa* (q.v., and see *MOLDINGS*). The ogee is also much used in Gothic architecture.

OGEE'CHEE LIME. An American tree. See TUPELO.

OGGIONE, ɔd-jō'nā, MARCO DA (c.1470-c.1540). An Italian painter, born at Oggiono, on Lake Como. A pupil and able imitator of Leonardo da Vinci, under whom he studied as early as 1490, he is best remembered for the excellent copies of his master's "Last Supper," one of which (in oil) is in the Royal Academy, London, another (in fresco) in the Brera Gallery, Milan, and a third, on a smaller scale, in the Hermitage, Saint Petersburg. In view of the almost total destruction of the original, the value of these faithful reproductions can hardly be overestimated. Of five fresco paintings executed for the Church of Santa Maria della Pace, Milan, the "Assumption" and "Marriage at Cana" are now in the Brera Gallery, which also contains a masterly canvas of "The Archangels Suppressing Lucifer." In the Louvre may be seen a "Holy Family," in the Berlin Museum a "Madonna," and in the Pinacoteca at Turin a "Christ Bearing the Cross."

OGIER (ɔ'zhyā') **THE DANE.** One of the most popular of Charlemagne's paladins, the hero of several of the chansons de geste of the Charlemagne cycle, the oldest form of which, "La Chevalerie Ogier de Danemarche," was edited by Barrois, and another version by Raimbert. Ogier, son of Godfrey, Duke of Denmark, was brought up as a hostage at Charlemagne's Court. His son being killed by the King's son, a long strife ensued, during which Ogier was long besieged in Castle-Fort, defending it with great valor. He inherited the Kingdom of Denmark, but gave it up to return to the French Court, and became one of Charlemagne's foremost champions. In extreme old age he was shipwrecked near the island of Avalon, and carried off by Morgan le Fay to her magic palace. A ring restored his youth, and a magic crown made him forget the past. Two hundred years later he returned to free France from invaders, probably Normans, after which he was carried away again by Morgan to Avalon. As the Danish national hero, Holger Danske, he still sleeps till danger wakes him. He figures in the literature of several countries. In English legends he is known as the father of Sir Bevis of Hampton, and appears in Morris's "Earthly Paradise."

OGILBY, ɔ'g'l-bī, JOHN (1600-76). A British author and publisher; born in or near Edinburgh. He accompanied Strafford, Lord Deputy of Ireland, to Dublin in 1633, and built a little theatre in Saint Werburg Street. The outbreak of the Civil War in 1641 ruined him, however, and he returned to London destitute. He then learned Latin and Greek, and translated Vergil, Æsop, and Homer. After the Restoration Ogilby enjoyed the favor of Charles II., and after a brief sojourn in Ireland he settled in London and became a publisher. The great fire of 1666 destroyed his printing house and stock, but he soon recovered, and during the next ten years published many fine works, several of which were illustrated with engravings by Hollar, Lombart, Faithorne, and others. During his latter years he devoted himself to the publication of works on geography and topography, freely illustrated with maps and engravings, among which were *An Embassy from the East India Company of the United Provinces to the Grand Tartar Cham,*

Emperor of China (1669); and the first volume of *Britannia*, a work which was to have comprised three volumes, but which was never completed, owing to its projector's death. Consult: Nicolson, *Historical Libraries* (new ed., London, 1796), and Conington's "English Translators of Vergil," in the *Quarterly Review* (London, 1861).

OGILVIE, ɔ'g'l-vī, CLINTON (1838—). An American landscape painter, born in New York. He studied in his native city under James Hart, and afterwards went abroad, where he spent much time, especially in France. In 1864 he was elected an associate of the Royal Academy. His landscapes are usually of Swiss or French scenes.

OGILVIE, JOHN (1797-1867). A Scottish lexicographer, born in Marnoch parish, Banff. The loss of a leg forced him to abandon physical labor at twenty-one, and he became schoolmaster while preparing himself for the university. In 1828 he graduated from Marischal College, Aberdeen. He taught privately in that city for three years, and was then mathematical master in Gordon's Hospital until 1859. He wrote *Imitations of Horace* (1831-32), in the Scottish dialect, for the *Aberdeen Magazine*; collaborated in Stackhouse's *History of the Bible* (1836); and from 1838 to the end of his life was engaged in revising and enlarging *Webster's Dictionary* under a new title, the *Imperial*, of which he published an abridgment in 1863, and a student's edition two years afterwards, which he abridged in 1867.

O'GIVE (Fr. *ogive*, *augive*, from ML. *augiva*, *ogive*, from Sp., Port., It. *auge*, highest point, from Ar. *awj*, highest point, zenith). The arch in Pointed Gothic vaulting which crosses the vault diagonally from one angle to another. By extension the term *ogive* is used to mean a Pointed arch, and French critics use it quite generally as synonymous with Gothic.

OGLESBY, ɔ'g'lz-bī, RICHARD JAMES (1824-99). An American soldier and politician. He was born in Oldham County, Ky., was orphaned at eight, studied law while living on a farm and working as a carpenter at Decatur, Ill., and began to practice at Sullivan, Ill., in 1845. He served as a lieutenant in the Mexican War, participating in the battles of Vera Cruz and Cerro Gordo. In 1847 he resumed his law practice at Decatur, and after a short course of study graduated at the Louisville Law School in 1848. During the gold excitement of 1849 he crossed the continent to the mining districts of California, but returned to Decatur in 1851. He was an unsuccessful candidate for Congress in 1858, but in 1860 represented his district in the State Senate. When the Civil War broke out he resigned his seat to accept the position of colonel of the Eighth Illinois Volunteers, and subsequently commanded a brigade at Forts Henry and Donelson, was promoted to the rank of brigadier-general of volunteers in March, 1862, and to that of major-general in November; served under Grant at Shiloh and under Halleck and Rosecrans at Corinth, where he was severely wounded, and commanded the Sixteenth Army Corps from April, 1863, to May, 1864, when he resigned from the service. He was afterwards Governor of Illinois from 1864 to 1869, for several months in 1873, and from 1884 to 1889; and from 1873 to 1879 was a member of the United States Senate.

OGLETHORPE, ō'g'l-thōrp, JAMES EDWARD (1696-1785). An English general and philanthropist, the founder of Georgia. He was born in London, December 22, 1696, and in 1710 entered the army. In 1722 he entered Parliament as member for Haslemere. The unhappy death of a friend in the debtors' prison drew Oglethorpe's attention to the horrible abuses of that institution. He brought the matter before Parliament, and was appointed chairman of a committee to investigate the subject. This experience led to the formation of a plan of colonization as a means of affording relief to insolvent debtors. In 1732 Oglethorpe and others obtained a charter granting them a tract of land in America, between the Altamaha and Savannah rivers. The plantation was called Georgia, in honor of George II., who was much interested in the project. Liberal subscriptions were made, and a Parliamentary grant of £10,000 was obtained. Oglethorpe was appointed Governor, and in November, 1732, sailed with 120 colonists, who founded the town of Savannah (q.v.). Oglethorpe was for nine years the guiding spirit of the settlement. Aside from his administrative activity, his claim to distinction in colonial history lies in his determined efforts to turn back the Spanish tide of colonization and conquest in the South. In expectation of an attack from the Spaniards at Saint Augustine, Oglethorpe organized the defenses of the little colony, and in 1738 he brought over a volunteer regiment of 600 men recruited in England. Upon the outbreak of the War of Jenkin's Ear in 1739, Oglethorpe successfully repelled an attack on Amelia Island, by the Spaniards, and in May, 1740, marched against Saint Augustine at the head of a force of 2000 militia and Indians, but in spite of the coöperation of a small fleet he was forced to abandon the attempt. In the spring of 1742 a threatened invasion of Georgia by a large Spanish force was repelled by Oglethorpe, who inflicted a severe defeat on the enemy at Frederica and thus assured the colony immunity from attack. In 1743 Oglethorpe was made brigadier-general, and in the same year he returned to England, a step rendered necessary by his financial obligations, most of which were incurred in advancing the necessary supplies for the defense of Georgia. During the Stuart invasion of 1745 Oglethorpe was accused by the Duke of Cumberland of failure to overtake the Jacobite fugitives when sent in pursuit of them. He was court-martialed, but acquitted. In 1752 he and the other trustees of Georgia resigned their charter, and the colony became a royal province. There is an admirable biography by Wright, *Memoirs of James Oglethorpe* (London, 1867). Consult also Lecky, *England in the Eighteenth Century*, vol. i. (New York, 1879). See GEORGIA.

OGMORE (ōg'mōr) **AND GARW**. A coal-mining town in Glamorganshire, Wales, 2½ miles southwest of Bridgend (Map: Wales, C 5). During the last decade much activity has been shown in the promotion of public industrial improvements. Of archæological interest in the neighborhood are Ogmores Castle, a Norman ruin; the remains of the twelfth century fortified priory of Ewenny; and Coity Castle and Church. Population, in 1891, 13,800; in 1901, 19,912.

O'GOR'MAN, THOMAS (1843—). An American bishop of the Roman Catholic Church, born

in Boston, Mass. He lived in Chicago and in Saint Paul, Minn., until 1853, and for twelve years thereafter studied in France. In 1867 he took a pastoral charge in Rochester, Minn., but left it in 1878 to become a member of the Paulist community in New York City for four years, and was then pastor at Faribault, Minn., until 1885. The following year he went to Saint Thomas College, Saint Paul, as professor of dogmatic theology, and was the first president of that institution. In 1890-95 he was professor of modern Church history in the Catholic University, Washington, D. C. He received his D.D. degree from the Pope in 1893, and in 1896 was consecrated Bishop of Sioux Falls, S. D. His publications include *A History of the Roman Catholic Church in the United States* (1895).

OGOWAI, ō'gō'wā', or **OGOVÉ**, ō'gō'vā'. The principal river of French Congo, equatorial West Africa. It rises about 150 miles northwest of Stanley Pool, and flows first northwestward through extensive savannas, and then westward through a dense forest region, where it leaves the inland plateau in a series of falls and rapids. Finally turning southwestward, it enters the Atlantic Ocean through a large delta in latitude 1° S. The Ogowai flows through a densely populated country, but, owing to its numerous rapids, its commercial importance is not as great as it was thought to be before its upper course was explored. Its length is over 700 miles, and it is navigable for small steamers a distance of 200 miles from its mouth. Along its banks are a number of European trading stations.

O'GRADY, STANDISH (1846—). An Irish author, and promoter of the Celtic Renaissance. He studied at Trinity College, Dublin, where he graduated with high honors. Then he read and practiced law, but gave it up for journalism, and that in turn for Irish history and legend, a field in which his studies and publications are very important. They include *The Bog of Stars*, legends of Elizabethan Ireland (1893), and other collections of tales; and historical essays: *History of Ireland* (1881); *The Story of Ireland* (1894); and, with Sir G. Carew, *Pacata Hibernia, or the Wars in Ireland* (1896).

O'GROW'NEY, EUGENE (1863-99). An eminent Irish Gaelic scholar, born at Ballyfallon, Athboy, Ireland. He entered the Diocesan Seminary of Saint Finans at Navan, and while there developed an interest in the Gaelic language and literature. Later, while a student in Maynooth College (1882-88), he devoted his leisure to the study of Irish history and antiquities. In 1889 he was ordained to the priesthood, and appointed a curate in the parish of Ballinacarrigy, County Westmeath. In 1890 he was appointed associate editor of the *Gaelic Journal*. Previously to this, during his vacations from Maynooth, he had paid several visits to the Aran Islands to learn the folk-tongue Irish, and in common with Professors Zimmer and Kuno Meyer, did much to establish the reputation of Inis Meadhoin as an Irish summer school. He afterwards held the reëstablished chair of Irish at Maynooth and later was elected a member of the Royal Irish Academy. He wrote many text-books, as well as numerous contributions to the current publications. In 1894 his health gave way, and he came to America, and settled in Arizona. He died at Los Angeles.

OGY'GES, or **OGYGUS** (Lat., from Gk. Ὀγυγῆς, Ὀγυγός). In Theban legend, one of the early kings of Bœotia, the son or grandson of Poseidon. In his reign a great flood took place in Bœotia, which destroyed cities on Lake Copais. His name was borne by one of the seven gates of Thebes, near which his grave was said to be. Later systematizing chronicles introduced Ogyges to Athenian legend, as King of Eleusis or even first King of Athens, while others transferred him to Egyptian Thebes. Whatever the origin of the name, there is much to show that Ogyges was originally the name in Bœotia of a sea-god like Poseidon.

OGYG'IA (Lat., from Gk. Ὀγυγίη). In Homer, the mythical island of Calypso, where she detained Odysseus. The word is originally an adjective, and describes the island as belonging to the sea-god Ogyges, whether identified with Oceanus or Poseidon. Later commentators tried to localize the island near Crete or Italy; in Homer its location is wholly indeterminate in the far West.

O'HA'GAN, THOMAS, first Baron (1812-85). An Irish jurist and statesman, born at Belfast. He was called to the Dublin bar in 1836, for the following four years he edited the *Newry Examiner*, and was afterwards associated with his friend Daniel O'Connell in lawsuits bearing upon national rights. He fell out of favor with the Patriot Party by his defense of the union with England, by his appointment to the Board of National Education in 1858, and to the Attorney-Generalship in 1862, but, despite opposition, he was sent to Parliament from Tralee in 1863. Five years afterwards, under Gladstone, O'Hagan was made Lord Chancellor of Ireland and served until 1874. He was the first Roman Catholic raised to that office during two centuries, and he took his seat in the House of Lords in 1870. In 1880 he was made vice-chancellor of the Royal University of Ireland, founded in that year, and the same year Mr. Gladstone, on his return to power, called him to resume the Lord Chancellorship of Ireland, but O'Hagan's health forbade his keeping it for more than a year, though he had time to make an eloquent appeal for the Irish Land Bill. His *Occasional Papers and Addresses* were published in 1884, and his *Speeches and Arguments* in 1885.

O'HARA, ô-hâr'â, THEODORE (1820-67). An American poet and soldier, born in Danville, Ky., February 11, 1820. After being educated at Bardstown, he studied law, was admitted to the bar, got an appointment at Washington, entered the army at the beginning of the Mexican War, and was brevetted major for gallantry. Afterwards he practiced law, flibustered in Cuba, performed diplomatic commissions and filled editorial posts, and in the Civil War served as colonel of an Alabama regiment and on staffs. After the war he engaged in the cotton business, but he suffered reverses. His body was removed to Kentucky and buried by the side of the victims of Buena Vista whom he had commemorated in his famous "Bivouac of the Dead," the only one of his occasional poems that keeps his memory fresh.

O'HIGGINS, ô-ê'gêns. An inland province of Chile, bounded by the Province of Colchagua on the south, Santiago on the north and west,

and Argentina on the east (Map: Chile, C 10). Area, 2524 square miles. The eastern part lies on the slope of the Andes and is very mountainous. In the west the surface is flat and well adapted for grazing, which, together with agriculture, is the chief occupation. Gold and other metals are found in the mountains. Population, in 1895, 85,277. The capital is Rancagua (q.v.).

O'HIG'GINS, Span. pron. ô-ê'gêns, AMBROSIO (c.1730-1801). A South American governor. He was born in County Meath, Ireland, and his original name was Ambrose Higgins; was sent by his uncle, a priest in Spain, to Buenos Ayres; there he set up as a peddler and finally crossed the country and settled in Chile. He entered the Spanish army, rose rapidly, and in 1788 received the appointment of Captain-General of Chile. The last five years of his life were spent as Viceroy of Peru, with the title of Marquis of Osorno.

O'HIGGINS, BERNARDO (1776-1842). A South American soldier, dictator of Chile. He was born at Chillan, was educated at Lima until he was fifteen and then in England, where he became intimate with Miranda; and after many strange adventures returned to Chile in 1802. He joined the patriots in 1810, and three years afterwards was appointed Carrera's successor. A breach between the two generals, which threatened civil war, seemed healed by the necessity of meeting the attack of the Spanish Army. O'Higgins, treacherously deserted by Carrera, was defeated at Rancagua (1814), and was forced to leave the country. In 1817 he returned as lieutenant of San Martin, and after the victory of the patriot army accepted the dictatorship, which his commander had refused. He was completely successful in driving out the Spaniards from Chile; but the aristocratic party distrusted his republican leanings and his attempts to introduce a liberal constitution. Under the followers of Carrera, they rebelled and deposed him in 1823. O'Higgins went to Lima, where he spent his remaining years.

OHIO (corruption of Iroquois *Ohionhiio*, beautiful river); popularly called the 'BUCKEYE STATE.' A north central State of the United States, lying between 38° 27' and 41° 57' north latitude, and between 80° 34' and 84° 49' west longitude. It is bounded on the north by Michigan and Lake Erie, on the east by Pennsylvania, on the southeast by West Virginia, on the southwest by Kentucky, and on the west by Indiana. Its southeastern and southwestern boundaries are formed by the Ohio River, while the others, with the exception of Lake Erie, are straight lines. The State measures 215 miles from east to west, and 210 miles from north to south. Its area is 41,060 square miles, of which 40,760 square miles or 26,086,400 acres are land-surface. It ranks thirty-second in size among the States.

TOPOGRAPHY. The surface is a rolling plain sloping gradually northward toward Lake Erie and southward toward the Ohio River from a low and flat ridge which forms the divide between the two water systems. This ridge crosses the State in an irregular line from near the northeastern corner to about the middle of the western boundary, keeping much nearer to the lake than to the Ohio River. The greater part of the State has an elevation of about 1000 feet, and the whole State about 1500 feet, except a point near Bellefontaine in the west-

central portion, where the altitude is 1540 feet. There are no marked irregularities in the surface except the trenches cut by the rivers, the Ohio River valley being lined with bluffs which in some places are 600 feet high. As noted above, the State is divided into two drainage basins. The northern portion is drained into Lake Erie by a number of streams which are all short except the Maumee, which flows through the northwestern part of the State from Indiana. The southern and much larger slope is drained into the Ohio River, some of whose tributaries in this State are of considerable size. These are the Muskingum, Hocking, Scioto, and Little and Great Miami. Muskingum is the longest river flowing wholly within the State, and is navigable for nearly 100 miles. The Ohio itself is navigable throughout its length on the boundary a distance of 436 miles. The other rivers of the State are chiefly important for water-power, some of them being very swift.

CLIMATE. The climate is in general pleasant and healthful, though variable, and subject to great and sudden changes of temperature. The mean temperature of the State for January is 26°, and for July 73°. The maximum may reach as high as 108° and the minimum 34° below zero, but extreme heat or cold is never very prolonged, on account of the variable winds. The southern half is the warmer, the heat of the northern portion being tempered by the presence of Lake Erie. In the north the winters are more severe, though seldom very rigorous in any part of the State. The average annual rainfall is 39.35 inches, very evenly distributed through the year, though there is a maximum in May and June.

SOIL AND VEGETATION. In the southeastern part the soil is formed directly from the decomposition of the underlying rocks, while in the remaining area, covering nearly two-thirds of the State, it consists of glacial drift of great fertility. This soil contains a great percentage of limestone material in the west, while in the northeast it consists chiefly of clay, and is well adapted for wheat-growing. The alluvial soil deposited along the river courses is excellent for the raising of Indian corn. The western part of the State lies within the great central prairie belt. The remainder was originally covered with forests, in which oak, chestnut, and maple predominated on the higher ground, and elm, beech, ash, and similar trees on the lowlands. The flora of the State partakes of the general character of the Northeastern United States and has few peculiar species.

For Fauna, see paragraph under UNITED STATES.

GEOLOGY. The principal feature in the geology of Ohio is the broad fold or anticlinal whose axis extends from central Kentucky and crosses southwestern Ohio near Cincinnati, thence running northwest into Indiana, while a branch axis runs northeast toward the western end of Lake Erie. From this axis the strata dip gently in either direction, so that a broad area of Silurian rocks is exposed, covering southwestern Ohio, southeastern Indiana, and north central Kentucky, with a narrower band along the branch axis toward Lake Erie. A small portion of this area near Cincinnati is composed of Lower Silurian rocks known as the Cincinnati group. On either side of the Silurian are narrower

outcrops of Devonian strata running on the one hand through central Indiana, and on the other through the whole length of Ohio a little west of the central line. The lateral outcrops of these strata along the branch axis occupy the northwestern corner of the State and a narrow belt along the entire southern shore of Lake Erie. The remainder of Ohio, including nearly the whole eastern half, consists of Carboniferous strata. The entire State seems to have been above sea level throughout the Mesozoic and Cenozoic eras, there being no formations later than the Carboniferous until we come to the glacial drift. This covers about two-thirds of the State, leaving the southeastern portion untouched by the ice invasion. The drift deposit is in some places several hundred feet thick, and consists of alternating layers of boulder clay, stratified sand, finely laminated clay, sandy clay, and gravel. Raised beaches showing the former extent of the Great Lakes have been traced through the State, and another interesting feature of the surface are the deeply carved river-valleys which are completely filled with debris, so that the rivers sometimes flow far above their former beds.

MINERAL RESOURCES AND MINING. Both the upper and lower coal measures contain several workable seams interbedded between strata of shale, limestone, sandstone, and clay, and ranging in thickness from two to over a dozen feet. It has been estimated that Ohio contains enough coal to supply the demand of the State for soft coal for 1000 years at the present rate of consumption. The interbedding strata of the coal measures yield fire-clay and building stone, and here also are found the iron ores of the carbonate variety. The Salina group of the Silurian strata near Sandusky contains valuable gypsum deposits, and salt deposits also occur at various places. One of the most remarkable events in the mineralogical development of Ohio was the discovery in 1884 of petroleum in the Trenton limestone formation of Lower Silurian age. This formation as well as the Upper Silurian inclosed also considerable reservoirs of natural gas.

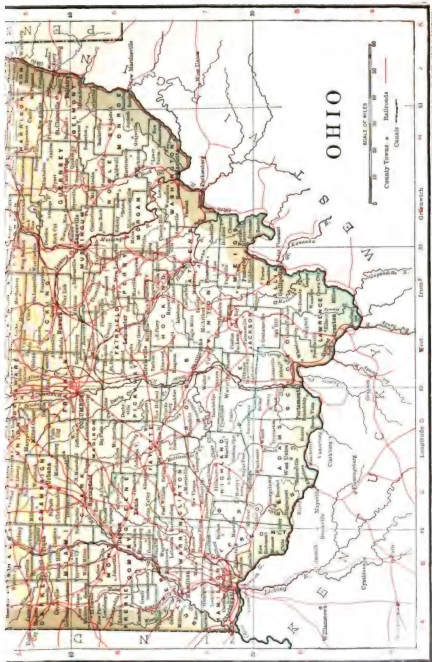
Ohio's output of coal increased from about 6,000,000 tons in 1880 to 13,562,000 tons in 1892. It did not exceed this figure again until 1898. In that year and in the two following years the increase was very rapid. The output in 1900 aggregated 18,988,150 short tons, amounting to 7 per cent. of the total output for the country. It was valued at \$19,292,246. Only a small amount of the coal output is used in the production of coke. The average number of employees engaged in the coal industry in that year was 27,628.

The petroleum development has been of recent date. Little had been produced prior to 1885, which year marks the beginning of the swift progress of the industry. The yield increased from 90,081 barrels in 1884 to 661,580 in 1885, 10,010,868 in 1888, and 23,941,169 in 1896. The last is the record year. The output for 1900 was 22,362,730 barrels, valued at \$24,091,601. This was much in excess of that of any other State, and was over one-fourth of the total output for the United States. The petroleum is obtained in two sections of the State, the southeast and northwest. The former is known as the Eastern district, and the latter—the more important—as the Lima district. In a third region, known

AREA AND POPULATION OF OHIO BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Adams.....	D 8	West Union.....	524	26,093	26,328
Allen.....	B 4	Lima.....	405	40,644	47,976
Ashland.....	F 4	Ashland.....	424	22,228	21,184
Ashtabula.....	J 2	Jefferson.....	601	43,655	51,448
Athens.....	F 7	Athens.....	528	35,194	38,730
Auglaize.....	B 4	Wapakoneta.....	304	28,100	31,192
Belmont.....	H 6	Saint Clairsville.....	611	57,418	60,875
Brown.....	C 7	Georgetown.....	430	29,899	28,277
Butler.....	A 7	Hamilton.....	498	48,597	56,870
Carroll.....	H 4	Carrollton.....	379	17,566	16,811
Champaign.....	C 5	Urbana.....	419	26,980	26,642
Clark.....	C 6	Springfield.....	403	52,277	58,939
Clermont.....	B 7	Batavia.....	431	33,553	31,610
Clinton.....	C 7	Wilmington.....	424	24,240	24,202
Columbiana.....	J 4	Lisbon.....	504	59,029	68,500
Coshocton.....	F 5	Coshocton.....	552	26,703	29,337
Crawford.....	E 4	Bucyrus.....	397	31,927	33,915
Cuyahoga.....	G 3	Cleveland.....	472	309,970	439,120
Darke.....	A 5	Greenville.....	604	42,961	42,532
Defiance.....	A 3	Defiance.....	412	25,769	26,387
Delaware.....	D 5	Delaware.....	431	27,189	26,401
Erle.....	E 3	Sandusky.....	312	35,462	37,650
Fairfield.....	E 6	Lancaster.....	493	33,939	34,259
Fayette.....	C 6	Washington C. H.....	444	22,909	21,725
Franklin.....	D 5	Columbus.....	479	124,087	164,460
Fulton.....	B 2	Wauseon.....	419	22,023	22,801
Gallia.....	F 8	Gallipolis.....	408	27,005	27,918
Geauga.....	H 2	Chardon.....	412	13,489	14,744
Greene.....	C 6	Xenia.....	453	29,820	31,613
Guernsey.....	G 5	Cambridge.....	484	28,645	34,425
Hamilton.....	A 7	Cincinnati.....	305	374,573	409,479
Hancock.....	C 3	Findlay.....	526	42,563	41,993
Hardin.....	C 4	Kenton.....	461	28,939	31,187
Harrison.....	H 3	Adiz.....	370	20,890	20,486
Henry.....	B 3	Napoleon.....	415	25,080	27,282
Highland.....	C 7	Hillsboro.....	558	29,048	30,982
Hocking.....	E 6	Logan.....	425	22,658	24,398
Holmes.....	F 4	Millersburg.....	439	21,139	19,511
Huron.....	E 3	Norwalk.....	516	31,949	32,390
Jackson.....	E 7	Jackson.....	411	28,408	34,248
Jefferson.....	J 5	Steuenville.....	390	39,415	44,357
Knox.....	F 5	Mount Vernon.....	514	27,600	27,768
Lake.....	H 2	Palmyra.....	242	18,235	21,680
Lawrence.....	E 8	Ironton.....	469	39,556	39,534
Licking.....	F 5	Newark.....	665	43,279	47,070
Logan.....	C 5	Bellefontaine.....	470	27,986	30,420
Lorain.....	F 3	Elyria.....	494	40,205	54,857
Lucas.....	C 2	Toledo.....	356	102,396	153,559
Madison.....	D 6	London.....	451	20,057	20,530
Mahoning.....	J 3	Youngstown.....	413	55,979	70,134
Marion.....	D 4	Marion.....	502	24,727	28,678
Medina.....	F 3	Medina.....	423	21,742	21,958
Meigs.....	F 7	Pomeroy.....	435	29,813	28,620
Mercer.....	A 4	Celina.....	466	27,220	28,021
Miami.....	B 5	Troy.....	417	39,754	43,105
Monroe.....	H 6	Woodfield.....	431	25,175	27,031
Montgomery.....	B 6	Dayton.....	489	100,852	130,146
Morgan.....	G 6	McConnellsville.....	396	19,143	17,805
Morrow.....	E 4	Mount Gilead.....	395	18,120	17,879
Muskingum.....	F 6	Zanesville.....	655	51,210	53,185
Noble.....	G 6	Caldwell.....	369	20,753	19,466
Ottawa.....	D 3	Port Clinton.....	292	21,974	22,213
Paulding.....	A 3	Paulding.....	415	25,932	27,528
Perry.....	F 6	New Lexington.....	413	31,151	31,841
Pickaway.....	D 6	Circleville.....	474	26,959	27,016
Pike.....	D 7	Waverly.....	411	17,482	18,172
Portage.....	H 3	Ravenna.....	569	27,808	29,246
Preble.....	A 6	Eaton.....	432	23,421	23,713
Putnam.....	B 4	Ottawa.....	475	30,188	32,525
Richland.....	E 4	Mansfield.....	514	38,072	44,289
Ross.....	D 7	Chillicothe.....	646	39,454	40,940
Sandusky.....	D 3	Fremont.....	429	30,617	34,311
Scloto.....	D 8	Portsmouth.....	565	35,377	40,981
Seneca.....	D 3	Tiffin.....	526	40,869	41,163
Shelby.....	B 5	Sidney.....	401	24,701	24,625
Stark.....	H 4	Canton.....	546	84,170	94,747
Summit.....	G 3	Akron.....	394	54,089	71,715
Trumbull.....	J 3	Warren.....	624	42,373	46,591
Tuscarawas.....	H 5	New Philadelphia.....	533	46,618	53,751
Union.....	D 5	Marysville.....	429	22,860	23,342
Van Wert.....	A 4	Van Wert.....	411	29,671	30,394
Vinton.....	E 7	McArthur.....	414	16,045	15,339
Warren.....	B 7	Lebanon.....	439	25,498	25,584
Washington.....	H 7	Marietta.....	627	42,380	48,245
Wayne.....	G 1	Weseter.....	544	34,005	37,879
Williams.....	A 2	Bryan.....	432	24,891	24,933
Wood.....	C 3	Bowling Green.....	626	11,092	11,555
Wyandot.....	D 4	Upper Sandusky.....	493	24,732	24,125





as the Mecca-Belden district, small quantities of lubricating oil are obtained. The utilization of the State's natural gas resources is also of recent development. There are two gas fields corresponding in a general way with those of petroleum. The extensive use of gas for fuel began in the Eastern district in the early seventies. The value of the gas burned in 1880 was estimated at over \$5,000,000. The product was extravagantly consumed, and the supply soon became exhausted, so that in 1885 the value of the product was only about \$100,000. The development of the gas fields in the northwest part of the State began at Findlay about this time, and the value of the output rapidly increased until 1889, when it exceeded that of any previous year. After 1889 the output declined steadily until 1898, since when its value increased again, amounting in 1900 to \$2,178,234. From 1890 to 1900 the State was exceeded in rank with respect to the output of natural gas by Pennsylvania and Indiana, and since 1890 by West Virginia.

Ohio ranks first in the annual value of clay products, contributing 17.3 per cent. (1900) of the total output for the country. Their value increased from \$10,860,934 in 1890 to \$18,504,628 in 1900. Of the latter amount, \$8,573,323 represented the value of the pottery (see MANUFACTURES), and \$9,731,305, the brick and tile. The State regularly ranks first in the figures for the sandstone product. From an annual value of over \$3,000,000 in the earlier years of the decade 1890-1900, Ohio's product fell to about half that amount, but rose in 1900 to \$2,233,596, including grindstones and whetstones. Of these it produces over four times as much as all the rest of the country, the value for 1900 being \$549,636. The output of limestone for the same decade fluctuated in value around \$1,500,000, approximately half the product being burned into lime. Considerable quantities of cement are annually manufactured. Iron ore was mined at an early period, and was of great importance to the industrial development of the State. Recently, however, iron-mining has become of less importance, both relatively and absolutely. From 344,484 tons in 1886 the output fell gradually to 61,016 tons in 1900, the entire product being of the carbonate variety of ore, and giving Ohio first rank in the production of carbonate ore. In 1900 sales of mineral water were reported from fifteen springs. In the same year the production of salt amounted to \$696,326, giving the State fourth rank.

FORESTS AND FOREST PRODUCTS. The greater part of Ohio was originally covered with forests of hard wood, largely white oak. Scarcely any of the primeval forests remain. The wooded area in 1900 was estimated at 9300 square miles, or 23 per cent. of the total area. The value of the lumber and timber products (see table below) was greater for 1900 than for any previous census year. The abundance of forests early gave rise to a number of industries, such as the manufacture of planing-mill products, furniture, etc., which have continued important, although much of their timber supply is now imported from other States.

AGRICULTURE. There is little waste land in the State. In 1900, 93.9 per cent. of the total land area was in farms. The proximity of large city markets and the excellence of the trans-

portation facilities help to stimulate agriculture. Every decade from 1850 to 1900 shows an increase in the area of improved land, which amounted in both 1890 and 1900 to 78.5 per cent. of the total farm area. The average size of farms decreased from 125.2 acres in 1890 to 88.5 acres in 1900. The farms operated by tenants in 1900 were 27.5 per cent. of the total number. Farm renting is becoming more common. The farms leased on share are more than twice as numerous as those leased for cash.

From the table appended it will be noticed that no particular agricultural products receive a monopoly of attention. In the variety of its farm yield the State has ranked high since the first settlement of the West. The staple products are grown throughout the State, there being only a slight difference in the adaptability of the different sections. The area of corn, wheat, and hay each exceeds three million acres, though the two last attained that record for the first time in 1900. From 1890 to 1900 the acreage of wheat increased 41.4 per cent. and the acreage of corn 20 per cent. Oats are also extensively grown, but this crop decreased in area during that decade. Rye, barley, and buckwheat are not extensively raised. Ohio is one of the largest producers of Irish potatoes, and the large city markets have given rise to the extensive raising of other varieties of vegetables—sweet corn, tomatoes, and cabbage being particularly important. The area devoted to tobacco increased 61.2 per cent. from 1890 to 1900, the rank of the State in 1900 being fourth. Over 43 per cent. of the area devoted to tobacco in 1900 lay in the counties of Montgomery and Darke. Ohio is probably the largest producer of temperate zone orchard fruits. Fifty-nine per cent. of the trees, or 12,952,625, are apple. The yield of this crop in 1900 was 20,600,000 bushels. The number of peach and pear trees was three times, and of plum and prune trees six times, as great in 1900 as in 1890. The region around Lake Erie is especially favored for fruit-raising. This region has become noted for its numerous and extensive vineyards. Large quantities of small fruits are grown. The use of fertilizers, estimated on the basis of cost, increased 68.2 per cent. from 1890 to 1900, amounting in the latter year to an average of \$10 per farm.

The following table of crop acreages is self-explaining:

CROP	1900	1890
Corn	3,826,013	3,189,553
Wheat	3,209,074	2,269,585
Oats	1,115,149	1,215,355
Rye	17,585	59,643
Buckwheat	13,071	14,062
Barley	34,058	37,092
Hay	3,015,261	2,992,026
Tobacco	71,422	44,303
Potatoes	167,590	185,393

STOCK-RAISING. Stock-raising is characterized by the same diversity as is the cultivation of crops. Ohio holds a prominent place in dairy-ing. The number of dairy cows has increased each decade since 1870. The production of milk gained 30.3 per cent. from 1890 to 1900. The receipts from sales of dairy produce in 1900 were \$15,484,849, or 61 per cent. of the value of the total product. Of this amount, \$8,303,626 was derived from the sale of milk, and most of

the remainder from butter. The State is noted for sheep-raising, having for a long time led in the number of sheep, but there was a large decrease from 1890 to 1900. The average weight of fleeces, however, increased in this last decade, and in 1899 \$4,299,025 was received from sales of wool. There was a significant gain from 1890 to 1900 in the number of cattle. The number of swine has remained about the same since 1880. Poultry is an important source of income.

The following table of holdings of stock explains itself:

	1900	1890
Dairy cows.....	818,239	794,833
Other cattle.....	1,235,074	968,584
Horses.....	874,205	880,677
Mules and asses.....	17,021	18,858
Sheep.....	2,648,260	4,000,729
Swine.....	3,188,563	3,275,922

MANUFACTURES. Until 1880 Ohio ranked fourth in the United States in the value of manufactured products, being exceeded in that year for the first time by Illinois. It has since held fifth place. The greatest absolute increase both in the value of products and the number of wage-earners employed was made between 1880 and 1890. In 1900 the value of products was estimated at \$832,438,000, and the wage-earners numbered 345,869, or 8.3 per cent. of the population.

The early settlers were mainly from the Atlantic coast States, and brought with them a knowledge of industrial methods which enabled them to begin at once a diversity of industries for the supplying of local needs. The local requirements were soon outgrown, however, in consequence largely of the superior advantages of transportation, which gave the industries easy access to the resources of raw materials outside the State, and to the markets of an extensive and rapidly developing region. The Ohio River on the south afforded communication with the States of the Mississippi Valley. Lake Erie on the north gave the State the advantages of the lake system of transportation, and, after the building of the Erie Canal, afforded communication with the Atlantic coast. The two systems of transportation were early connected by two canals, and these waterways determined the location of the early industrial centres, three of which, Cincinnati, Cleveland, and Toledo, were especially favored by their positions at the junction of the artificial with the natural waterways. They still hold their industrial precedence.

From 1800 to 1850 Cincinnati not only far surpassed all other cities in the State, but was the metropolis of the West. From 1890 to 1900, however, there was a decrease in both the value of its products and the number of its wage-earners. Cleveland by contrast has rapidly grown, and now surpasses all Ohio towns in importance as to manufactures. What has brought Cleveland and other cities in the northeastern part of the State into recent prominence is the advantage they enjoy in the manufacture of iron and steel. This has become the State's leading industry. The first iron and steel establishment was in this section of Ohio, but as the forests, which supplied the charcoal used as fuel, became exhausted,

the industry shifted to the southern part. The revival of iron and steel manufacture in the northeastern part was due to the development of the Lake Superior iron mines and the easy transportation afforded by the Great Lakes to this section of Ohio, together with the fact that the coke-producing regions of Pennsylvania were near. Youngstown, near which place the industry originated, has become the largest producer of iron and steel in Ohio. Since 1870 the State has ranked next to Pennsylvania, and between 1890 and 1900 its product more than doubled in value. The closely allied tin and terne-plate industries are also rapidly developing. The prominence of the iron and steel industry and the convenient resources of coal have exercised a beneficial influence on the manufacture of foundry and machine-shop products—the second largest industry in the State. This branch early attained large proportions at Cincinnati, which city was favored by its location on the Ohio River and its nearness to the coal and iron regions farther east. The industry has since developed generally throughout the State, Cleveland having become the largest centre. From 1890 to 1900 there was a gain of 68 per cent. in the value of the product. In the construction of merchant vessels Cleveland now ranks first among the cities of the United States.

In 1900 Ohio led all States in the manufacture of metal-working machinery. The large steam railway interests have led to an extensive car and general shop construction industry, and the increased use of electricity has occasioned a rapid development in the manufacture of electrical apparatus and supplies. From the first the preëminence of Ohio in agriculture has been a potent factor in manufacturing, having created a market for certain products, and supplying raw materials for others. A number of towns are best known by their manufacture of agricultural implements and wagons and carriages. The local iron and steel supply and the native forests within or near the State boundaries have afforded the chief raw materials required. The products of the farms in turn have occasioned a large slaughtering and meat-packing output, extensive manufactures of liquors, and a large production of flour, grist and tobacco products, and food preparations. In 1900 Ohio ranked third in the value of flour and grist-mill output, and also in the value of liquor products. Toledo ranks first in the production of the former, and Cincinnati in that of the latter. Cincinnati is also the largest centre of the slaughtering and tobacco interests. Being located close to the junction of the three largest swine-raising States, Cincinnati was, from 1800 to 1850, the largest meat-packing centre in the United States. The importance of the tobacco manufacture of that city is due to the fact that it is surrounded by one of the largest tobacco-growing regions in the United States. Akron is the chief producer of food preparations, an industry which enjoyed a sixfold increase from 1890 to 1900. Other industries which depend upon the resources of the State include the manufacture of glass, pottery and other clay products, and the refining of petroleum. When the natural gas supply partially failed, some of the glass factories removed to the Indiana gas fields. The value of the output for Ohio has therefore decreased. The value of the pottery products, on the con-

trary, more than doubled during the decade ending with 1900. East Liverpool, on the Ohio River, produces nearly one-half of the white

the percentage of the value of products has increased much more than that of the number of establishments:

INDUSTRIES	Year	Number of establishments	Average number wage-earners	Value of products, including custom work and repairing
Total for selected industries given below for State.....	1900 1890	9,557 7,997	213,545 169,057	\$547,619,814 402,134,891
Increase, 1890 to 1900.....	.....	1,560	44,488	145,484,923
Per cent. of increase.....	.....	19.5	26.3	36.2
Per cent. of total of all industries in State.....	1900 1890	29.5 27.9	61.7 57.7	65.8 62.7
Iron and steel.....	1900 1890	107 101	33,677 23,546	138,935,256 65,206,828
Foundry and machine shop products.....	1900 1890	861 600	41,799 24,795	72,399,632 43,617,072
Cars and general shop construction and repairs by steam railroad companies.....	1900 1890	91 64	11,534 7,397	12,975,182 8,096,905
Electrical apparatus and supplies.....	1900 1890	64 11	3,773 348	6,504,847 604,780
Agricultural implements.....	1900 1890	78 106	6,852 7,701	13,975,268 14,333,258
Carriage and wagon materials.....	1900 1890	109 99	4,529 2,697	7,186,271 4,310,607
Carriages and wagons.....	1900 1890	543 709	7,274 9,493	15,919,173 18,777,866
Flouring and grist-mill products.....	1900 1890	1,150 919	2,438 3,311	37,390,367 39,468,409
Slaughtering.....	1900 1890	71 138	1,765 1,346	20,660,780 17,012,198
Soap and candles.....	1900 1890	55 49	1,427 1,013	8,150,069 5,746,660
Liquors: total.....	1900 1890	190 179	3,978 3,666	31,771,501 28,484,290
Tobacco.....	1900 1890	1,196 995	12,189 8,259	20,832,629 16,387,719
Food preparations.....	1900 1890	31 35	1,100 270	7,166,532 1,020,842
Coffee and spice, roasting and grinding.....	1900 1890	26 32	678 488	5,849,644 7,806,763
Glass.....	1900 1890	28 69	4,546 0,435	4,547,063 5,649,182
Pottery, terra cotta, and fire-clay products.....	1900 1890	248 125	11,870 4,806	11,851,225 5,047,501
Petroleum, refining.....	1900 1890	9 15	1,008 1,976	8,396,977 16,343,493
Clothing, men's, factory product.....	1900 1890	559 508	6,521 15,210	16,593,824 20,604,134
Clothing, women's, factory product.....	1900 1890	126 81	4,817 2,546	7,772,771 4,352,098
Boots and shoes, factory product.....	1900 1890	81 63	12,718 5,743	17,920,854 8,489,728
Leather—tanned, curried and finished.....	1900 1890	58 113	1,384 1,447	5,182,065 6,701,670
Rubber and elastic goods.....	1900 1890	19 7	3,505 658	7,330,104 1,486,777
Printing and publishing: total.....	1900 1890	1,253 987	11,021 9,026	20,391,868 17,198,851
Lumber and timber products.....	1900 1890	2,054 1,461	8,539 11,727	20,790,854 15,279,843
Lumber, planing mill products, including sash, doors and blinds.....	1900 1890	354 335	4,696 5,356	11,066,671 12,910,538
Furniture, factory product.....	1900 1890	165 215	6,723 7,076	9,514,764 9,988,129
Paper and wood pulp.....	1900 1890	51 50	3,184 2,921	6,543,513 7,209,750

ware manufactured in the United States. Yellow ware is manufactured at Zanesville and other points.

The manufactures of clothing, boots and shoes, leather, and rubber and elastic goods are all important. The value of the boots and shoes manufactured in 1900 was twice that for 1890, and the value of the rubber and elastic goods increased fivefold during the same period. Ohio has always been the largest boot and shoe manufacturing State west of the Alleghany Mountains, and only three cities, all located in Massachusetts, rank in this line ahead of Cincinnati.

The following table with respect to the leading industries explains itself. It will be seen that

TRANSPORTATION AND COMMERCE. Ohio ranks fifth in its total railroad mileage; and in its mileage per 100 square miles of area—21.61 miles—it is exceeded by only one other of the large States. The first railroad built in Ohio, the Mad River and Lake Erie, now a part of the Big Four System, was chartered in 1832. By 1850 the mileage had increased to 572 miles; in 1870, 3538 miles; in 1890, 7980 miles; and in 1900, 8885 miles. In 1901 there were 100 railroad companies represented in the State. Among the longer lines were the Baltimore and Ohio Southwestern, the Cincinnati, Hamilton and Dayton, the Cleveland, Cincinnati, Chicago and Saint Louis, the Hocking Valley, the Lake Shore

and Michigan Southern, the New York, Chicago and Saint Louis, the Pittsburg, Cincinnati, Chicago and Saint Louis, the Toledo and Ohio Central, and the Wheeling and Lake Erie. In recent years there has been a decided tendency toward centralization of the railroads. In 1901 there were 858,815,080 passengers carried one mile; the average distance which passengers were carried was 25.73 miles; and the average receipt per passenger per mile was \$.025. In the same year there were 12,450,261,839 tons of freight transported one mile, the average distance haul per ton being 72.18 miles, and the average amount received per ton mile \$.013. Ohio leads every State in the extent of its interurban electrical railways. It is now possible to cross the northern part of the Commonwealth on electrical lines, or to go from Newark to Cincinnati. Cleveland, Toledo, Columbus, and Dayton are important centres for electrical lines.

Ohio has three United States customs districts, of which the ports of entry are Toledo, Sandusky, and Cleveland. Cincinnati also is a port of entry in the district of Louisiana for the State of Ohio. These customs ports represent only the foreign imports and exports which the position of Ohio on the lakes, adjoining Canada, and in communication with ocean commerce through the Canadian canals and the Saint Lawrence, enables the local merchants to make direct to and from foreign countries. The same may be said of Cincinnati, though its foreign trade has to be carried much more indirectly through the Ohio and Mississippi rivers. The foreign commerce of Ohio is, however, insignificant compared with the vast domestic commerce east, west, north, and south, along the State's lakes, railways, canals, and great river. Lake Erie is still the greatest single highway of commerce for the State, and the Government has improved several of its harbors. Those at Cleveland and Sandusky are the finest in the State. Sandusky Bay extends inland about eighteen miles, and admits the largest lake vessels to wharf. Cleveland figures most prominently in the lake commerce. Formerly the canals were expected to be second only to the lake and the Ohio River in volume of commerce, but the railways have far surpassed them in carrying facilities. The great value of the canals is now to force low rates upon the railway system by their cheaper, though slower, transportation. The canals now operated comprise the Ohio Canal, completed in 1835, extending from Cleveland to Portsmouth, 309 miles long; the Miami and Erie Canal, completed in 1835, extending from Cincinnati to Toledo, 250 miles long; the Hocking Canal, a branch of the Ohio, completed in 1843, extending from Carroll to Nelsonville, 42 miles long; and the Walhonding Canal, completed in 1843, extending from Rochester to Roscoe, 25 miles long. There is also a large mileage of artificial feeders and slack-water navigation.

BANKING. In 1803 a trading company was chartered with the privilege of doing a banking business. From 1808 to 1813 five more banks were incorporated, each by a special act of the Legislature. The banks did a prosperous business, and when in 1817 a branch of the first United States Bank was established in Cincinnati it called forth strong opposition. The State made an effort to drive out this branch by special taxation, but was defeated in the United States Supreme Court.

Some 25 banks were established in the following twenty years, and when in 1836 the second United States Bank made an effort to establish a branch, a special act was passed prohibiting it. A large number of unauthorized banking institutions sprang up between 1840 and 1850, and their currency flooded the State. Several of them failed and caused losses to the holders of currency. To correct the evil, the State in 1845 strictly prohibited any one from engaging in the banking business without special authority of the State; but the law did not prove sufficient, and in 1851 the State was forced to pass a free banking law. In 1863 almost all the State banks became national. Since then the national banks have remained the more popular. In the panics of 1873, 1884, and 1893 the numerous bank failures were practically limited to the private and State banks. A reaction in favor of State banks came toward 1900, when the high prices of the United States bonds made the advantages of national banking unattractive. Savings banks have existed in Ohio since 1850, but the institutions do also a commercial business.

The condition of the various banks in 1902 is shown in the following table:

	National banks	State banks	Private banks	Savings banks
Number.....	211	225	91	4
Capital.....	\$50,545,000	\$24,820,000	\$4,330,000	.....
Surplus.....	16,858,000	5,906,000	844,000	\$2,437,000
Cash, etc.....	22,455,000	7,166,000	1,391,000	743,000
Deposits.....	185,468,000	142,913,000	20,246,000	44,180,000
Loans.....	202,388,000	114,161,000	18,123,000	15,796,000

FINANCES. The first debt of the State was created in 1825, when the construction of several important canals was begun. In 1835 the debt amounted to \$4,500,000. The State continued to subscribe to railroad, turnpike, and canal companies, until in 1843 it had a public debt of \$16,880,000, in 6 and 7 per cent. bonds, and interest charges of \$1,022,000. Simultaneously with the loans, the State established a system of taxation to meet the charges. All the income from the canals and a special tax were pledged for that purpose. These measures kept the credit of Ohio high and enabled it to borrow further sums. In the financial stringency of 1838-40, however, borrowing became more difficult, and as the abandonment of work would have meant too great a loss, 7 per cent. bonds had to be issued in 1843. But the law authorizing this loan also closed up all means of further increase of the debt. The sinking fund, the proceeds from sale of lands, and the school fund were absorbed by the canals. The debt was then gradually reduced and in 1856 it was \$13,897,242. During that year, however, \$2,423,349 more was borrowed, after which the debt was rapidly reduced by redemption of several hundreds of thousands of dollars each year. In 1880 the debt was only \$6,476,805; a greater part of these bonds were acquired by the school fund and so became irredeemable. Of the redeemable debt only \$2,541,655 was left in 1890, and in 1902 only \$200,000—maturing in 1903. The income of the State was always derived mainly from direct taxation and was divided between the general revenue fund, sinking fund, and school fund. In 1892 a special university fund was created. In 1902 the total income was \$9,855,524, of which almost 60 per

cent. came from a general property tax and 17½ per cent. from an excise tax. The expenses were \$7,967,003. The balances in all the funds on November 15, 1902, amounted to \$3,572,244.

GOVERNMENT. Ohio has its second Constitution, the one now in operation having been adopted by a popular vote in 1851. An amendment proposed in either House must be approved by three-fifths of the members elected to each House, and in turn by a majority of the electors voting at a popular election, each amendment being voted upon separately. A constitutional convention may be called if demanded by two-thirds of the members elected to each branch of the General Assembly, and by a majority of all the electors voting at a popular election. The question 'Shall there be a constitutional convention?' is voted upon at a popular election each twentieth year and determined by a majority of all the electors voting. The exercise of the franchise has the usual limitations of age, sex, and sanity, and the requirement of a residence of one year in the State and such time in the county, township, or ward as may be provided by law. The Legislature may deny the right of suffrage to persons convicted of bribery, perjury, or other infamous crime. The registration of voters is required in cities of not less than 9000 inhabitants. The State sends 21 members to the National House of Representatives.

LEGISLATIVE. The Legislature consists of a Senate and a House of Representatives. Representation is upon the basis of population. Most of the counties have one or more members in the Lower House, the smaller counties being united with other counties for representation. The members of both Houses are elected for two years, the day of election being the same as that for executive officers—the first Tuesday after the first Monday in November. The Legislature meets in regular session biennially the first Monday of January, in even-numbered years. The number of Senators and Representatives is determined biennially. Counties are united for Senatorial representation, but any county may be made a separate Senatorial district when it has acquired a population equal to a full Senatorial ratio, providing, however, that a full Senatorial ratio is left in the district from which it is removed. The compensation of the members of the General Assembly is fixed by law. The Lower House impeaches and the Senate tries all cases of impeachment, the concurrence of two-thirds of the Senators being necessary to a conviction. Bills may originate in either House, and no bill may contain more than one subject.

EXECUTIVE. The term of the Governor, Lieutenant-Governor, Secretary of State, State Treasurer, and Attorney-General is two years; that of the Auditor four years; and that of the school commissioner, and of the board of public works, three years. The commissioner of railroads and telegraphs, superintendent of insurance, supervisor of public printing, gas commissioner, and State and law librarians are appointed by the Governor.

The Governor may call extra sessions of the General Assembly. He exercises the usual pardoning power, subject to regulations as to the manner of applying for pardons.

The Lieutenant-Governor, president of the Senate, and Speaker of the House are in the line

of succession to the Governorship in case of a vacancy.

JUDICIAL. The judicial power of the State is vested in a Supreme Court, circuit courts, courts of common pleas, courts of probate, justices of the peace, and such other courts inferior to the Supreme Court, as the General Assembly may from time to time establish. The officials here mentioned are all elected by popular vote. The term of service for the Supreme Court judges cannot be less than five years, that for the judges of the common pleas is five years, and that of the probate court judges and the justices of the peace is three years. The term of the circuit judges is determined by law. The General Assembly may establish courts of conciliation, and prescribe their powers and duties, but their judgment is not final except upon agreement of the parties to abide by such judgment.

LOCAL GOVERNMENT. The General Assembly may provide for the organization of cities and incorporated villages by general laws, and variously restrict their powers. Similarly, provision is made for the election of such county and township officers as may be necessary, the day of election for county officers being the same as that for State officers. Their terms of office do not exceed three years. No person is eligible to the office of sheriff or county treasurer for more than four years in any period of six.

LAWS. The legal rate of interest is 6 per cent., but 8 per cent. is allowed by contract. Willful absence or habitual drunkenness for three years, extreme cruelty, imprisonment in penitentiary, divorce procured by either party in another State, are some of the chief causes for divorce. Residence required, one year.

MILITIA. The men of militia age in 1900 totaled 893,327. The militia in 1901 numbered 6001.

POPULATION. The following figures show the growth of the population: 1800, 45,365; 1820, 581,295; 1840, 1,519,407; 1860, 2,339,511; 1870, 2,665,260; 1880, 3,198,062; 1890, 3,672,316; 1900, 4,157,545. From eighteenth in rank in 1800 Ohio rapidly advanced to third in 1840, which position it held until surpassed by Illinois in 1890, since when it has been fourth. The greatest absolute increase was made in the decade 1830-40. From 1890 to 1900 the increase amounted to 13.2 per cent., as compared with 20.7 for the United States. The earliest development of the State was along the Ohio River, many of the early settlers coming from the Southern States. But the great bulk of the population in the later developing central and northern portions came from Pennsylvania and the Northeastern States. Ohio, particularly the southern part, attracted large numbers of the early German and Swiss immigrants, and Cincinnati became well known for its large German population. In 1900 the Germans constituted over half of the 458,734 foreign-born population. In the same year the negroes numbered 96,901. The increase between 1890 to 1900 was almost wholly on the part of the urban population. Only two States have a larger number of places containing over 4000 inhabitants. The 83 towns of this size in 1900 together had 44.8 per cent. of the State's population. There is an average of 102 persons to the square mile, which figure exceeds that for any State west of the Allegheny Mountains.

In 1900 the population of the nine largest cities was as follows: Cleveland, 381,768; Cincinnati, 325,902; Toledo, 131,822; Columbus, the capital, 125,560; Dayton, 85,333; Youngstown, 44,885; Akron, 42,728; Springfield, 38,253; Canton, 30,667.

RELIGION. The principal Protestant denominations are the Methodists, with about one-fourth of all the church members of the State, and the Presbyterian, with about one-tenth. The Roman Catholics also have about one-tenth. The other Protestant denominations, in order of their importance, are the Lutheran, the Baptist, the Disciples of Christ, the Congregational, and the Protestant Episcopal.

EDUCATION. The first grant of land for public education in the territory of Ohio was made in 1785, when the Continental Congress reserved for that purpose the sixteenth section of every township. These grants were supplemented later by similar grants in the Virginia and United States military reservations and the Connecticut Reserve. In 1825 a school tax law was passed, and in 1827 provision was made for the sale of the school lands. A general school law was passed in 1873 providing for the classification of school districts, and making the use of the English language obligatory in teaching all branches, instead of German, which had thitherto been used in many schools.

During the second half of the nineteenth century Ohio was in many respects the leading State in the West with regard to education, and some of the most important educational reforms in the United States were first introduced here. School attendance is compulsory between the age of eight and that of fourteen. Considerable progress has been made of late in Ohio in the centralization of rural schools, with the result that there has been an increase in the number of high and graded schools, as well as in the regularity of attendance. The cost of maintaining the schools under the new system, including transportation, is in some cases less than under the old system. The census of 1900 gives the illiterate population of Ohio as 4 per cent. of the total population of ten years and over, being 2.4 per cent. for native white, 11.1 per cent. for foreign white, and 17.9 per cent. for colored. The total school age population (six to twenty-one) in 1901 was 1,219,919, of whom 829,857 were enrolled in the public schools. The average attendance in the same year was 610,622, or nearly 74 per cent. of the total enrollment. The length of the school term averages 163 days. The male teachers constituted 39.2 per cent. of all instructors in 1901. The average salaries of teachers in that year were \$40 for males and \$35 for females.

The school revenue is derived from State and local taxes, fines and penalties, and various other sources. The State contributions consist of the general State tax of one mill and the interest (6 per cent.) on the money obtained from the sale of the school lands and held by the State as an irreducible State debt, amounting in 1901 to \$3,978,705. In 1901 the total school revenue was \$14,237,752, of which \$11,351,987 was obtained from local taxes, \$1,783,258 from State taxes, and \$242,257 from the income of the permanent fund. The average expenditure per pupil of average attendance in the same year was \$23.33. Public kindergartens are found in all

the larger cities. For the preparation of teachers there are a number of State and private normal schools. Some of the colleges and the universities also give courses in pedagogy. Ohio has more public high schools than any other State, though New York has a greater high school attendance. In 1901 there were in Ohio 899 public high schools, with a total attendance of 41,909. In the same year the 383 high schools of New York had an attendance of 63,549. The Case School of Applied Science ranks among the leading technological schools in the United States.

The best known of the academic institutions are the State University, at Columbus; Oberlin College (nonsect.), at Oberlin; Western Reserve University (nonsect.), at Cleveland; and the University of Cincinnati (city), at Cincinnati. Among the other higher institutions are Miami University (State), at Oxford; Ohio University (State), at Athens; Ohio Wesleyan University (Methodist Episcopal), at Delaware; University of Wooster (Presbyterian), at Wooster; Hiram College (Christian), at Hiram; Marietta College (nonsect.), at Marietta; Kenyon College (Protestant Episcopal), at Gambier; Saint Xavier (Roman Catholic) and the Hebrew Union College, at Cincinnati. Most of these institutions are coeducational.

CHARITABLE AND PENAL INSTITUTIONS. The State Board of Charities, consisting of six unsalaried members, is appointed by the Governor. This board investigates the whole system of public charitable and correctional institutions, including 17 State institutions, 8 workhouses, 89 infirmaries, 88 county jails, over 50 children's homes, and all municipal institutions and lock-ups. The plans for all new buildings, additions, or alterations must be submitted to the board for its criticism and approval. The following table includes the 17 State institutions for the year ending November 15, 1901:

INSTITUTION	Location	Daily Average number in institution	Current expenses, including salaries
State Hospital.....	Athens.....	997	\$127,436
" "	Cleveland.....	1,121	184,710
" "	Columbus.....	1,367	200,287
" "	Dayton.....	837	133,363
" "	Mansfield.....	733	116,789
" "	Toledo.....	1,515	226,022
Long View Hospital.....	Carthage.....	1,118	168,115
Hospital for Epileptics.....	Gallipolis.....	841	163,787
Inst. for Feeble-Minded.....	Columbus.....	1,068	168,017
Inst. for Deaf and Dumb.....	"	510	101,007
Inst. for Blind.....	"	330	76,520
Soldiers and Sailors' Orphans Home.....	Xenia	800	176,292
Soldiers and Sailors' Home.....	Sandusky.....	1,258	209,906
Boys' Ind. School.....	Lancaster.....	827	121,231
Girls' Ind. Home.....	Delaware.....	312	59,272
Penitentiary.....	Columbus.....	1,831	308,614
State Reformatory.....	Mansfield.....	339	89,979
Total State Institutions.....	.....	15,664	\$2,606,621

In the same year municipal institutions, comprehending eight workhouses and one house of refuge, had a daily average attendance of 1609, and total expenses of \$246,543. The expenses for county institutions for the same period, including infirmaries, children's homes, jails, outdoor relief, as reported by infirmary directors (\$232,209), and as reported by township clerks (\$261,285), and by the soldiers' relief commis-

sion, aggregated \$2,182,720. The total State municipal and county expenses for the year were \$5,034,886. Petty criminals are committed to work-houses or to jails, the commitments to the former in 1901 numbering 813, to the latter 1627. No employment is afforded to those committed to the county jails. The State has a cumulative sentence law, but it is not enforced. The State Reformatory at Mansfield has the benefit of a parole law, and a 'field officer' is appointed to look after paroled men. Convicts at the penitentiary are employed under the peace-price and the contract systems, but the prisoners remain in the complete control of the State. At Dayton is located a National Soldiers' Home with accommodations for about 6000 inmates.

HISTORY. Ohio was formed from a part of the Northwest Territory (q.v.), and includes a portion of the Virginia cession of 1784 and all of the Connecticut cession of 1800. The first explorers cannot be surely determined. Possibly La Salle, about 1670, visited the region, but he left no record of his wanderings. The enmity of the Iroquois kept the French away from Lake Erie long after they had explored the other great lakes, and though large numbers of *coureurs des bois* roamed the wilderness and trading posts were doubtless established, not one resulted in a permanent settlement. About 1686 Governor Dongan of New York sent trading expeditions into the region with but little success. In 1749 a French officer, De Coleron, under the orders of Galissonière, Acting Governor of Quebec, crossed Lake Erie, put his boats into the Allegheny, and thus reached the Ohio and the Mississippi. His report is the first authentic relation of this part of the country. At several points he placed tablets declaring all the region of the Ohio to be French territory regardless of the grants of the Stuart kings. English traders were driven out, and this precipitated the French and Indian War. (See OHIO COMPANY.) By the Peace of Paris in 1763 the French possessions east of the Mississippi passed to Great Britain. During the Revolution the only settlement within the present limits of the State, consisting of some Moravian villages near the present site of New Philadelphia, was broken up by Indians and renegade whites. After the Northwest Territory was formed, settlement was rapid. Massachusetts pioneers founded Marietta in April, 1788. John Cleves Symmes, of New Jersey, bought a large tract between the Miami rivers and sent out settlers. In 1788, too, a party from Lexington, Ky., founded Losantiville (now Cincinnati) on a portion of this tract. A French settlement was made at Gallipolis in 1789 or 1790, and about the same time Virginians began to come in large numbers. A provision in the Ordinance of 1787 allowed the creation of a representative assembly when 5000 white males of voting age should be resident in the territory. The first session of such an assembly was held at Cincinnati in 1799, and William Henry Harrison was chosen the first delegate to Congress. In 1800 Connecticut completely abandoned her jurisdiction over the territory along Lake Erie, though she still retained proprietary rights in the soil. This was called the Western Reserve (q.v.) and rapidly filled with settlers chiefly from New England. In May, 1800, the Territory was divided and the western part was named Indiana.

On April 30, 1802, Congress authorized the election of delegates to a convention to determine whether a State government should be established. The convention sat at Chillicothe, November 1-29, and adopted a constitution, which was not submitted to the people. The boundaries were fixed, according to the suggestion of Congress, as the Pennsylvania line on the east, the Ohio River on the south, a north and south line from the mouth of the Big Miami to its intersection with an east and west line passing through the most southerly point of Lake Michigan on the west, and this east and west line through Lake Erie to the Pennsylvania line on the north. A proviso was inserted, however, that if this northern line should touch Lake Erie south and east of the mouth of the Maumee, the northern line should then run from Lake Michigan through the mouth of this stream. Such was found to be the case later and Michigan refused to give up claim to the strip of territory including Toledo until it was made a condition of her admission as a State in 1834. An election for members of the Legislature was ordered for January 11, 1803, and the Legislature met on March 1st. Meanwhile, on February 19th, Congress declared that Ohio, by adopting a constitution, had become a State of the Union, though there was as yet no State Government. The capital was fixed at Chillicothe and so remained until 1810, and was then moved to Zanesville. In 1812 the offer of a land company to build a new city was accepted, and since 1816 Columbus has been the seat of government. Considerable excitement was caused by the alleged Burr-Blennerhasset plot in 1806. During the War of 1812 the occupation of Ohio by the British was prevented by Gen. William Henry Harrison. Many Indians joined the British, but the combined forces were defeated, October 5, 1813, on the river Thames in Canada, and Tecumseh, the Indian leader, was killed. This battle, following close upon Perry's victory on Lake Erie, ended the war, so far as this State was concerned. The population steadily increased, but the lack of a market for the products of the State was the greatest need. Some sea-going vessels had been built upon the Ohio, but such sailing vessels were worth little on rivers. The application of steam to navigation, the construction of the Erie Canal, and the completion of the Miami and Ohio canals in 1835 made a new era. From that time access to the sea was comparatively easy and the country entered upon a period of magnificent prosperity, to which the coming of the railroads gave an additional impetus.

The State supplied more than its quota of troops for the Mexican War, and at the outbreak of the Civil War was exceedingly active. Seventy regiments responded to the first call for troops, though only thirteen were asked. Soldiers were sent into Virginia and helped to save West Virginia to the Union, and the prompt action of Governor Dennison had its influence upon Kentucky also. There were many Southern sympathizers in southern Ohio, however, and resistance was offered to national officers in 1863, when the advantage seemed to be with the Confederate armies. (See VALLANDIGHAM, CLEMENT L.) A large number of the most successful Federal officers were natives of the State, as Grant, Sherman, McDowell, Rosecrans, Garfield, and others.

Ohio was Democratic in national elections from

the time of its admission to 1836. In that year it voted with the Whigs, and since then has been Whig and Republican, with the exception of the years 1848 and 1852, when it cast its vote for Cass and Pierce respectively. The following have been the Governors of Ohio:

GOVERNORS OF THE NORTHWEST TERRITORY.

Arthur St. Clair.....	1788-1802
C. W. Byrd (acting).....	1802-03

STATE GOVERNORS.

Edward Tiffin.....	Democratic-Republican	1803-07
Thomas Kirker (acting)....	"	1807-08
Samuel Huntington.....	"	1808-10
Return Jonathan Meigs.....	"	1810-14
Othniel Looker (acting)....	"	1814
Thomas Worthington.....	"	1814-18
Ethan Allen Brown.....	"	1818-22
Allen Trimble (acting)....	"	1822
Jeremiah Morrow.....	"	1822-26
Allen Trimble.....	"	1826-30
Duncan McArthur.....	Whig	1830-32
Robert Lucas.....	"	1832-36
Joseph Vance.....	"	1836-38
Wilson Shannon.....	Democrat	1838-40
Thomas Corwin.....	Whig	1840-42
Wilson Shannon.....	Democrat	1842-44
T. W. Bartley (acting)....	"	1844
Mordecai Bartley.....	Whig	1844-46
William Bebb.....	"	1846-49
Seabury Ford (acting)....	"	1849-50
Reuben Wood.....	Democrat	1850-53
William Medill (acting)....	"	1853-54
William Medill.....	"	1854-56
Salmon P. Chase.....	Republican	1856-60
William Dennison.....	"	1860-62
David Tod.....	"	1862-64
John Brough.....	"	1864-65
C. Anderson.....	"	1865-66
Jacob D. Cox.....	"	1866-68
Rutherford B. Hayes.....	"	1868-72
Edward F. Noyes.....	"	1872-74
William Allen.....	Democrat	1874-76
Rutherford B. Hayes.....	Republican	1876-77
Thomas L. Young (acting) ..	"	1877-78
Richard M. Bishop.....	Democrat	1878-80
Charles Foster.....	Republican	1880-84
George Hoadly.....	Democrat	1884-86
Joseph B. Foraker.....	Republican	1886-90
James E. Campbell.....	Democrat	1890-92
William McKinley.....	Republican	1892-96
Asa S. Bushnell.....	"	1896-1900
George K. Nash.....	"	1900—

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OHIO COMPANY. In American history, the name applied to two companies organized for the purpose of exploiting and making settlements in the Ohio Valley. The first was an association of prominent Virginia planters and some London merchants, and was organized in 1749. It received from George II. a grant of 500,000 acres

of land lying chiefly south of the Ohio River, in what is now West Virginia. Thomas Lee, president of the Virginia Council, was the originator of the scheme, and Lawrence Washington, a brother of George Washington, was one of the leading members. In 1772 the Walpole Company secured from the King a grant of the whole territory southeast of the Ohio from the Pennsylvania boundary to a point opposite the mouth of the Scioto. The Ohio Company now became merged in the Walpole Company. A second company, known as the 'Ohio Company of Associates,' was formed at Boston in March, 1786, by officers and soldiers, chiefly of the Massachusetts, Connecticut, and Rhode Island lines, for the purchase and settlement of Western lands. Gen. Rufus Putnam, Samuel H. Parsons, and Manasseh Cutler were chosen as directors, and the lands selected for purchase lay along the Ohio River on both sides of the Muskingum. After considerable delay the company secured a grant upon favorable terms from Congress and the contract was formally signed in October, 1787, by the Treasury Board of Congress and by Dr. Cutler and Winthrop Sargent, acting as agents of the Ohio Company. In December, several companies of surveyors, carpenters, smiths, farmers, and others, under the leadership of General Putnam, emigrated to the new territory, arriving in April, 1788. Opposite Fort Harmer they laid out a town which was named Marietta in honor of the French Queen, Marie Antoinette. Consult: King, *History of Ohio* (Boston, 1899); and McMaster, *History of the People of the United States*, vol. i. (New York, 1883). See NORTHWEST TERRITORY, and OHIO.

OHIO RIVER. The most important affluent of the Mississippi River in point of the amount of commerce, and the longest tributary excepting the Missouri (Map: United States, J 3). It is formed by the junction at Pittsburg of the Allegheny and Monongahela rivers, and is navigable, excepting at the lower stages of water, from Pittsburg to its confluence with the Mississippi, 975 miles. After leaving Pennsylvania it flows between Ohio, Indiana, and Illinois on the right, and West Virginia and Kentucky on the left. Its drainage basin is over 200,000 square miles, and the rainfall over the basin averages 43 inches a year. Its discharge of water averages 158,000 cubic feet a second, surpassing that of the Missouri by nearly 40,000 cubic feet. The elevation of the river above the sea is 1021 feet at Pittsburg and 322 feet at its mouth. Its mean rate of flow is 3 miles an hour, and its mean fall is about .70 of a foot to the mile. The Allegheny and Monongahela are regarded as having equal claims as the source of the river, though the Allegheny is longer, with 123 miles of navigation. The Allegheny rises on the plateau of northern Pennsylvania west of the Allegheny Mountains, drains Lake Chautauqua in New York, and descends through a series of narrow valleys to its junction with the Monongahela. The latter river (navigable for 60 miles) draws its farthest supplies from the rains and melting snows of the upland Allegheny valleys in the centre of West Virginia, and in the lower part of its course passes through a valley composed of Carboniferous rocks, where coal is mined almost at the water's edge. Below Pittsburg the Ohio winds through a wide flood plain between the inclosing hills, receiving waters from the north that rise

only ten to twenty miles from the south shore of Lake Erie. The glacial drift in this north part of the Ohio basin changed the line of the water parting so that the crest of the divide between the Saint Lawrence and the Ohio basins is now ten or more miles nearer the lake than in the pre-glacial epoch. The chief northern tributary is the Wabash, a placid stream navigable by small boats to Terre Haute, Ind. Other northern affluents, as the Muskingum, the Scioto, and the Miami, descend, like the Allegheny, from the plain studded with lakes not far from Lake Erie. The southern affluents are larger, and rise, like the Monongahela, among the upland glades of the Appalachians or on the Appalachian plateau. The Kanawha (navigable to Charleston, W. Va.) and the Licking traverse salt-yielding regions. The Kentucky River (navigable to Beattyville, Ky.) joins the Ohio above the Louisville Rapids and marks the natural division between the middle and lower courses of the river. At Louisville a coral reef obstructs the Ohio with a series of rapids which disappear during the floods, but which arrested navigation at low water until the rapids were turned by lateral riverine canals. The greatest tributaries from the south are the Cumberland, navigable to Burnside, Ky., and the Tennessee, navigable to Knoxville.

Many fine towns and cities border the Ohio, the larger places standing chiefly at the mouths of the affluents. Below Louisville the valley broadens and the skirting hills retire to a great distance from the river banks. As the larger part of the drainage comes from the mountain districts, the Ohio is unable in times of very heavy rainfall or rapid thaw of the winter's snow to carry off the vast quantity of water suddenly emptied into it. The volume of its discharge has varied as much as eightfold. The difference between the high and low water marks is sometimes as much as 50 to 60 feet in a single season and in 1887 it exceeded 70 feet. The river at flood covers the lower parts of many towns on its banks, causing great loss of property and much suffering. On the other hand, in periods of drought the current is often reduced to a fordable depth above Cincinnati. These great variations in the level are a serious impediment to navigation. Boats loaded with many thousands of tons of coal and other freight destined for Ohio and Mississippi river points are frequently held up for weeks at Pittsburg waiting for enough water to float them. In spite of this drawback, the Ohio and its tributaries carry over 15,000,000 tons of freight a year, mainly coal, lumber, grain, and the product of iron and steel mills and the potteries on their banks. The total length of navigation on the river and its affluents is about 2300 miles. In the development of the West the Ohio played a prominent part.

Consult: Ellet, "Contributions to the Physical Geography of the United States," in *Smithsonian Institution Contributions to Knowledge* (Washington, 1849); Bliss, "Dr. Saugrain's Relation of His Voyage Down the Ohio River," in *American Antiquarian Society Proceedings* (Worcester, 1897).

OHIO STATE ARCHÆOLOGICAL AND HISTORICAL SOCIETY. A learned society, founded in 1875 as the Ohio Archæological So-

ciety, and reorganized and incorporated under its present name in 1885. Its object is to promote a knowledge of archæology and history, especially as relating to the State of Ohio, through the maintenance of a library and a museum, open to the public, as well as by courses of lectures and the publication of books dealing with subjects within its scope. The society is officially recognized by the State Legislature from which it receives an annual appropriation for the prosecution of its work. The membership is divided into four classes known as active members, life members, corresponding members, and honorary members. The regular annual meeting of the society is held during the month of February in the city of Columbus, unless some other meeting place be designated by the executive committee. The society issues an annual volume of *Publications* (11 vols. 1887-1902).

OHIO STATE UNIVERSITY. A coeducational State institution at Columbus, Ohio, founded in 1870 as the Ohio Agricultural and Mechanical College, and opened in 1873. The present name was assumed in 1878. The original endowment provided by the Land Act of 1862 has been supplemented by a permanent annual grant from the United States under an act of 1890, by special appropriations of the General Assembly, and by a permanent annual State grant made in 1891 and doubled in 1896. The university is organized in six colleges: Arts, philosophy, and science; agriculture and domestic science; engineering; law; pharmacy; veterinary science. Admission to the college is by certificate from accredited institutions or after examination in five groups of studies—English, history, mathematics, science, and foreign languages. The entire work of the college is arranged on the group and elective systems. It confers the bachelor's degree in course in the various departments, and the engineer's, master's, and doctor's degrees for advanced work. Military instruction and the wearing of a uniform are required of the students. The attendance in 1903 was 1717, distributed as follows: Arts, 527; engineering, 662; law, 166; agriculture, 243; pharmacy, 40; veterinary medicine, 94. The faculty numbers 133. The library contains 44,523 volumes. The university grounds consist of 345 acres, of which 235 are devoted to agricultural and horticultural purposes. A laboratory is maintained at Sandusky for summer work. The value of the property under the control of the university in 1903 was \$2,850,000, the grounds and buildings being valued at \$2,500,000. The total endowment was \$569,876, and the income \$545,909.

OHIO UNIVERSITY. A coeducational State institution at Athens, Ohio, organized in 1804, two townships of land having been set aside for the founding of a university by the terms of the purchase made from the United States Government by the Ohio Company of Associates in 1787. Besides the collegiate department, the university has schools of music and commerce, a preparatory department, and a normal college. The bachelor's degree in arts, philosophy, science, and pedagogy is given in course and the master's degree after one year's graduate work. Tuition is free. The registration in 1903 was 551, and the faculty numbered 39. The library contains 17,500 volumes. The university receives about \$7000 a year from its land endowment and about

\$70,000 by direct tax. The income for 1902 was \$85,000, and the value of the college property was estimated at \$400,000.

OHIO WESLEYAN UNIVERSITY. A co-educational institution of higher learning under the control of the Methodist Episcopal Church at Delaware, Ohio, opened in 1844. The Ohio Wesleyan Female College, founded in 1853, was united with the university, and in 1890 an existing medical school at Cleveland was annexed under the name of the Cleveland College of Physicians and Surgeons. The university embraces a college of liberal arts, an academic department, and schools of music, oratory, business, fine arts, and medicine. In 1849 the trustees authorized the sale of scholarships to secure an endowment, and during the next five years 3740 scholarships were sold, calling for more than 25,000 years of tuition. In 1902 the faculty numbered 111 and the student body 1385. The endowment was \$954,121, and the value of the grounds, fifteen buildings, and equipment, \$742,503. The library contained 42,000 volumes.

OHLAU, ó'lou. A town of Silesia, Prussia, 16 miles southeast of Breslau, on the Ohlau, a tributary of the Oder (Map: Prussia, G 3). The town has a gymnasium. The surrounding country is a tobacco district, so the town has large tobacco and cigar factories, and in addition manufactures of white lead, machinery, lime, wagons, bone-dust, and shoes. There are also saw-mills and brick-kilns, and the town has steamboat communication with Breslau. Ohlau was formerly a residence of the dukes of Brieg and of the Sobieskis, and in 1742 became part of Prussia. Population, in 1900, 9235.

OHLIGS, ó'liks (formerly MERSCHIED). A town in the Rhine Province, Prussia, near the Rhine, 10 miles southeast of Düsseldorf (Map: Prussia, B 3). There are manufactures of steel goods, umbrella frames, cloth, silk, and bricks. Population, in 1900, 20,682.

OHM (named after Georg S. Ohm). The practical unit of electrical resistance. It is defined as being the electrical resistance offered to the passage of an unvarying electric current by a column of mercury, 106.3 cm. long, of uniform cross-section, having a mass of 14.4521 grams, the mercury being at the temperature of 0° C. (This would require a cross-section of 1.00003 square millimeters.) The ohm is substantially equal to 10° C.G.S. electro-magnetic units of resistance. See ELECTRICAL UNITS; RESISTANCE.

OHM, óm, GEORG SIMON (1787-1854). A German physicist and discoverer of the famous law in electricity bearing his name. He was born and educated at Erlangen, and after giving instruction in mathematics and physics in a number of schools, he was called in 1817 to a chair in the gymnasium at Cologne. He made a study of the laws of galvanic currents, and while investigating the relative conductivity of metals finally discovered the relation known as 'Ohm's law,' which underlies all electrical theory and measurement. The experimental proof of this law was first published in a paper in *Schweigger's Journal für Chemie und Physik*, vol. xlv. (1826), under the title of "Bestimmung des Gesetzes nach welchem Metalle die Kontaktelectricität leiten, etc." An exposition of the theory is contained in *The Galvanic Chain, Mathematic-*

ally Worked Out (1854). He resigned his professorship at Cologne in 1826, was director of the Nuremberg Polytechnic School 1833-49, and was then called to the chair of physics at Munich. The name of Ohm was given to the unit of electrical resistance by the Paris Congress of Physicists (1881). Previously (1846) the British Association had called the unit of resistance the Ohmad. See *Scientific Works of Georg Simon Ohm*, by Eugene Lommel, a biographical sketch in *Smithsonian Report*, 1891, Washington; also, Mann, *Georg Simon Ohm* (Leipzig, 1892).

OHM'S LAW. See ELECTRICITY, section on *Laws of Steady Currents*.

OHNET, ó'ná', GEORGES (1848—). A popular French novelist and dramatist. Ohnet left law for journalism, attempted the stage with *Regina Sarpi* (1875), and began his novelistic series, *Les batailles de la vie*, in 1881. Of these the most successful were: *Le maître de forges* (1882); *La Comtesse Sarah* (1883); *Lise Fleuron* (1884); *Le docteur Rameau* (1888). Most of Ohnet's novels have been translated and several of them dramatized. Story and character are conventional; the tone is monotonously optimistic. But Ohnet manages commonplace material with a melodramatic skill that has won a phenomenal commercial success.

OIDIUM, ó-íd'í-úm (Neo-Lat., from Gk. *óōs*, *óōn*, egg). The conidial form of certain Erysiphææ, an important family of minute fungi growing on animal and vegetable substances. The species of Oidium consist of tiny tubular white or bright colored threads, forming flocks, simple or irregularly branched, assuming in their upper part the form of strings of beads, which finally break up into elliptic spores. Oidium albicans is found on the epithelium in the mouth and throat in the disease called aphthæ, or thrush. It is more common in children and aged persons than in those who are in the prime of life. Another species, Oidium tuckeri, which has attracted great attention in Europe, is regarded by many as producing a destructive grape disease. It is the conidial form of Uncinula necator, or Uncinula spiralis. It makes its appearance at first in the form of a mycelium of creeping, branching filaments, which send out upright or decumbent jointed stems. Each bead-like joint of the stems develops into a sort of spore, numbers of which are finally discharged in little clouds. The grape disease was first observed in Kent, England, in the spring of 1845. The disease rapidly spread over other English vineries; was observed about the same time in the vineries of Paris, and soon in the vineyards of almost all parts of France, Italy, Greece, Tyrol, and Hungary, finally, and in a slighter degree, affecting the vineyards of the Rhine. Its ravages extended to Algeria, Syria, Asia Minor, and many other countries, among which is particularly to be noted the island of Madeira, where it proved almost completely destructive to the grapes and nearly put an end to the production of the celebrated Madeira wine. It is probable that the complete isolation of the Madeira vineyards made the progress of the disease more rapid, and its result more complete than elsewhere, by reason of the prevalence of the conditions favorable for it. This disease is more fully described under GRAPE as powdery mildew, for which remedies are there suggested.

OIL-BEETLE. Any of the blister-beetles of the family Meloidæ, particularly those of the type genus *Meloidæ*. See BLISTER-BEETLE.

OIL-BIRD. See GUACHARO.

OIL-CAKE. The residue which remains in the press when seeds are crushed to express the oil which they contain. Oil-cake still retains a portion of the oil of the seed, along with almost all its other constituents, and is valuable either for feeding cattle or for manure. As it is too rich in proteins and fats to be given alone, it is mixed, for feeding, with hay, straw, or cereals. Sometimes the cake is ground, in which case the product is known as oil meal. The amount of oil remaining in the cake depends upon the process employed in expressing; whether by simple pressure, by pressure combined with heat, or by a solvent, as carbon disulphide or petroleum ether. From 8 to 10 per cent. of oil is now left in the cake when extracted by the latter method, but when solvents were first introduced they extracted the oil so completely as to make the cake of little value for cattle food.

The accompanying table gives the composition of a number of the most important oil cakes:

COMPOSITION OF THE MOST IMPORTANT OIL-CAKES
(From Sadtler's *Industrial Organic Chemistry*)

	Water	Fat	Non-nitrogenous materials, woody fibre	Ash	Protein material	Nitrogen
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Earth-nut cake.....	11.60	8.80	31.10	7.25	41.35	6.80
Cottonseed cake.....	13.00	7.50	51.00	8.50	20.00	2.90
Rape-oil cake.....	10.12	9.23	41.93	6.48	31.88	5.00
Colza-oil cake.....	11.35	9.00	42.82	6.28	30.55	4.50
Beechnut cake.....	11.40	8.50	49.80	5.30	24.00	3.80
Linseed cake.....	10.54	9.83	44.61	6.50	28.50	4.25
Camellina cake.....	9.60	9.20	50.90	7.00	23.30	3.60
Poppy-oil cake.....	9.50	8.90	37.67	11.43	32.50	5.00
Sunflower-oil cake.....	10.20	8.50	48.90	11.40	21.00	2.40
Hempseed cake.....	10.00	8.26	48.00	12.24	21.50	3.30
Palm-nut cake.....	9.50	8.43	40.95	10.62	30.40	4.50
Cocanut cake.....	10.00	9.20	40.50	10.50	30.00	4.50
Sesame-oil cake.....	10.35	10.10	38.80	9.80	31.93	5.00

See COTTONSEED AND ITS PRODUCTS; FLAX; FEEDING STUFFS.

OIL CITY. A city in Venango County, Pa., 132 miles north by east of Pittsburg; on the Allegheny River, at the mouth of Oil Creek, and on the Erie, the Pennsylvania, and the Lake Shore and Michigan Southern railroads (Map: Pennsylvania, B 2). There are several bridges within the municipal limits, and Smithman's and Hasson's parks. The more prominent structures include the Carnegie Free Library, city hospital, high school, the Oil Exchange, and the office buildings of the Standard Oil Company. Oil City is the centre of the celebrated petroleum fields of western Pennsylvania, and has large refineries and barrel works; also foundries and machine shops, tubing and casing works, boiler and engine shops, and manufactories of oil-well supplies. Under a charter of 1889, the government is vested in a mayor, elected every three years, a bicameral council, and administrative officers, most of whom are elected by the council or confirmed by that body on nomination of the mayor. The treasurer, comptroller, assessors, constables, and school board, however, are chosen by popular vote. The water-works are owned by the municipality. Oil City was settled about 1825, but did not become of any particular im-

portance until after 1859, when the vast oil wells were developed. It was incorporated as a borough in 1863 and in 1874 it received a city charter. On June 5, 1892, a quantity of burning oil swept down Oil Creek from Titusville, 18 miles above Oil City, and caused the loss of over 100 lives and of property valued at more than \$1,000,000. Population, in 1890, 10,932; in 1900, 13,264.

OILCLOTH. A coarse canvas, coated on both sides, and partly saturated with thick oil-paint, one side having usually a colored pattern printed upon it in oil-paint. The canvas basis for oilcloth is usually jute or burlap. This is first sized by drawing through troughs filled with liquid glue, rye flour, tapioca, or varnish, different manufacturers employing different materials. As the canvas passes through the trough the surplus sizing is squeezed out by rollers between which it passes. In making the very wide varieties, the canvas is put upon a frame first and the sizing applied with a brush. After the cloth is sized it is rubbed down thoroughly with pumice-stone, either by hand or with steam rollers. The cloth is then given a coat of paint, composed of ochre, benzine, and

linseed oil. The surface is afterwards evened down by passing the cloth through a series of metal blades, which scrape off the superfluous paint. The surface is again rubbed down with pumice-stone and the process of painting and rubbing down is repeated many times, the number determining the quality of the cloth. The next step is the applying of the pattern. The pattern is carved on wooden blocks, a separate block for each color. The blocks are of pine, faced with a thin layer of harder wood, which is glued on. The part of the design assigned to each block is carved in relief upon it. The color is applied by rollers, which have taken up the coloring matter from troughs. The printing of the cloth is done by machinery. The cloth passes over a table and under the blocks, which have a rising and falling motion. The cloth is now passed to the drying-room, where the process of drying is hastened by artificial heat. When dry and hard the cloth is varnished, trimmed, and rolled. Manufacturers sometimes use instead of the carved blocks, pin blocks, which consist of three layers of wood firmly cemented together. The surface block is divided up into a series of pegs and interstices by sawing the block in lines very close together and at right angles to each other. All the pegs not needed for outlining the

figure are then cut away. See *History and Manufacture of Floor Covering* (New York, 1899).

OIL-FISH, or **GOLOMYNKA**. A remarkable fish (*Comephorus Baikalensis*) of the blenny family, living only in Lake Baikal (q.v.). It is about a foot long, is destitute of scales, and is very soft, its whole substance abounding in oil, which is obtained from it by pressure. It is never eaten. In winter it retires to great depths, but in summer approaches the shores, and great numbers often are stranded.

OILLET (OF., eyelets), or **CEILLET**. A small opening or window, often circular, used in mediæval buildings; also called **CEIL DE BŒUF**.

OIL PALM (*Elæis*). A genus of palms of the same tribe with the cocoanut palm. The best known species, *Elæis guineensis*, sometimes attains a height of 20 to 30 feet, has pinnate leaves with spiny footstalks and flowers with an odor like anise or chervil. The fruit forms an immense head, like a great pineapple, consisting of a large number of bright orange-colored thin-skinned drupes, with hard stones and oily pulps, which by bruising and boiling yield a bland violet-smelling oil which when taken to cold climates becomes butter-like in consistency. This oil, now largely exported from tropical Africa, is much used for making candles, toilet soaps, etc., but when fresh is eaten like butter. The nut was formerly rejected as useless after the oil had been obtained from the fruit; but from its kernel a fixed clear and limpid oil called palm-nut oil is extracted and has become to some extent an article of commerce.

OIL RIVERS. A name applied to the channels forming the delta of the Niger (q.v.) in West Africa and the neighboring small independent rivers, on account of the vast forests of oil palms which line their banks (Map: Africa, E 4). The surrounding district, a British dependency, was formerly known as the Oil Rivers Protectorate, but is now a part of Southern Nigeria.

OILS (OF. *oile, ole, uile*, Fr. *huile*, from Lat. *oleum*, oil, from Gk. *ἐλαιον, elaiōn*, oil, olive oil, from *ἐλαία, elaiā*, olive-tree). A term applied to a large number of liquids characterized by being insoluble in water and being highly viscous. Their 'greasy feeling' often mentioned as an additional characteristic is due largely to their viscosity and insolubility in water. Capability of saponification (see further below), formerly considered essential, is confined to a variety of substances, chiefly of animal or vegetable origin, while the unsaponifiable class includes the so-called mineral oils and similar products prepared artificially. Chemically the oils possess no property in common which would justify their being grouped together in any rational classification of substances. And if they are still referred to collectively as a distinct class of chemical substances, it is owing partly to custom, partly to the fact that chemically different oils are sometimes associated industrially.

LIQUID FATS. The vegetable and animal oils of liquid fats do not differ essentially from the class of substances described under **FATS** (q.v.). They, too, contain olein, palmitin, and stearin, together with certain other fatty bodies, which give each oil its characteristic properties. Palmitin and stearin are solids at ordinary tempera-

ture, but are freely soluble in the liquid olein, and a liquid fat is essentially a solution in one proportion or another of palmitin and stearin in olein. Olive, cottonseed, corn, linseed, and lard oils are types of this class of oils, all of which are soluble in ether, carbon disulphide, chloroform, hydrocarbons, etc.

All of the fatty oils are also capable of being saponified, i.e. of being broken up into glycerin and so-called fatty acids. The term 'saponification' (from Lat. *sapo*, soap) is used on account of the decomposition being oftenest effected by the use of caustic soda or potash, which combines with the freed fatty acids to form the mixtures of salts well known as soaps. There are, however, other methods by which the decomposition may be sometimes brought about. And since, whatever the method, the decomposition is accompanied by the chemical absorption of the elements of water, it is more exactly referred to, not as saponification, but as *hydrolysis*, or *hydrolytic splitting*. The several methods by which the hydrolysis of oils may be brought about include: (1) Boiling with caustic alkali; (2) the action of steam under high pressure; (3) bacterial action, e.g. when fats become rancid; (4) the action of dry heat.

The following classification of these compounds by A. H. Allen will be found useful; it serves to illustrate the origin and approximate composition of the more common oils.

Olive Oil Group, vegetable oleins, non-volatile, high viscosity, non-drying, insoluble in alcohol.

Rape Oil Group, derived from the Cruciferae, non-volatile, highest viscosity, non-drying, insoluble in alcohol.

Cottonseed Oil Group, non-volatile, medium viscosity, semi-drying, insoluble in alcohol.

Linseed Oil Group, drying oils, non-volatile, absorb oxygen, insoluble in alcohol, low viscosity.

Castor Oil Group, distinctly different from the above in chemical composition by reason of containing a large proportion of hydroxy-fatty acids including ricinoleic acid—highest viscosity, soluble in alcohol and glacial acetic acid, non-volatile, non-drying.

Lard Oil Group, animal oleins, non-volatile, non-drying, high viscosity.

Whale Oil Group, marine animal oils, slightly volatile, low viscosity, partly drying, darken with chlorine, characteristic odor.

Palm and cocoanut oils are omitted because solid at ordinary temperatures. Sperm oil is not a true oil, but a liquid wax.

Plants contain a greater variety and, as a rule, relatively larger quantities of oils than animals. Vegetable oils are obtained by the simple process of grinding or crushing and hydraulic pressing of seeds or kernels, which contain the largest proportion of oil. At times the ground materials are pressed cold and hot, the cold process yielding better products, but smaller quantities. Of late years extraction processes using light hydrocarbon solvents are much used. The solvents are allowed to act on the crushed material at a slightly elevated temperature; on exhaustion, the liquid is drawn off, and the solvent is separated by distillation. Oils produced by this process are very free from foots or gelatinous material, but, on the other hand, are liable to be contaminated with resins and coloring matters or any other material soluble in

the solvent used. Animal oils occur in cells of putrescible tissue and require prompt rendering or extraction to retain their quality. Rendering may be of three types, viz.: (1) Open-kettle rendering; (2) acid rendering; (3) steam rendering. In the first process the fatty tissue is chopped, heated over water until the oil or fat is melted, and tried out. The broken tissue shrivels and rises to the top, where it is skimmed off and pressed to remove traces of oil. On cooling, the oil and water stratify, and may be readily separated. In acid rendering, the fatty tissue is, without previous treatment, boiled with water and sulphuric acid, which dissolves away the tissue and liberates the oil. In steam rendering the tissue is destroyed by treatment with steam under pressure in autoclaves, the exhaust of foul-smelling gases being discharged into a chimney.

The drying oils, linseed, poppy-seed, etc., expressed by hot pressure, are subsequently boiled or heated with various oxidizing substances, such as the oxides of lead and manganese, in order to increase their drying or varnish-making properties. On mixing these boiled oils, which always contain some free fatty acid, with pigments whose base is some readily decomposable lead compound, such as white lead (basic carbonate), a lead soap forms and dissolves in the excess of oil. The resulting product, on exposure for some time to the atmosphere, readily dries or forms a tough elastic coating, which acts as a protective covering to the material beneath. Oils of the rape oil group absorb oxygen when heated, especially if air is forced through the liquid. Such are the so-called 'blown oils.' During this process the liquid becomes thicker, its viscosity and hence the lubricating value increasing materially. The thickness is probably caused by exchange of the sulphur contained by these oils for oxygen.

The tests usually applied to fatty oils include determinations of specific gravity, of the amount of alkali necessary for saponification, of the amount of free fatty acids present, of the amount of volatile fatty acids, and of the amount of bromine or iodine that the oil is capable of absorbing, as well as various color tests with acids and special reagents.

ESSENTIAL OR VOLATILE OILS. These are liquids which give the peculiar odor to plants. Their composition differs very widely. The various types are as follows: Terpenes, or hydrocarbons of the general formula $(C_{10}H_{16})_n$; certain ethers, aldehydes, ketones, and phenols (substances composed of carbon, hydrogen, and oxygen); and finally, certain substances containing sulphur or nitrogen among their elements, e.g. mustard oil. All these substances are soluble in alcohol, ether, petroleum, and certain other organic solvents. Some of them have been prepared synthetically, but the greater number are still obtained from plants, by one of the following processes: (1) By distilling the plant with water; (2) by extraction of the plant with solvents; (3) by pressing the plant; (4) by macerating in fat; (5) by enfleurage, or absorption in fat. In the distillation process, the material is put into a still with a large quantity of water. During ebullition, the steam carries the oil over mechanically and separation of oil and water takes place on cooling, the oil being usually on top. Turpentine is produced by this process from the gum of the pine tree, the residue in the retort

being common rosin. The processes of extraction and expression require no explanation. Maceration, employed in those cases in which the product would be injured by high temperatures, consists in gently heating the flowers or leaves in pure sweet tallow or lard, until exhausted, the product being called a pomade. The oil may be extracted from it with alcohol. Enfleurage is used in those cases in which an elevation of temperature would destroy the odor. The flowers or leaves are placed on glass-bottomed trays coated with pure tallow or lard; these trays are then stacked up and allowed to stand until the fatty matter becomes strongly charged with the perfume, and this is subsequently extracted with cold alcohol.

HYDROCARBON OILS. An account of the chemistry of the hydrocarbons may be found in a special article under the name. Mixtures of liquid hydrocarbons, or 'hydrocarbon oils,' of natural or artificial origin, are used largely as fuels, illuminants, and lubricants. The main sources of these oils are petroleum, shale, and bituminous coal. Most of the native American oil comes from the Devonian and Upper Silurian. It occurs in sandstone or conglomerate (oil sand) between impervious layers of shale or slate. The Russian petroleum deposits are usually of Tertiary origin. Considerable discussion has arisen concerning the origin of petroleum. According to Berthelot it is produced by the action of steam and carbonic acid gas on alkali metals. Mendeléeff regards it as the product of the action of water on metallic carbides. According to other theories, petroleum is derived from either plant or animal matter by a slow process of destructive distillation under the enormous pressure of superincumbent strata. Since either natural gas or anthracite coal is usually found at no great distance from oil sources, it would seem that the last mentioned theories are the most plausible. American petroleum is mainly composed of the liquid members of the marsh gas or paraffin series together with small quantities of olefins, and traces of benzenes. Russian oils consist largely of the naphthene series, similar to the olefins. Oil fresh from the well is a thick, syrupy liquid, greenish brown to black in color and of a disagreeable odor. Many samples are fluorescent. The specific gravity varies from 0.782 to 0.85. Marsh gas, ethane, propane, and butane are generally found in the fresh oil, but soon escape. Sand and water are frequently mixed with the oil, but are readily removed by settling in tanks.

The oil is prepared for the market by a process of fractional distillation and refining of the fractions with acid and alkali. The distillation process serves to separate the oil into three portions, viz.: (1) Benzine distillate; (2) burning oils; (3) residuum. The first portion is redistilled and yields very volatile products (naphthas and gasolenes) that are used as solvents and for power in small engines. The second portion is likewise redistilled and yields two fractions, which are treated separately with strong sulphuric acid, followed by a washing with water, then treatment with caustic soda, and a final washing with water. By this process the oils are bleached and partly deodorized. The two oils are commonly known under the name of kerosene. If the distillation of the crude oil has been carried on by the vacuum process, in

which the heavy vapors are withdrawn from the stills as soon as formed, 'cracking' does not take place and the residuum may be used entirely for preparing lubricating oils and vaseline. During the 'cracking,' which is facilitated by heating the stills over free fires, the residuum is decomposed and yields a further series of volatile products (chiefly used as burning oils), together with paraffin, lubricating oil, yellow 'wax,' and coke. Russian oils may be successfully treated by a continuous process of distillation, as they are not very susceptible to cracking. To guard against any possibility of change, the stills are heated by superheated steam. Oils containing large quantities of sulphur are very offensive and must be distilled over mixtures of oxides of copper and lead to take up the sulphur, before they can be refined. The crude oil is, however, now largely used for fuel purposes with steam or compressed air in injector burners. The following mineral oils are commercial articles:

Petroleum Ether, distills over between 40° and 70° C (104° and 158° F.), and is used as a solvent and for gas machines.

Gasolene, distills over between 70° and 90° C. (158° and 194° F.), and is used as a solvent and for carbureting coal-gas.

Naphtha, distills over between 80° and 110° C. (176° and 230° F.), and is used for burning in vapor stoves, and as a solvent for resins.

Benzine, distills over between 120° and 150° C. (248° and 302° F.), and is used as a substitute for turpentine for cleaning clothing.

Kerosene. See article PETROLEUM.

Lubricating Oils, including spindle oils and cylinder oils. The analytical tests applied to these oils include determinations of specific gravity, the 'fire test' (i.e. determination of the flash-point and burning-point), the cold test, and determinations of viscosity and neutrality. For burning oils the fire test and the determination of neutrality are the most important. For lubricating oils the determination of viscosity is also essential. A large number of forms of apparatus have been devised for obtaining the flash and burning point, but no other is as simple and reliable as the New York State 'closed tester.' This apparatus consists of a double boiler of copper heated by a gas or lamp flame, the inner chamber being filled with oil and covered with a glass plate perforated with two holes, one for the thermometer, the other for the introduction of the test flame. The oil must not be heated more rapidly or slowly than 2° F. per minute. At minute intervals the test flame is brought to the hole in the glass cover. A flash is said to occur when a blue flame momentarily plays over the surface of the heated oil, and at this point the thermometer is read. The burning-point, usually a few degrees higher, is that temperature at which the oil begins to burn.

Previous to the introduction of petroleum products, bituminous shale had been subjected to destructive distillation, yielding gas, ammonia, oil, and tar. This process is still carried out in Scotland, Germany, and various other European countries. Oil does not occur as such in bituminous shale, but is liberated by the decomposition of the latter, which is a sort of pitch. Shale, in small pieces, is fed into vertical retorts heated to a low red heat, and steam is injected into the retorts to promote distillation. The vapors are condensed in a hydraulic main and scrubbers

similar to those employed in the distillation of coal (see GAS, ILLUMINATING), the gases given off being utilized for heating the retorts. The crude oils are refined with acid and alkali, and are redistilled to furnish naphthas, burning and lubricating oils, and paraffin (q.v.).

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OIL SAND. A term applied to beds of sand or porous sand rock which contain petroleum. There may sometimes be several oil sands separated by beds of rock in one formation. See PETROLEUM.

OIL SHARK, or SOUP-FIN SHARK. A tope-like shark of southern California (*Galeorhinus zyopterus*), often six feet long and grayish in color, with the front of both dorsal fins black. It is sought for the oil in its liver—single fishes sometimes yielding a gallon—and for the fins, which are highly prized by the Chinese as material for soup. The fins are dried and a fine white gelatin is extracted. The fish is rarely taken except in July and August, when it enters quiet bays to be delivered of its young.

OIL-STONE. A very smooth fine-grained type of rock used for abrasive purposes, more especially for sharpening various cutting instruments. The material used in the manufacture of oil-stones is obtained from a number of different localities, but the most important stones at the present time are those from Arkansas, Indiana, and Germany. Those from Arkansas go under the name of *Arkansas* and *Washita* stones and are an extremely fine-grained siliceous rock of white color. They are especially adapted to sharpening fine tools requiring smooth edges. Owing to the limited supply of the Arkansas rock of good quality, the difficulty in quarrying, and the very large loss in trimming, the material retails at \$2.50 per pound. The Washita is less expensive. The German stone is much used for razor hones. The Indiana oil-stones, which are very fine-grained sandstones, are commonly known in the market as *Hindustan* or *Orange* stones. They are not suited for sharpening such fine steel instruments as those for which Washita rock is used. See ABRASIVES.

OIL WELLS. See PETROLEUM.

OINTMENT (ME. *oinement*, from OF. *oigner*, from *oigner*, *oindre*, *ongier*, to anoint, from Lat. *unguere*, *ungere*, Skt. *añj*, to smear). A fatty preparation, either soft or solid at ordinary temperatures, but liquid when rubbed into the skin. Ointments are composed of a fatty base, either lard or vaseline, alone or mixed with olive or almond oils or with spermaceti or wax, to diminish or increase their consistency as desired. Benzoin is often added to the lard or other base to prevent decomposition. Hydrated sheep's wool fat (lanolin) is more quickly absorbed than most fats and may be mixed with more than twice its weight of water without

losing its ointment-like character. It is employed as a base when rapid absorption is wished, as sometimes happens in the case of mercury. Into the base is thoroughly incorporated the substance which, as a rule, gives to the ointment its remedial virtues. The greatest care is necessary to insure a minute subdivision of the medicinal element in order that the ointment may be homogeneous and free from gritty particles. The United States Pharmacopœia recognizes twenty-seven ointments, but many more are made. Among the better known may be mentioned zinc, sulphur, and the various mercurial ointments. **COLD CREAM** (q.v.) is the popular name of rose-water ointment.

OISE, wîz. A northern department of France, formed from parts of the former provinces of Ile-de-France and Picardie, and lying on both sides of the Oise River, north of Paris (Map: France, J 2). Its area is 2272 square miles. The surface is generally level and about two-thirds of it is cultivated, producing cereals, potatoes, sugar-beets, and large quantities of fruit, including grapes. Stock-raising is well developed, as are the industries, covering the manufacture of iron, pottery, paper, chemicals, and textiles. Population, in 1891, 401,835; in 1901, 407,808.

OISE. A river of Northern France. It rises among the Ardennes in Southern Belgium, flows southwest through the French departments of Nord, Aisne, Oise, and Seine-et-Oise, and joins the Seine 15 miles northwest of Paris (Map: France, J 2). Its length is 189 miles, and it is navigable 86 miles to Chauny. A lateral canal follows part of its upper course, and other canals connect it with the Somme, the Sambre, and the Scheldt rivers. The principal towns on its banks are Compiègne, Chauny, and Novon.

OJÉDA, ó-há'dá, ALONSO DE (1465-1515). A Spanish explorer, born of noble parentage, in Cuenca, Spain. He accompanied Columbus on his second voyage, and from that time until his death was closely associated with the exploration and settlement of the newly discovered region. One of his first exploits was the capture by stratagem, in 1495, of the cacique Caonabo, who had formed a scheme for an alliance of all the natives against the Spaniards in Hispaniola. Four years later, accompanied by Columbus's former pilot, Juan de la Cosa, and by Amerigo Vesputius, he succeeded in exploring the northern coast of South America from some point on the north coast of what we now call Brazil as far westward as the Gulf of Maracaibo. He made a second voyage in 1502, and for trespassing on territory given by the Papal bull to Portugal, was upon his return censured and heavily fined. In 1509, with about 300 men, he sailed from Hispaniola to take possession, as Governor, of Nueva Andalucía, which comprised the territory between the gulfs of Urabá (Darien) and Maracaibo. Near the site of the present town of Cartagena he landed with a party of about seventy men in order to capture Indians for slaves, but the party was overpowered, and only Ojéda and one other man escaped. A colony was then established at San Sebastian, but provisions soon ran so low that Ojéda set out for Hispaniola for supplies and reinforcements. The vessel was wrecked off the coast of Cuba, and Ojéda reached his destination only after great hardships. He was unable to fit

out another expedition, and died in great poverty and misery at Santo Domingo.

OJIB'WA, or **CHIPPEWA**. The largest and most important tribe of the Algonquian stock (q.v.), formerly holding an extensive territory about the upper Great Lakes, in Michigan, Minnesota, Ontario, Manitoba, and adjacent regions, and now gathered upon a number of reservations within the same area. The name is from a root signifying 'puckered,' or 'drawn up,' said by some authorities to refer to the peculiar sewing of the tribal moccasin, although this derivation is disputed. They call themselves usually *Anishinabeg*, 'spontaneous men,' were known to the French as *Ojibois*, or *Saulteurs*, from their residence about Sault Saint Marie, and were commonly known to the English as *Ojibwa*, or in its corrupted form, *Chippewa*.

Although the Ojibwa are the largest tribe north of Mexico, yet, owing to their looseness of organization and remoteness from the settlement frontier, they were not proportionately conspicuous during the colonial period. According to their tradition they emigrated from the Saint Lawrence region in the east, in company with the Ottawa and Pottawatomi, the three tribes separating at Mackinaw, the two others going southward, while the Ojibwa spread westward along both shores of Lake Superior. The Cree, Maskegon, and Missisaga (qq.v.) are claimed by the Ojibwa as later offshoots from their own tribe, and are sometimes so closely affiliated that they are hardly distinguished from the Ojibwa. The Ojibwa, Ottawa, and Pottawatomi, though differing in language, also formed a sort of loose confederacy, and were sometimes for this reason designated in Indian councils as the 'Three Fires.' When first known, about the year 1650, the Ojibwa were confined to a comparatively narrow area close along the shore of Lake Superior, hemmed in by the hostile Sioux and Foxes on the west and south. On procuring firearms from the traders, however, they became aggressive and soon drove out the Foxes from northern Wisconsin, compelling them to take refuge with the Sauk farther south. They then turned their attention to the Sioux, driving them from the headwaters of the Mississippi and continuing their victorious westward march until they had occupied the upper Red River country and established their frontier band in the Turtle Mountains, on the boundary between Dakota and Manitoba. In the meantime other bands of the tribe had overrun the Ontario peninsula, formerly conquered by the Iroquois from the Huron and others. These bands later became known as Missisaga. The Ojibwa first turned the westward tide of Iroquois invasion by inflicting upon them a disastrous defeat at the place thence known to the Indians as 'The place of Iroquois Bones,' now Point Iroquois, near Sault Sainte Marie. Throughout the colonial wars they adhered to the French side and later to Pontiac, but took sides with the English and Tecumseh against the Americans in the Revolution and War of 1812, joining with other tribes in the general treaty of peace in 1815. Since then they have been at peace with the whites. By a general treaty of 1825 for the adjustment of intertribal boundaries in the Northwest the Government made an end to the hereditary war between the Ojibwa and the Sioux. By other treaties, on both sides of the

line, they have sold the greater part of their former territory, retaining only their present reservations.

Scattered over such an immense region, extending hundreds of miles from east to west, the Ojibwa had a large number of bands and divisions, some of which were hardly known to the others more remote, as well as a large number of clans which were not all represented in the same section. According to Warren, they themselves recognized ten principal divisions, including three on the Canadian side of the boundary. Among these the Makandwe, or Pillagers, about Leech Lake, Minn., are perhaps the best known. The number of clans is variously stated from eleven to twenty-three, Warren making it twenty-one, grouped into five phratries representing original clans, one of which claimed the hereditary chieftainship, while another claimed precedence in the war councils. In their general habit they resembled the other northern Algonquian tribes. Living in a cold country, they gave little or no attention to agriculture, but depended for subsistence upon hunting, fishing, and the gathering of wild fruits and seeds, particularly the abundant wild rice of the lake region, with the sugar which they had learned to extract from the maple. Their houses were framed in wigwam or tipi shape, covered usually with birch bark, from which also they made their light canoes, their bowls and boxes, and upon which they scratched their simple pictograph records. They made no pottery, but were skillful mat-weavers. They had an elaborate mythology and ritual, chiefly in the keeping of the secret Mide Society. Despite missionary effort and contact with civilization, the primitive culture of the Ojibwa is little modified. The principal works in the Ojibwa language are Baraga's Dictionary, Belcourt's Grammar, and the shorter treatises of Schoolcraft. Of myths, the best collection is Schoolcraft, *Algonquian Researches*, upon which Longfellow based his *Hiawatha*. In ritual mythology and general description the best work is Hoffman, "Midewiwin of the Ojibwa," in *Seventh Report of the Bureau of Ethnology*. On traditional and later history the most satisfactory is Warren, "History of the Ojibwa," in fifth volume of Minnesota Historical Society Collections, after which come Copway, *History of the Ojibwa Indians*, and Jones, *History of the Ojibwa Indians*, all three authors being of mixed Ojibwa blood. In special research may be noted Jenk, "Wild Rice Gatherers," in *Nineteenth Report of the Bureau of Ethnology*.

The Ojibwas were estimated in 1764 at about 25,000; in 1783, at 15,000; in 1843, at 30,000; in 1851, at 28,000. They number now about 30,000, divided between the United States and Canada as follows: United States—Minnesota (chiefly at Leech Lake, Red Lake, and White Earth), 8130; Wisconsin (chiefly at Lac Court Oreille, Lac de Flambeau, and La Pointe), 5100; North Dakota (Turtle Mountain), 2460; Michigan, 700 on upper peninsula, with 5600 scattered Chippewa and Ottawa on lower peninsula; Kansas, mixed Munsee and Chippewa, 90. Canada—all in Ontario Province, on numerous small reservations, and variously designated as 'Chippewas,' 'Ojibbewas,' and 'Saulteaux.' 10,760, besides Ojibbewas and Ottawas of Manitoulin and Cockburn islands, 1950. See Colored Plate of INDIANS, AMERICAN.

O. K. The story that General Jackson used these letters to indorse official papers as correct seems to have been started by Seba Smith (Major Downing), the humorist. It was a hit at Jackson's supposed illiteracy, and as a party cry during the Presidential campaign of 1832 acquired great vogue. Parton states that Jackson used to indorse legal documents O. R., order recorded, and the mistaking of the letters was probably the basis of Downing's jest. The term is also said to have originated with Josh Billings and has been ascribed to several other persons. Jacob Astor is said to have used it to indicate the standing of traders about whom he was questioned. In colonial days, the best tobacco and rum were imported from Aux Cayes, and from this fact Aux Cayes (O Kay) became a popular expression for excellence.

OKA, ô-kä'. A river of Central Russia, and the principal west affluent of the Volga (Map: Russia, F 3). It rises on the southern boundary of the Government of Orel and flows in a general northeast direction with several large bends, joining the Volga at Nizhni-Novgorod after a course of 960 miles through the most fertile parts of Russia. The river is navigable for steamers to the town of Bielev, a distance of 862 miles, and for smaller vessels 32 miles farther to the city of Orel. It is a very important commercial route.

O'KA. A mission settlement of Catholic Iroquois, Nipissing, and Algonquin, on the Lake of Two Mountains, a few miles from Montreal, in Quebec Province, Canada. Oka is the Algonquin name, said to signify a pickerel, while the Iroquois name, Canasadaga, by which it was formerly known, refers to the position of the village on the slope of a hill. It was settled originally in 1720 by the Catholic Iroquois who had previously been at the Sault au Recollet and who numbered about 900 at the time of removal. They were soon afterwards joined by some Nipissing and Algonquin from the abandoned mission of Isle aux Tourtes. The two bodies occupy different parts of the same village, separated by the church, the Iroquois using the Mohawk language while the others speak Algonquin. In 1881 a part removed to Gilson, Ontario, where they are now established. Those at Oka number now about 450.

OKAPI, ô-kä'pê (African name). An animal of the giraffe family (*Ocapia Johnstoni*), discovered in 1899 by Sir Harry Johnston in the Semliki Forest of the Congo State. The animal stands about 4½ feet high at the withers, and is of the peculiar form shown on the Plate of GIRAFFE AND OKAPI. The head is giraffe-like, but there are no external horns. The tail is rather short, and the neck is short and thick. The skull is characteristically giraffine and exhibits rudiments, or rather vestiges, of three horn-cores. The coloration as described by Sir Harry is extraordinary. The cheeks and jaws are yellowish white, contrasting with the dark-colored neck. The forehead and a line down to the muzzle is a deep-red chestnut, and the large broad ears are of the same tint, fringed with black. The neck, shoulders, and body range in tone from sepia and jet-black to vinous red; the belly is blackish, the tail chestnut with a small black tuft. The hind quarters, hind and fore legs are either snowy white or pale cream color, touched here and there with orange, and boldly

marked with purple-black horizontal stripes and blotches. Not much is known of the okapis except that they live in pairs in the forests of the northern Congo Basin. Consult *Transactions and Proceedings of the Zoölogical Society of London* for 1901 and 1902.

OKAVANGO, ô'kâ-vân'gô. A river of Central Africa. See KUBANGO.

OKAYAMA, ô'kâ-yâ'mâ. The capital of the prefecture of the same name and of the Province of Bizen, Japan, situated on the river Asahi, in the southwestern part of Hondo, 80 miles by rail west of Kobe (Map: Japan, C 6). It has an old castle formerly inhabited by the daimio, and close to it a magnificent Japanese garden. Population, in 1898, 58,025.

OKEECHOBEE, ô'kê-chô'bê. A lake in the southern part of Florida, the largest in the Southern United States (Map: Florida, H 5). It is 40 miles long and 30 miles wide, with an area of 1250 square miles and a maximum depth of 12 feet. It borders on the great Everglade swamps, and its shores are nearly everywhere inaccessible, consisting of marshy jungles, while great parts of the lake itself are overgrown with weeds. Its waters are discharged partly by seeping through the Everglades, partly through the Caloosa River, connection with which has been facilitated by several canals which have reduced the size and depth of the lake, and drained large portions of the surrounding swamps, rendering them fit for agriculture.

O'KEEFE, ô-kêf', JOHN (1747-1833). An Irish playwright and actor. He was born in Dublin, and in his youth studied painting, but he began writing comedies at the age of fifteen. A few years later he joined a theatrical company in his native city, and wrote meanwhile a number of small pieces, in which he appeared at his own benefits. His *Tony Lumpkin in Town* was produced at the Haymarket, London, in 1778, and gained for its author an English reputation. He settled in London, and, though threatened with blindness, continued to write for the stage. His dramatic pieces by his own statement number sixty-eight, of which about fifty were performed, and some of them, such as the operatic farces, *The Highland Reel* and *The Agreeable Surprise*, and the farce *Wild Oats*, were unusually successful. In 1798, when he had become almost totally blind, he published *The Dramatic Works of John O'Keefe, Esq.*, in four volumes. For some years afterwards he was in straitened circumstances, till he was relieved by a pension from the Crown. In 1830 he went to live in Southampton, where he died on February 4, 1833. The next year, his daughter Adelaide, who was herself an author, published a collection of his verse under the title of *A Father's Legacy to His Daughter*. O'Keefe's plays, many of which have been separately published, are deficient in characterization and incident, and rough in diction, but full of broad humor and rollicking spirits. Consult the *Recollections of the Life of John O'Keefe* written by himself (London, 1826); also as edited by R. H. Stoddard (New York, 1876); Geneste, *History of the English Stage* (Bath, 1832).

O'KEFINO'KEE SWAMP. One of the largest swamps in the United States, covering parts of Baker County, Fla., and of Ware, Clinch, and

Charlton counties, in Georgia (Map: Georgia, D 5). It consists of a series of swamps about 180 miles in circuit, and having an area of 500,000 acres. It is filled with pools and islands, some overgrown with bay trees, others with vines and brush. Moccasins and alligators are numerous. In the eastern portion is an open lake dotted with small floating islands.

OKEGHEM, ô'ke-gêm, **OKEKEM**, **OCKEGHEM**, **OCKENHEIM** (c.1420-c.1500). One of the great masters of the Netherlandish school of composition. He was born in East Flanders and was a chorister in the Antwerp Cathedral, and subsequently studied under Dufay. Accuracy with regard to dates considering the life and history of Okeghem is impossible. He was first master of music to the French King Charles VII. (1454), and held similar important appointments under Louis XI. As a teacher he is principally famous through his pupil Deprès (q.v.), who introduced his master's style and music to the world at large, and greatly influenced modern German church music through Luther, who was a contemporary and admirer of Desprès. Okeghem's music is still very much admired by musical scholars. He wrote nearly twenty masses, besides numerous motets, a ninefold canon in 36 parts, chansons, etc. See MUSIC—SCHOOLS OF COMPOSITION (section iii.).

O'KELLY, CHARLES (1621-95). An Irish historian, born in Screen Castle, Galway, and educated at the Irish College in Saint Omer, France. He took part in the Civil War in 1642, and when Cromwell won, O'Kelly with 2000 compatriots followed the fortunes of Charles II. in France and Spain. They returned to England at the Restoration, and after the next revolution O'Kelly represented Roscommon in 1689 at the Dublin Parliament of James II., whom he also served as colonel of cavalry. He defended the island of Boin against the Orange troops in 1691, but was forced to capitulate there, as well as from his later post, and he retired into private life at the Treaty of Limerick. His *Macariæ Excidium* (1692), an invaluable contemporary account of the revolution, was first printed by the Camden Society in 1841, and J. C. O'Callaghan (q.v.) prepared an annotated edition of it for the Irish Archaeological Society in 1850, while a third appeared under the title *The Jacobite War in Ireland* (1894).

O'KELLY, JAMES (c.1757-1826). A pioneer preacher of the Methodist Episcopal Church and leader of the first secession from it. He was born in Ireland about 1757, came to America, and in 1778 began work as a traveling preacher. He was among the number who were ordained elders at the organization of the Methodist Episcopal Church in 1784. He became presiding elder of the South Virginia district, and was a member of the first Council meeting in 1789. He took the lead in a movement opposing the authority and life tenure of the bishops. O'Kelly shortly after the General Conference of 1792 withdrew from the connection, taking several other ministers with their congregations or parts of congregations with him, and formed a Church known as the Republican Methodist. His opposition to Methodism became more bitter, and he denounced ordination as spurious. His secession movement reached its height in 1795, causing a loss of nearly 6500 members to the Methodist

Church. The name of his organization was afterwards changed to the Christian Church, but at the end of twenty years it had almost disappeared. Consult Buckley, *History of Methodism in the United States* (New York, 1897).

OKEN, ôk'en, LORENZ (1779-1859). A German naturalist and philosopher, born at Bohlsbac. His real name was Ockenfuss. He studied medicine and the natural sciences at Würzburg and Göttingen. In 1807 he became a professor of medicine at Jena, and in 1812 received the chair of natural sciences, but in 1819 he was compelled to resign his position because a scientific journal called *Isis*, which he had conducted since 1816, gave offense to the Government. In 1828 he obtained a professorship in the newly founded University of Munich, and in 1832 accepted a chair at Zurich, where he remained until his death. Oken sought to unify all the natural sciences, and invented an entirely new and very complicated terminology for the purpose. His system was in some respects fantastic, and is now almost obsolete. Some of his speculations were, however, fortunate. As early as 1805 he foreshadowed the theories of the cellular structure of organisms and of the protoplasmic basis of life, and his vertebral theory of the structure of the skull, although false, was an important contribution to comparative morphology. His most important works are: *Die Zeugung* (1805); *Ueber die Bedeutung der Schädelknochen* (1806); *Lehrbuch der Naturphilosophie* (1808-11), translated into English by Tulk and called *Elements of Physio-philosophy* (1847); *Lehrbuch der Naturgeschichte* (1813-27).

OKHOTSK, ô-kôtsk', SEA OF. A large inlet of the Pacific Ocean, indenting the east coast of Siberia, and separated from the ocean on the east by the Kamtchatka Peninsula, and on the south by the Kurile Islands (Map: Asia, O 3). In the southwest it communicates with the Japan Sea by La Pérouse Strait between the islands of Yezo and Sakhalin, and by the long passage which separates Sakhalin from the mainland. It is nearly rectangular in shape, its northern shore lying nearly on the 60th parallel N., and it is about 1000 miles long and 600 miles wide. The coasts are steep and forbidding, very sparsely inhabited, and ice-bound from November to April and even to July. The open sea is ice-free, but subject to heavy fogs and storms. The sea is very little frequented, but has been exploited by American whalers for the last half century.

OKINAGAN, ô'kê-nâ'gân. An important tribe of Salishan stock (q.v.), and formerly the head of a confederacy including also the Colville, Sanpoil, and a number of other cognate tribes. They occupied an extensive territory upon Okinagan and Similkameen rivers in northern Washington and the adjacent part of British Columbia. They were converted by Jesuit missionaries about fifty years ago, and are now civilized and fairly prosperous. They reside upon the Colville reservation in northern Washington, numbering altogether 575, and have been made citizens under the allotment act.

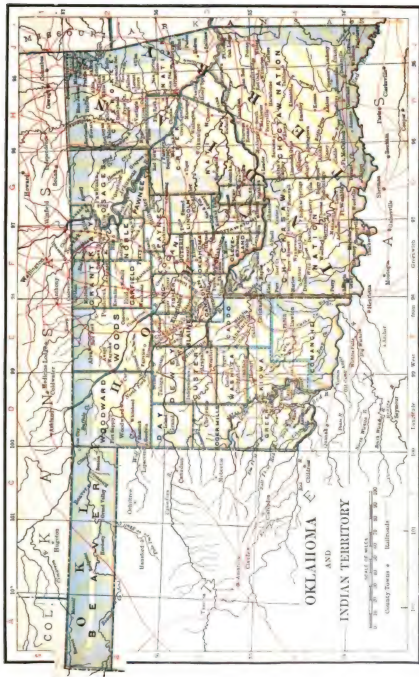
OKINAWA, ô'kê-nû'wâ. A Japanese ken or prefecture formed in 1879 to include those islands of the Loo-Choo (q.v.) Archipelago that were not incorporated into Kagoshima Ken. It takes its name from Okinawa, the largest of the group.

OKLAHOMA, ôk'la-hû'mâ. A Territory of the United States, lying in the south central division between 34° and 37° north latitude, and between 96° and 103° west longitude. It is bounded on the north by Colorado and Kansas, on the east by Indian Territory, on the south by the last and by Texas, and on the west by Texas and New Mexico. Its extreme north and south dimension is 205 miles, and its extreme length from east to west, including the long narrow western projection constituting Beaver County, is 383 miles, though its width farther south is only 190 miles. Its area is 39,030 square miles, of which 38,830 square miles, or 24,851,200 acres, are land surface. It exceeds in area twelve of the States, and is nearly equal in size to the State of Kentucky.

TOPOGRAPHY. The surface is in general a rolling plain rising gradually from an elevation of about 800 feet in the extreme east to 2500 feet on the western boundary of the main portion, and to 5000 feet on the extreme western boundary of Beaver County. A range of hills known as the Chautauqua Mountains runs through the central portion. In the south the picturesque Wichita Mountains rise in a group of more or less isolated granite peaks to a height of 1000 feet above the surrounding plains. The western part of the Territory belongs to the region of the Great Plains rising toward the Rocky Mountains. The Red River flows on the southern boundary, and the southern part of the Territory is drained by its tributaries, chief of which are the North Fork and the Washita, the latter joining its main stream in Indian Territory. The rest of the Territory is drained by the Arkansas River, whose main stream flows through the northeastern corner. Several of its large tributaries traverse the Territory from west to east, namely, the Salt Fork, the Cimarron, and the Canadian River with its long North Fork.

CLIMATE AND VEGETATION. The climate of Oklahoma is very favorable for agriculture, since, owing to the southern situation, the winters are not severe, and the rainfall is for the most part sufficient. There is, nevertheless, a considerable range of temperature, and the region is subject to severe and sudden cold waves. The maximum temperature recorded during eight years is 115°, and the minimum 25° below zero. The latter figure is, however, entirely abnormal, and the cold winter periods are of short duration, the mean temperature for the coldest month (January) being well above freezing (36.9°). The mean temperature for July is 81.2°, and for the year 59.5°. The average annual rainfall is 31.8 inches, evenly distributed through the year with a maximum in midsummer, but ranging in localities from 57 inches to a small amount, the smallest amount falling in the extreme northwest. In the western part generally the precipitation is very light for farming. The soil is formed by the decomposition of the underlying rock formations, and consists chiefly of red clay and sandstone material. In the river valleys these are mixed with a rich black alluvium, and the soils are generally of sufficient depth to be of almost inexhaustible fertility.

There are some forests of oak, walnut, and hickory in the east, but the western plains are generally treeless, and covered with grama, drop-seed, and bunch grasses, while in the ex-



AREA AND POPULATION OF OKLAHOMA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Beaver	A 2	Beaver	5,739	2,074	3,051
Blaine	E 3	Watonga	941	.....	10,658
Canadian	F 3	El Reno	803	7,158	15,981
Cleveland	F 3	Norman	545	6,605	16,388
Comanche	E 4	.....	.....	.....	.....
Custer	D 3	Arapaho	1,001	.....	12,264
Day	D 3	Grand	1,044	.....	2,173
Dewey	D 3	Tuloga	1,008	.....	8,819
Garfield	F 2	Enid	1,086	.....	22,076
Grant	F 2	Pondereck	1,004	.....	17,273
Greer	D 4	Mangum	2,303	5,338	17,922
Kay	F 2	Newkirk	805	.....	22,530
Kingfisher	F 3	Kingfisher	891	8,332	18,501
* Kiowa	D 4	.....	.....	.....	.....
Lincoln	F 3	Chandler	961	.....	27,007
Logan	F 2	Guthrie	749	12,770	26,538
Noble	F 2	Perry	631	.....	14,015
Oklahoma	F 3	Oklahoma	713	11,742	25,854
Pawnee	G 2	Pawnee	542	.....	12,366
Payne	F 2	Stillwater	759	7,215	20,909
Pottawatomie	F 3	Tecumseh	790	.....	26,413
Roger Mills	D 3	Cheyenne	1,191	.....	6,190
Washita	D 3	Clondchief	988	.....	15,001
Woods	E 2	Alva	2,749	.....	34,975
Woodward	D 3	Woodward	3,295	.....	7,469
Kaw Indian reservation	G 2	.....	.....	.....	768
Kiowa, Comanche and Apache Indian reservation .....	.....	Anadarko	4,043	.....	4,908
Cange Indian reservation	G 2	.....	2,398	.....	6,717
Wichita Indian reservation .....	.....	.....	968	.....	1,420

* Organized since the last census was taken.

AREA AND POPULATION OF INDIAN TERRITORY.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Cherokee Nation	H 2	.....	7,133	.....	101,754
Chickasaw Nation	F 4	.....	7,326	.....	139,300
Choctaw Nation	G 1	.....	579	.....	99,681
Creek Nation	G 3	.....	1,843	.....	40,674
Seminole Nation	G 3	.....	10,910	.....	3,786
Medoe Indian reservation	J 2	.....	.....	.....	140
Ottawa Indian reservation	J 2	.....	.....	.....	2,205
Peoria Indian reservation	J 2	.....	.....	.....	1,180
Quapaw Indian reservation	J 2	.....	210	.....	800
Seneca Indian reservation	J 2	.....	.....	.....	970
Shawnee Indian reservation	J 2	.....	.....	.....	297
Wyandotte Indian reservation	J 2	.....	.....	.....	1,213

treme west are found sage-brush, yucca, and cactus. For Fauna, see paragraph under UNITED STATES.

GEOLOGY AND MINERAL RESOURCES. The surface rock in the greater part of the Territory is Triassic sandstone, on which here and there are small areas of Cretaceous deposits. The great central Carboniferous area of the United States covers the eastern part of the Territory, and the western part of Beaver County consists of Neocene deposits. The Wichita Mountains in the south present an intrusion of Archæan rocks flanked by the upturned Silurian strata. The principal minerals found are building-stone, gypsum, salt, petroleum, iron, gold, and silver. A little copper is mined in Beaver County, and a small amount of coal in Pawnee County.

AGRICULTURE. Oklahoma is preëminently an agricultural and stock-raising region. The development of agriculture since the Territory was opened to settlement has been phenomenal. In 1900, 15,719,258 acres, or 63.3 per cent. of the total area, was included in farms, of which 35.1 per cent. was improved. The average size of farms was 251.5 acres. Cash tenants represented 8.2 per cent. of the farms, and share tenants 12.9 per cent.

The striking feature is the great variety of crops successfully grown. The cotton yield per acre is in excess of that of any other State or Territory.

Corn and wheat lead in importance. In 1899 there were 1,320,506 acres of corn and 1,279,826 acres of wheat. Other cereal crops in 1899 were: oats, 156,619 acres; Kafir corn, 63,455; barley, 16,453; and rye, 3501. Hay and forage for the same year had an area of 695,313 acres. Cotton is produced most extensively in the southern section. In 1899, 240,678 acres were devoted to this crop. The cultivation of potatoes, sorghum, melons, peanuts, castor beans, and broom corn receives considerable attention. Not a little fruit is grown. The peach trees in 1900 numbered 5,519,072, or over five-eighths of the total number of fruit trees. In 1900 there were 5,733,385 acres of vacant Government land in the Territory subject to homestead entry. A great part of this was in the arid Beaver County, formerly known as 'No Man's Land.' For the recent opening of land to settlement, see *History* below.

STOCK-RAISING. The western third of the Territory is given up to cattle-raising, which flourished before the region was opened to settlement. The number of cattle has increased prodigiously since that time. Horses, mules, and swine are also important, and some sheep are raised.

The following table gives the number of domestic animals on farms in 1890 and 1900:

	1900	1890
Dairy cows.....	165,852	16,756
Other cattle.....	1,543,940	110,199
Horses.....	303,631	25,554
Mules and asses.....	57,194	4,923
Sheep.....	48,535	16,565
Swine.....	584,878	21,962

MANUFACTURING. The total number of establishments in 1900 was 870; capital, \$3,352,064; value of product, \$7,083,934. The flouring and grist-mill industry is the most prominent, the number of mills being 55; capital, \$1,080,661.

Cotton-ginning and the manufacture of cotton-seed oil are next in importance.

RAILROADS AND COMMERCE. The development of Oklahoma was not delayed for want of railroad facilities. Railways were already constructed when the Territory was given over to the public, and they aided greatly in the rapid progress made. In 1900 there were 899 miles, divided between the following companies: Atchison, Topeka and Santa Fe; Chicago, Rock Island and Pacific; Choctaw, Oklahoma and Gulf; Saint Louis and San Francisco. There are no navigable streams. Wheat is much the largest export. Cattle, corn, hogs, and cotton rank next in shipment in the order named. Coal and manufactured articles are imported.

BANKS. The rapid economic growth of the Territory is also seen in the development of its banking facilities. There were only three banks when Oklahoma was organized. In 1892 there were 9 banks; in 1895, 57; and in 1902, 206. The banks are governed by a stringent banking law, passed January, 1898. It prohibits private banking, created the office of bank commissioner, makes quarterly reports obligatory, defines the minimum of capital and the liability of the officers. The condition of the various banks in 1902 is shown in the following table:

	National Banks	State Banks
Number.....	67	152
Capital.....	\$2,270,000	\$1,248,000
Surplus.....	237,000	194,000
Cash, etc.....	787,000	986,000
Loans.....	7,796,000	4,584,000
Deposits.....	9,482,000	7,535,000

GOVERNMENT. Oklahoma has the usual Territorial form of government. (See TERRITORIES.) The capital is Guthrie.

FINANCES. The budget grew during 1890-1902 from less than \$40,000 to more than \$1,000,000. A small public bonded debt was created in 1893 for purposes of construction, but besides this an excess of expenditure over receipts was a constant feature from 1890 to 1900. This resulted in an accumulation of \$684,176 of unpaid and interest-bearing warrants. However, there was in November, 1902, a balance of \$648,440 in the treasury. The main sources of income are a general tax and the rentals of public lands. The receipts from the latter source go mainly for support of the various educational funds. In 1902 the total receipts were \$1,054,794; and the expenditures were \$778,460, out of which 75 per cent. was devoted to educational purposes and current school expenses, schoolhouse construction, and the formation of permanent school funds.

POPULATION. From 1890 to 1900 Oklahoma was a prominent centre for native-born American colonists. The great fertility of the land was an irresistible attraction to home-seekers. The population increased from 61,834 in 1890 to 398,331 (excluding Indians—13,873) in 1900, or 544 per cent. Kansas, Missouri, and Texas have been the largest contributors to the population. The opening of additional territory since the 1900 census was taken has resulted in a large increase to the total population. Naturally the urban population is small, only 5 per cent. being in cities of over 8000. Oklahoma City had a popu-

lation of 10,037 in 1900 (since greatly increased); Guthrie, 10,006.

INDIANS. Since the opening of the Kiowa and Comanche reservations there remain only the Osage and Kansas Indian reservations—in all 2,469,246 acres. The Indians are slowly progressing, but in the main continue to live in idleness.

RELIGION. In 1900 there were about 900 church organizations, with a membership of 70,000. They owned church property valued at \$500,000. The Catholic Church had a membership of 13,804. The Methodist Episcopal, Christian, Baptist, and Missionary Baptist churches each recorded a membership of nearly 8000, but the total number of adherents was much greater. The Methodist Episcopal South had 6340 members.

EDUCATION. In 1900 the illiterate population amounted to 5.5 per cent. of the total population ten years of age and over. Almost from the first Oklahoma has provided facilities for primary education equal to those of the most advanced States. The first public structure in almost every community was a schoolhouse. Two sections in each township were reserved for the use and benefit of the common schools. The income from the rental of these lands has increased annually, and in 1899 amounted to \$189,486. The total expenditure for public schools in 1900 was \$686,095, of which \$385,856 was paid as salaries to superintendents and teachers. In 1900 there were 120,210 children between the ages of five and eighteen, of whom 99,602 were enrolled in the public schools, and 63,718 were in average attendance. In 1901 the Legislature granted authority to counties having a population of over 6000 to establish high schools. There are separate schools for colored children. In 1900 there were 1004 male and 1339 female teachers. Higher institutions of learning maintained by the Territory are as follows: University of Oklahoma, at Norman; an agricultural and mechanical college, at Stillwater; the normal school, at Edmond; Northwestern Territorial Normal School, at Alva; and Langston University (colored), at Langston. There are also four sectarian colleges, and not a few academies and private schools. The United States Government maintains schools for the education of the Indians. The largest of these is the Chillico Industrial School, in Kay County.

CHARITABLE AND PENAL INSTITUTIONS. The deaf mutes and insane of the Territory are cared for in private institutions by contract. The insane are kept in a sanatorium at Norman, the contract allowing \$200 per patient. Convicts are cared for by contract in the Kansas State Penitentiary. The cost per convict for 1899 was \$123.

HISTORY. Oklahoma was a part of the Louisiana Purchase, and was included in the "unorganized or Indian country" set apart by Congress in 1834. The Creek Indians (June 14, 1866) ceded to the United States the western part of their domain in Indian Territory, for 30 cents an acre, while the Seminoles gave up their entire holdings for 15 cents an acre. The Sacs and Foxes, Cheyennes, and other tribes were settled upon part of these lands, but great tracts remained unoccupied. Though white men were forbidden by law to settle upon these lands, schemes for colonization were developed in 1879. President Hayes issued proclamations both in 1879 and 1880 forbidding settlement, but it was

necessary to use troops to dislodge the 'boomers.' Congress in 1885 authorized the President to open negotiations with the Creek and Seminole Indians, for the purpose of opening these vacant lands to settlement. This was accomplished in 1889, and by proclamation of the President the lands were thrown open to entry April 22, 1889. The only governmental authority within the region was a United States court. Troops kept the expectant settlers in order until noon of the appointed day. A mad race for the best lands and town sites ensued. Canvas towns were laid out and each began to lay plans to secure the capital. There was at once a vast influx of settlers, and the population increased at an extraordinary rate. Additional lands were laid open to settlement in 1891, 1893, and 1901; and the scenes of the original opening were repeated. There was no government in the Territory until Oklahoma Territory was created (March 2, 1890). The first Legislature met at Guthrie, August 27, but spent almost the entire session quarreling over the location of the capital, which remained at Guthrie. The agitation for Statehood began in 1891, and a bill admitting Oklahoma as a State passed the House of the Fifty-seventh Congress, but failed to reach a vote in the Senate.

GOVERNORS OF OKLAHOMA.

George W. Steele.....	1890-91
Robert Martin (acting).....	1891-92
Abraham J. Seay.....	1892-93
William C. Renfrow.....	1893-97
Cassius M. Barnes.....	1897-1901
William M. Jenkins.....	1901
Thompson B. Ferguson.....	1901—

OKLAHOMA, UNIVERSITY OF. A coeducational institution established in 1892 at Norman, Okla., and supported by a general State tax of one-half mill, and by the income from lands reserved in the Cherokee outlet. The university consists of (1) a College of Arts and Sciences, embracing an undergraduate course, in the main elective, a combined course in collegiate and medical studies, and combined courses in collegiate subjects and engineering; (2) a School of Pharmacy; (3) a School of Fine Arts; and (4) a Preparatory School. Tuition is free to residents of Oklahoma and Indian Territory. The total enrollment in 1902 was 359 and the faculty numbered 28. The library contained 8000 bound volumes and 5000 pamphlets. The college property was valued at \$250,000, and the grounds and buildings at \$128,000; the income was \$50,000.

OKLAHOMA CITY. The county-seat of Oklahoma County, Okla., 31 miles south of Guthrie; on the North Fork of the Canadian River; and on the Atchison, Topeka and Santa Fe, the Choctaw, Oklahoma and Gulf, the Saint Louis and San Francisco, the Missouri, Kansas and Texas, the Oklahoma City and Western, and the Oklahoma City and Southeastern railroads (Map: Oklahoma, F 3). It has a Carnegie Public Library, and is the seat of Epworth University, an institution under the joint control of the Methodist Episcopal Church and the Methodist Episcopal Church South. There are various manufactures, principally of flour; important wholesale interests, and a trade in cotton, grain, live stock, fruit, and produce, the city being the centre of a fine farming and stock-raising section. Settled in 1889, Oklahoma City was incorporated two years later. The government is vested in a mayor, elected biennially, and a unicameral council. The water-

works are owned and operated by the municipality. Population, in 1890, 4151; in 1900, 10,037.

O'KRA. See **HIBISCUS**, and **Plate of YAM**, **SWEET POTATOES**, ETC.

OKUBO, ô'kû-bô, TOSHIMICHI (1830-78). A Japanese statesman and reformer. A native of the warlike clan of Satsuma, he was one of the five leaders in the restoration of the Emperor to power in 1867-68. After the establishment of peace he was equally prominent as the advocate of progressive measures. He was vice-ambassador in the Japanese embassy of 1872-73 which traveled around the world. Going to Peking in 1874, he settled the Formosan difficulty, which threatened war between the two empires. For eight years he was in the Cabinet of the Emperor. In 1877 a portion of the Satsuma clan, led by his old friend and comrade in arms, Saigo, rebelled. But Okubo remained in the Cabinet, aiding in the suppression of the rebellion. In revenge six clansmen of Satsuma killed him while he was on the way to the Emperor's palace, May 14, 1878. He was given high posthumous rank and his sons were ennobled.

OKUMA, ô'kû-mâ, SHIGENOBU (1837-). A Japanese statesman, born in the Province of Hizen, Kiushiu, in 1837. Okuma was one of the younger leaders in the restoration of the Emperor (1867-68), and upon the conclusion of peace was given prominent official positions, distinguishing himself especially by his work in putting the finances of the Empire on a sound basis. In 1881 Okuma seceded from the company of men who were governing Japan and established the Progressive Party, advocating a more rapid advance toward constitutional and parliamentary government. In addition to his work as statesman he established a large school for the teaching of law and political economy and literature, which exerts a wide and an increasing influence. After the establishment of the Parliament Okuma again held high office and continued to be a powerful factor in the public affairs of the nation.

OLAF I., ô'lâf, TRYGVASSON (?-1000). King of Norway from 995 to 1000. He was a descendant of Harald Haarfagr, and in his early years was one of the Vikings who terrorized the coasts of the North Sea, and made descents upon England, Ireland, and France. In 995 he seized the Government of Norway. He had previously been baptized, and he now exerted himself to introduce Christianity among his subjects. Some of the nobles, who refused to acknowledge his authority, stirred up the rulers of Denmark and Sweden to make war upon Olaf, who was defeated and slain in a great naval battle in 1000.

OLAF II., surnamed the Saint or the Great (c.995-1030). King of Norway from about 1015 to 1028. He was a son of Harald Grånske, and at the age of fifteen he began his marauding expeditions, which extended to the coasts of Sweden, Germany, France, and Spain. At the age of about twenty he made himself master of Norway, where he completed the establishment of Christianity. (See **NORWAY**.) In 1028 he was driven out by Canute (q.v.) and fled to Russia. He was killed in 1030, in an attempt to recover his kingdom. Because of his zeal for Christianity, he was canonized in 1164 and became the patron saint of Norway (q.v.).

ÖLAND, ô'lând', or **OELAND**. An island in the Baltic Sea, lying off the southeast coast of Sweden, from which it is separated by Kalmar Sound, from 4 to 17 miles wide (Map: Sweden, G 8). It is included in the Swedish Län of Kalmar. The island is 80 miles in length, and from 4 to 10 miles in breadth, with an area of 510 square miles. It consists mainly of a sandstone ridge scantily covered with soil, but in some parts it is well wooded, and has good pastures, on which cattle and sheep are reared. In favorable seasons, barley, oats, and flax yield good crops. The fishing is excellent all round the coasts. There are large alum-works on the island, and an extensive line of windmills along the Alvar Hills, near which stands Borgholm (population, in 1900, 926). This town is famous for the magnificent ruins of Borgholm Castle. Oeland was often a battlefield in the wars between Denmark and Sweden. Population, in 1890, 37,519; in 1900, 30,408.

OLATHE, ô-lâ'thé. A city and the county-seat of Johnson County, Kan., 21 miles south-west of Kansas City; on the Saint Louis and San Francisco, the Missouri, Kansas and Texas, and the Atchison, Topeka and Santa Fe railroads (Map: Kansas, H 3). It is the seat of the State Institution for the Deaf and Dumb. The adjacent country is largely interested in farming and stock-raising; and the city manufactures flour, bricks, shoes, furniture, etc. There are municipal water-works. Population, in 1890, 3294; in 1900, 3451.

OLBERS, ôl'bërs, HEINRICH WILHELM MATTHÄUS (1758-1840). A German physician and astronomer, born at Arbergen, a small village near Bremen. He studied medicine at Göttingen from 1777 till 1780, and subsequently commenced to practice at Bremen. After 1779 all the leisure time that he could spare from professional occupations was devoted to the study of astronomy. He first became widely known through his calculation of the orbit of the comet of 1779, which was performed by him while watching by the bedside of a sick patient, and was found to be very accurate. In 1781 he rediscovered the planet Uranus, which had previously been supposed to be a comet, and in 1802 and 1807 respectively discovered the planetoids Pallas and Vesta. He also discovered five comets, in 1798, 1802, 1804, 1815, and 1821, all of which, with the exception of that of 1815, had been some days previously observed in Paris. His observations, calculations, and notices of various comets, which are of value to astronomers, were published in the *Annuaire* of Bode (1782-1829), in the *Annuaire* of Encke (1832), and in three collections by the Baron de Zach. Most of these calculations were made after a new method, discovered by himself, for determining the orbit of the comet from three observations. It is still employed by astronomers under the name 'Olbers's method.' The general equality of the elements of the planetoids led him to propound the theory that the planetoids are fragments of some large planet which formerly revolved round the sun at a distance equal to the mean of the distances of the planetoids from the same luminary. Olbers also made some important researches on the probable lunar origin of meteoric stones, and invented a method for calculating the velocity of falling stars. Con-

sult Schilling, *Wilhelm Olbers: Sein Leben und seine Werke* (Berlin, 1894).

OLCHAS, ol'cház, or MANGUN. One of the North Tungusic tribes dwelling at the mouth of the river Amur, in Asia, and closely related to the so-called Reindeer Tunguses. See TUNGUSES.

OLD AGE, DISEASES OF. See SENILITY.

OLD AGE PENSIONS. Allowances paid to the aged workman either by the Government or by the employer. The term is commonly extended so as to include allowances from a fund to which the recipient has contributed, but which is derived only partially from such contributions. Old age pensions are usually defended on the ground that a large class of laborers are unable to make adequate provision for old age, and hence are certain to become paupers when no longer able to work. Of these aged paupers, a large number have been sober and industrious workers, and for this reason their fate serves to discourage the workmen of the lowest paid classes. Opponents of old age pensions contend that if provision for old age is made by the State, one of the chief incentives to thrift will be removed. Defenders of the plan argue that it is simple justice that a faithful workman should be decently fed and housed when incapacitated for work by age. It is questioned whether such pensions actually discourage thrift; whether the despair of escaping pauperism which is common in certain classes does not do more to destroy industrious habits than a judicious plan of old age pensions. In Europe the provision for old age is a subject of great practical importance. The recognition of State responsibility is an innovation of the last decade. A system of State pensions has been established in Denmark and compulsory insurance obtains in Germany and Sweden. Similar laws have been enacted for coal-miners in Austria (1889), France (1894), Rumania (1895), and Belgium. The State may create institutions for voluntary insurance and may offer inducements to the workmen to insure themselves, as in France and Belgium. Privately organized institutions, e.g. friendly societies controlled by the State, may perform this function, as may also be done through funds set apart by the employer—a common plan in transportation, mining, and the iron and steel business.

Compulsory insurance originated in Germany. Dr. Schaeffle, the founder of State insurance, conceived the plan in 1867. In the early seventies it was generally discussed, and Wagner and other economists gave it their support. The present law (Invalidity and Old Age Insurance, 1889; revised July, 1899) was enacted through the influence of Bismarck, who hoped thereby to check the growth of socialism. All workmen, assistants, journeymen, foremen, engineers, servants, clerks, and teachers, who are sixteen years of age and upward, and who do not receive more than \$500 yearly, must contribute to a pension fund, to which the employer must contribute equal sums, while the Empire adds \$12.50 annually to each annuity and pays the cost of administration. Thirty-one institutions have been provided to which payments are made by means of stamps. Pensions are paid to septuagenarians.

Sweden introduced compulsory insurance in 1889 and Iceland in 1890. A Parliamentary commission to investigate the subject was appointed in Norway in 1894. In Finland old age insur-

ance is voluntary, with local pension funds administered by the State. Denmark (1891) grants small pensions in the form of additional income to the worthy poor. This differs from poor relief in that the recipient retains his right to vote.

In Belgium, the *Caisse Général d'Epargne et de Retraite* (1850) is guaranteed by the State. The system has rapidly developed since 1891. Subsidies are offered to friendly societies, and the attention of employers is called to the benefits of insurance. The new accounts increased from 568 in 1888 to 43,873 in 1898. In France the *Caisse Nationale des Retraites pour la Vieillesse* (1850) has not been popular. It is used by the railroads and other corporations which provide pensions for their employees. Among the many corporations which provide old age pensions may be mentioned the Joint Stock Company of Vielle (zinc workers) and the Gas Company of Paris. The pension funds are usually supported by contributions from the employees, but sometimes entirely from the profits of the company.

In England Canon Blackley first initiated the movement for old age pensions, but the name of Charles Booth is chiefly associated with its later development. He advocates granting pensions without regard to age or desert. Several reports of committees of Parliament (notably 1891, 1899) cover the ground extensively. Some trade unions provide pensions.

In 1898 New Zealand passed a pension law granting £18 yearly to citizens of twenty-five years' residence who were sixty-five years of age. Deductions are made when there are other sources of income, so that the stigma of poverty is attached to the scheme.

In the United States there has been no extensive demand for the adoption of the system by the Government, although it has long existed in embryo in the practice of retiring on half pay certain officials, who have served a given number of years or have attained a certain age. There is also a marked tendency among railroads and other large corporations to pension their aged employees. The Chicago and Northwestern Railroad on December 12, 1900, adopted a plan which is being followed by other roads. The pensions are managed by a board of four officials, and all employees may enjoy them. Men seventy years old who have been thirty years in service are retired; those from sixty to sixty-nine who have served thirty years and are incapacitated may be retired at the discretion of the board. The pension amounts to 1 per cent. of the average monthly payment, for the ten years preceding retirement, for each year of service. The Pennsylvania, Illinois Central, Union Pacific, Philadelphia and Reading, and the Grand Trunk have recently adopted pension systems. Among street railways, the Metropolitan, New York (July 1, 1902), provides for the retirement, voluntary and involuntary, of men between sixty-five and seventy-five years of age after a service of twenty-five years. For a continuous service of twenty-five years the pension amounts to 25 per cent. of a workman's salary, and increases with length of service. A number of gas companies have pensioned their aged employees, notably the Consolidated Gas Company of New York City, and the Gas Company of Grand Rapids, Mich. Andrew Carnegie has provided for the pensioning of employees at the Pittsburgh

mills. The Standard Oil Company has adopted a plan which provides for the pensioning of every official, no matter what his rank, the pension to be 25 per cent. of his salary. See FRIENDLY SOCIETIES.

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OLD ARM-CHAIR, THE. A poem by Eliza Cook recalling the writer's mother. It became popular and was set to music by Henry Russell.

OLD BAILEY (probably from OF. *baille*, palisade, inclosure, probably from Lat. *baculum*, rod). An ancient criminal court, with a prison adjoining, in London, England. It attained a gruesome reputation at a time when many crimes other than murder were punishable with death, because of the great number of convictions there for various capital offenses, and the apparent eagerness of the judges and juries serving there to convict any accused person brought to trial. It was graphically described by Charles Dickens in his *Tale of Two Cities* as the scene of the trial of the hero, Charles Darnay, for treason. It was destroyed by fire during the Gordon Riots of 1780, but was rebuilt, and is now officially known as the Central Criminal Court, although it is usually popularly referred to as the Old Bailey. See COURT.

OLDBUCK, JONATHAN. The chief character in Scott's *Antiquary*; an irascible, good-hearted collector of antiquities. Scott says that he was modeled partly on George Constable, an old friend of the author's father.

OLD BULGARIAN. See OLD CHURCH SLAVIC LANGUAGE AND LITERATURE.

OLD BURY. A manufacturing town in Worcestershire, England, five and one-half miles west by north of Birmingham, on the river Teme (Map: England, D 4). Coal, iron, and limestone abound in the neighborhood; and in the town, iron, steel, aluminum, railway equipment, bricks, glass, chemicals, etc., are manufactured. The town exhibits much modern improvement, owning its gas supply, a free library, and a technical institute. Population, in 1891, 22,697; in 1901, 25,191.

OLDCASTLE, JOHN (?-1417). An English nobleman, who suffered death as a Lollard. He was born about the time of the accession of Richard II. (1377), probably in the Manor of Almeley, near Weobley, Western Herefordshire. He acquired the title of Lord Cobham by marriage (1409), and later signalized himself by the ardor of his attachment to the doctrines of Wiclif. He took part in the presentation of a remonstrance to the English Commons on the subject of the corruptions of the Church. At his own expense he had the work of Wiclif transcribed and widely disseminated among the people, and paid a large body of preachers to propagate the views of the reformer throughout the country. During the

reign of Henry IV. (1399-1413) he commanded an English army in France, and forced the Duke of Orleans to raise the siege of Paris; but in the first year of the reign of Henry V. (1413) he was accused of heresy and was imprisoned in the Tower, whence after some time he escaped and concealed himself in Wales. A bill of attainder was passed against him and 1000 marks set upon his head. After four years' hiding he was captured, brought to London, and, being reckoned a traitor as well as a heretic, he was hanged and his body consumed as it hung in chains over a fire, December 14, 1417. He is said to have been the original of Shakespeare's Falstaff, as he was believed to have been in his youth the boon companion of Henry V. in his early days. Consult his *Life* by Gilpin (London, 1765), Gaspey (ib., 1843), Brown (ib., 1848), and in Maurice's *English Popular Leaders* (ib., 1872).

OLD CATHOLICS. A religious communion, found principally in Germany and Switzerland, which owed its origin to certain Roman Catholics who refused to accept the dogma of infallibility passed by the Vatican Council (q.v.), July 18, 1870. Before the Council assembled it was known that such a dogma would be discussed, and a determined opposition to it developed. Foremost among the opponents was the Munich professor Ignatz von Döllinger (q.v.), and after the dogma was promulgated he headed a gathering at Nuremberg, August 27, 1870, of professors from Bonn, Breslau, Braunsberg, Munich, Münster, Prague, Würzburg, and elsewhere, who sent forth a protest. The chief signers of the protest were deposed or excommunicated. Nevertheless, they persisted in the advocacy of their belief and found sympathizers. On September 22-24, 1871, the first Old Catholic Congress met at Munich, attended by about 300 delegates from Germany, Austria, and Switzerland, and friends from Holland, France, Russia, England, and other countries. In the resolutions adopted the congress defined its theological status. Döllinger was not in favor of forming an ecclesiastical organization, but the majority determined upon it. A large number of Old Catholic congregations sprang up in many places in Germany. The second congress met at Cologne, September 20-22, 1872; provision was made for the election of a bishop, intercommunion with the Eastern and Anglican churches was sought, and a claim to recognition by the State, with a share of the Church property, was asserted. Joseph Hubert Reinkens (q.v.), professor of the theology in the University of Breslau, was elected bishop in the following June and consecrated in August at Rotterdam by Heycamp, Jansenist Bishop of Deventer. He continued to serve till his death, January 4, 1896, when he was succeeded by Theodor Weber, who had been consecrated coadjutor bishop the preceding year. Old Catholic bishops have been recognized by the governments of Baden, Hesse, and Prussia, and the latter has granted them a share in the ecclesiastical property. The third congress, held at Constance, September, 1873, further perfected the organization, and in the following year the Church was able to report 132 parishes and societies in Germany, with about 25,000 members, 41 priests, and 12 theological students. After the fourth congress (at Baden, 1874), a conference aiming at Church unity was held at Bonn. Dr. Döllinger

presided, and representatives of the Eastern and Anglican churches participated.

The bishops of the Old Catholic Church in Germany are chosen by the clergy and people together. Its synods are representative bodies having the initiative in legislation. It rejects the doctrines of infallibility and the immaculate conception, the obligation to confess, and priestly absolution. Indulgences and the veneration of saints are modified. Many ecclesiastical taxes are abolished, and the mass is recited in the vernacular. The priests are allowed to marry. Unions for church improvement and charitable work have been formed. Between 1887 and 1900, 800,000 marks were spent in church building. The *Altkatholischer Press- und Schriftenverein* had, in 1900, 1476 members in about 200 places. The *Altkatholischer Schwesternverein* in Bonn maintains a deaconess work. The *Amalie von Lasaulx Haus* is a training institute for nurses at Essen. The *Charitas* mutual benevolent or burial society had 1742 members in 1900. An orphans' home was founded at Bonn in 1897. In 1901 there were 59 Old Catholic priests in Germany, with Dr. Thürlings as theological professor in the University of Bern, and from 50,000 to 60,000 adherents.

The movement early took root in Switzerland, especially in Geneva, and resulted in 1873 in the formation of the Christian Catholic Church of Switzerland. Eduard Herzog (q.v.) was chosen bishop in 1876. In 1901 there were 41 congregations, 56 priests, and 50,000 adherents.

In Austria the Old Catholic Church has 24 parishes and upward of 16,000 members. Dr. Amandus Czech of Warnsdorf has been chosen bishop, but not consecrated, the Government withholding its consent until adequate provision for an episcopal fund shall have been made. The Old Catholic Union of Austria has been organized to promote the work of the Church, and has local branches in some of the larger towns. A sisters' home was established at Warnsdorf in 1899. The progress of the Old Catholic Church in the Austrian Empire has been assisted in late years, particularly in Bohemia and Styria, by a popular movement whose battle-cry is 'Los von Rom.' It began with the publication in 1898 of a tract by an Old Catholic priest, Anton Nittel of Warnsdorf. At first political motives influenced the movement, but it has assumed more of a religious character as it has gone on. At the international Old Catholic congress in 1902 Bishop-elect Czech said that 7000 members had been added to the Church through the 'Los von Rom' movement. A report published in 1902 gave the entire number of new members in the Old Catholic churches in Bohemia, Moravia, Styria, Upper Austria, and Vienna as 8114, as compared with 18,082 who had joined the Lutheran and Reformed churches.

In Holland the Jansenist Church (see JANSENISM), which is affiliated with the movement, has 3 bishops, 8000 adherents, and 30 priests. In Italy there are 8 congregations and 10 priests; in Spain, 3000 adherents and 11 priests. In France the 'Gallican Church' at Paris, founded by Père Hyacinthe (see LOYSON, CHARLES), now under the charge of the Bishop of Utrecht, is in sympathy with the movement. There are also a few of the communion in Portugal and Mexico. The so-called Independent Catholic Church in the United States (q.v.), founded by the Rev. Anton Koszowski among the Polish

immigrants in Chicago, has been generally regarded as representing the movement in America. There have also been a few congregations in Wisconsin. They have a bishop, René Vilatte. International Old Catholic congresses have been held at Cologne (in 1890), Lucerne (1892), Rotterdam (1894), Vienna (1897), and Bonn (1902).

A number of Old Catholic periodicals are published: the *Internationale theologische Zeitschrift* (*Revue internationale de théologie*), quarterly, Bern; *Amtliches altkatholisches Kirchenblatt*, occasional, Bonn; *Deutscher Merkur*, weekly, ib.; *Altkatholisches Volksblatt*, weekly, ib.; *Der Katholik*, weekly, Bern; *Le Catholique National*, weekly, ib.; *De Oud Katholiek*, monthly, Rotterdam; *Le Catholique Français*, monthly, Paris; *Il Labaro*, monthly, San Remo; *Girolamo Savonarola*, weekly, Piacenza; *La Luz*, Madrid.

The literature is voluminous. The reports of the congresses, synods, etc., the pastoral letters, addresses, and other publications of the bishops and leaders, and the periodicals, particularly the *Deutscher Merkur*, give detailed information of the progress of the work. For its origin, consult Friedberg, *Sammlung der Aktenstücke zum ersten vatikanischen Concil* (Tübingen, 1871), and *Aktenstücke, die altkatholische Bewegung betreffend, mit einem Grundriss der Geschichte derselben* (ib., 1876). Consult, also, Herzog, *Beiträge zur Vorgeschichte der christkatholischen Kirche der Schweiz* (Bern, 1896); Nippold, *Die Anfänge der christkatholischen Bewegung in der Schweiz und der Los-von-Rom Bewegung in Oesterreich* (Bern, 1901). For the history of the movement, consult von Schulte, *Der Altkatholizismus* (Giessen, 1887), and the article "Altkatholizismus" by the same author in the Hauck-Herzog *Realencyclopädie*, which is complete and authoritative for Germany to 1896. Hergenröther, *Handbuch der allgemeinen Kirchengeschichte*, vol. ii. (3d ed., Freiburg, 1884), treats the movement from the Roman Catholic standpoint. A popular account in English may be found in an article by Beyschlag, "The Origin and Development of the Old Catholic Movement," in the *American Journal of Theology*, vol. ii. (1898).

OLD CHURCH SLAVIC LANGUAGE AND LITERATURE. The oldest language and literature of the Slavic group of Indo-Germanic languages, presenting one of the most important dialects for the study of comparative linguistics. (See PHILOLOGY.) Formerly called Old Slovenian, and even now frequently termed Old Bulgarian, the best name seems to be Old Church Slavic, for the language appears not to have coincided with any national or geographical division, while its use from an early time in the Greek Church (where it occupies a position somewhat analogous to Latin in the Roman Catholic Church), and its evident Slavic characteristics, amply justify the use of this term. The place of its origin cannot be exactly determined, although it seems to have been the dialect of a region in the Balkan Peninsula. The widespread use of the language, however, permitted the incorporation of certain Pannonianisms and Bohemianisms or Slovenianisms, even in the oldest records. It nevertheless remained free from the Russian, Servian, and other importations which characterize the later form of the language which may be called Church Slavic.

In its phonology Old Church Slavic adheres

closely to the characteristic representations of the Indo-Germanic sound-system which mark the Slavic languages (q.v.).

The inflection of Old Church Slavic is full and in many cases primitive in type. The noun has three numbers, singular, plural, and dual; seven cases, nominative, genitive, dative, accusative, vocative, locative, and instrumental; and three systems of declension, nominal, pronominal, and compound. There are six nominal declensions, according as the stems end in -o, -ā, -i, -u, -ā, or a consonant. As in other Indo-Germanic languages, the pronominal declension was originally entirely different from the nominal, although transfers from one system of inflection to the other are not infrequent. The compound inflection, peculiar to the Slavic and Scandinavian languages, is formed by adding the pronoun *i* to an adjective or a participle, both parts of which are then declined, as *dobra*, 'of good (man)', *yego* 'of him', *dobrayego*, 'of the good (man)'. The process, therefore, is precisely analogous to the Scandinavian article suffixed to a noun, as Old Icelandic *borps-ens*, 'of the shield.' The comparative of the adjective is formed by -*yis*, -*ēyis*, as *krēpūkū*, 'strong,' *krēpyii*; *dobrū*, 'good,' *dobrēi*; and the superlative is either the comparative used with superlative force, or is formed by prefixing *na-* to the comparative, as *naikrēpyii*, 'strongest.' The verb in Old Church Slavic, as in other languages of this group, is either perfective, expressive of a completed action, or imperfective, denoting either a continuous (durative) or interrupted (iterative) action. A durative verb becomes perfective if a preposition is prefixed (as *nesti*, 'to carry,' but *iznesti*, 'to carry out'), while under like conditions an iterative verb becomes durative, or more rarely iterative-perfective. Only two of the original tenses are retained, present and aorist, and only two moods, indicative and imperative, the latter being originally an optative. The Indo-Germanic middle voice has been lost, like the future and perfect tenses, while of the original passive only the present and perfect participles (as *redomū*, *redenū*, from *vesti*, 'to conduct') remain. In addition to the active infinitive there is a supine corresponding precisely to that found in Latin (as Latin *datum*, Old Church Slavic *datū*, from *dare*, *dati*, 'to give'). The aorist, inherited from the Pre-Indo-Germanic period, is formed either with or without *s*, the latter class steadily increasing at the expense of the former. The imperfect is specifically a Slavic formation, being made apparently by adding to a datival (or possibly locative) infinitive an augmented imperfect of the root *as*, 'to be,' as *redēchū*, *redēchū*, from *vesti*, 'to conduct.' The future and perfect, like the pluperfect, future perfect, passive, and conditional, are periphrastic in formation, although the future is often expressed by the present, and the passive by a reflexive made by the active with the reflexive pronoun *se*, 'himself' (as *otū tebe kristiti se*, 'to be baptized by thee,' more rarely *bē napisano*, 'it was written'). In syntax the most noteworthy features are the use of the genitive instead of the accusative after negative verbs, and after transitive verbs in the case of proper names, a usage which probably arose from the desire to avoid the ambiguity resulting from the identity of form of the nominative and accusative singular of masculine nouns; the use of the dative as an absolute case, and the use

of the predicative dative after verbs of becoming (as *i sirology dētisti ne bqdetū*, 'and the child shall not become an orphan').

Old Church Slavic is written in two alphabets, called Glagolitic and Cyrillic. (See GLAGOLITSA; CYRILLIC ALPHABET.) The literature, which is of considerable extent, and consists altogether of translations, is entirely religious. Besides the Bible, there are versions of the Euchologium, homilies, legends of the saints, and certain apocryphal books.

Consult: Schleicher, *Formenlehre der kirchenslavischen Sprache* (Bonn, 1852); Ziljski, *Uzajemna slovnica* (Prague, 1865); Chodzka, *Grammaire paléoslave* (Paris, 1869); Leskien, *Handbuch der altbulgarischen (altkirchenslawischen) Sprache* (3d ed., Weimar, 1898); Vondrák, *Altkirchenslawische Grammatik* (Berlin, 1900); Wiedemann, *Beiträge zur altbulgarischen Conjugation* (Saint Petersburg, 1886); Meillet, *Recherches sur l'emploi du génitif-accusatif en vieux-slave* (Paris, 1897); Miklosich, *Lexicon Linguae Slovenicae Veteris Dialecti* (Vienna, 1850).

OLD COLONY. The name given to the territory of the Plymouth Colony in Massachusetts, and later extended to the whole State.

OLD CURIOSITY SHOP, THE. A novel by Charles Dickens (1840). It appeared first as a serial in a weekly publication, *Master Humphrey's Clock*, but was published independently. The keeper of the shop and his grandchild, Little Nell, are driven by poverty to a wandering life, and meet kind friends, among them Mrs. Jarley and the schoolmaster, with whom they find their last refuge. Little Nell dies before help reaches them. Other prominent characters are the hideous dwarf, Quilp, Sally Brass and her brother, Dick Swiveller, and the Marchioness.

OLD DOMINION. Virginia. See STATES, POPULAR NAMES OF.

OLDENBERG, ɔl'den-börk, HERMANN (1854—). A German Orientalist and philologist. He was born in Hamburg, and was educated at Göttingen and Berlin. Upon graduation at the latter university he became privat-docent there, and later professor extraordinarius. He was called to Kiel in 1889 as professor of Sanskrit and comparative philology. He has published *The Dipavamsa* (1879); *The Vinaya Pitakam* (1879-83); *The Theragāthā* (1883); "Vinaya Texts," in Max Müller, *Sacred Books of the East* (1881-85); *Buddha, sein Leben, seine Lehre und seine Gemeinde* (1881; 2d ed. 1890; trans. 1882); *Die Hymnen des Rigveda* (1888); *Die Religion des Veda* (1894); and "Vedic Hymns Translated," in Max Müller, *Sacred Books of the East* (1897).

OLDENBURG, ɔl'den-börk. A grand duchy of the German Empire, composed of the Duchy of Oldenburg and the two principalities of Birkenfeld (q.v.) and Lübeck. The Duchy of Oldenburg, which constitutes the bulk of the State, is bounded by the North Sea on the north, by the Prussian Province of Hanover and the State of Bremen on the east, and by Hanover on the south and west (Map: Germany, C 2). Total area, 2479 square miles. The Duchy of Oldenburg forms a part of the northwestern plain of Germany. It is low and marshy along the coast where it has to be protected from the sea, while the interior, somewhat higher, is mostly sandy and

largely occupied by moors and heaths. The region belongs to the basins of the Weser and the Ems. It is watered chiefly by the Hunte, a tributary of the Weser, and by the Haase and Soeste, both tributaries of the Ems. There are also a number of small streams flowing into the Jade, an inlet of the North Sea, and there is an extensive canal system for draining purposes.

The climate is mild, humid, and somewhat unhealthful in the marshes of the north. About three-fifths of the total area of Oldenburg proper has been brought under cultivation. The land is divided into small holdings, only 69 of the 59,106 holdings of the grand duchy in 1895 containing over 247 acres each. The best land is found in the marshy districts on the north. They produce cereals for export, and are famous for their excellent cattle. In the interior, cereals are the chief product, and the proportion of uncultivated land is much greater. The forest area is small. The manufacturing industries are developed but slightly, and the domestic system of production still largely prevails. The chief manufactures are tobacco, corks, woolen yarn, linoleum, brick, knit goods, etc. The railways of the grand duchy had a total length of 343 miles in 1900, and are all operated by the State.

The throne of the grand duchy is hereditary in the male line. The Constitution, adopted in 1849 and revised in 1852, provides for one chamber, whose members are elected indirectly at the rate of one Deputy for every 10,000 inhabitants. The Landtag ordinarily assembles every three years, and during its intermission is represented by a permanent committee. The principalities of Birkenfeld and Lüneburg have separate provincial diets. The executive power is vested in a responsible Minister representing the Grand Duke. Oldenburg is represented by one member in the Bundesrat, and returns three Deputies to the Reichstag. For the administration of justice the Duchy of Oldenburg has a provincial court of appeal and a supreme court. The principalities of Birkenfeld and Lüneburg are connected for judicial purposes with Cologne and Hamburg, respectively.

The three divisions of the grand duchy have separate budgets, but there is also a common budget for the grand duchy, which derives its revenue from customs duties, State domains, and contributions from its constituent States. The budget of the grand duchy balanced in 1900 at \$901,425. The total estimated revenue and expenditure for the three constituent States in 1900 were \$1,859,511 and \$2,254,776, respectively. The total indebtedness of the three constituent States amounted in 1900 to \$13,295,700. Population of the Duchy of Oldenburg in 1890, 279,008; in 1900, 318,434. The population of the grand duchy was 354,968 in 1890 and 399,183 in 1900. Over three-fourths of the population is Protestant. Capital, Oldenburg (q.v.). Most of the inhabitants are of Saxon stock, but there are also found descendants of the Frisians in the north and west of the Duchy of Oldenburg.

HISTORY. The territory now included in the Grand Duchy of Oldenburg was in ancient times occupied by the Germanic tribe of the Chauci, who were subsequently merged with the Frisians. In the early centuries of the German Kingdom the dukes of Saxony held sway in the region. A Count of Oldenburg first appears about the

beginning of the twelfth century. In 1247 Count Otho II. founded the town of Delmenhorst, and his descendants were henceforth known as counts of Oldenburg and Delmenhorst. In 1448 Count Christian of Oldenburg became by election King of Denmark. The Reformation was early introduced into Oldenburg. After the death of Count Anthony Günther, without heirs, in 1667, the territories of Oldenburg passed to the royal house of Denmark. In 1773 Christian VII. of Denmark transferred the principality to Paul, Duke of Holstein-Gottorp (the future Paul I. of Russia), who immediately made it over to his cousin, the Prince Bishop of Lüneburg. In 1777 Oldenburg was raised to the rank of a duchy. The present reigning family is descended from Duke Peter, of the line of Holstein-Gottorp. This Prince in 1808 became a member of the Confederation of the Rhine. He soon grew restive under the obligations imposed upon him by Napoleon, and, abandoning the French alliance, left the country, which was thereupon (1810) annexed to the French Empire. The victories of the Allies restored Peter to power in 1813. The Congress of Vienna increased the territory of Oldenburg, and raised it to the rank of a grand duchy. The secularized See of Lüneburg had been annexed to the principality in 1803. The revolutionary movement of 1848 affected Oldenburg, and in 1849, after having lived for centuries without even a show of constitutional or legislative freedom, the country entered suddenly into possession of the most liberal of constitutions. The reaction in favor of absolutism, which the want of purpose of the popular party induced, led in 1852 to a revision and modification of the Constitution. In the Seven Weeks' War Oldenburg sided with Prussia, and afterwards joined the North German Confederation. In 1866 a treaty was concluded with Prussia, by which the Grand Duke renounced his claims to the Holstein succession in return for the cession of a small portion of Holstein territory and an indemnity. In 1871 Oldenburg became part of the new German Empire.

Consult: *Jahrbuch für die Geschichte des Herzogtums Oldenburg* (Oldenburg); Kollmann, *Das Herzogtum Oldenburg* (ib., 1893); Erdmann, *Geschichte der politischen Bewegungen im Oldenburg* (ib., 1897); Pleitner, *Oldenburg im 19. Jahrhundert* (ib., 1899-1901).

OLDENBURG. The capital of the Grand Duchy of Oldenburg, Germany, on the Hunte, and the Hunte-Ems Canal, 25 miles west of Bremen (Map: Germany, B 2). Its Church of Saint Lambert, built in the thirteenth century, and restored in 1874, contains the vaults of the reigning family. The palace, surrounded with fine gardens, has a choice collection of paintings and sculptures, and a large library. The city has a museum of natural history, a gymnasium, a higher *Realschule*, and a public library of over 100,000 volumes. There are manufactures of glass, cigars, leather, machinery, and musical instruments. There is a trade in grain and cattle. Population, in 1890, 23,118; in 1900, 26,635. Oldenburg is mentioned as early as 1108. It became a city in 1345.

OLDENBURG, HOUSE OF. A princely family which has given rulers to a number of European countries. Count Dietrich the Fortunate, of Oldenburg, married in 1424 the daughter of Ger-

hard VI., Duke of Schleswig-Holstein. His eldest son, Christian, was chosen King of Denmark (1448) and of Norway (1450), and Duke of Schleswig-Holstein (1460), thus founding (1) the royal line of Denmark, which became extinct in 1863, in the person of Frederick VII. A younger son of Dietrich continued the line of Oldenburg which became extinct in 1667. Adolph, son of Frederick I. of Denmark, founded (2) the ducal line of Gottorp, whose representative, Duke Charles Peter Ulrich, ascended the Russian throne in 1762 as Peter III. A grandnephew of Peter III., Adolph Frederick, was chosen King of Sweden in 1751, while a younger brother of Adolph Frederick became the founder of the new grand ducal line of Oldenburg. (3) The ducal line of Sonderburg founded by John the Younger, the third son of Christian III. of Denmark, fell apart into a number of lines, of which the line of Augustenburg alone survives. (4) The line of Beck or Glücksburg was founded by a grandson of John the Younger. Prince Christian, fourth son of Duke William of this line, ascended the Danish throne in 1863 as Christian IX. (q.v.). His second son, George, became in the same year King of Greece.

OLD ENGLISH. See **ENGLISH LANGUAGE**; **ENGLISH LITERATURE**; **ANGLO-SAXON LANGUAGE AND LITERATURE**.

OLD-FASHIONED GIRL, AN. A story by Louisa M. Alcott (1869). It was begun as a serial for *Merry's Museum*, a child's magazine, and afterwards enlarged. The cheery, unaffected little heroine is effectively contrasted with some gay city friends.

OLD-FIELD, ANNE (1683-1730). A noted English actress. Though she was of good birth, her family was in humble circumstances, and she was apprenticed to a seamstress in Westminster, till as a girl she attracted the attention of Farquhar by her beauty and her expression in reading a play. She was then given an opportunity at Drury Lane. At first the critics were doubtful of her dramatic gifts, but she made steady progress in her art and became the foremost actress of her time. One of her greatest successes was as Lady Betty Modish in Colley Cibber's *Careless Husband* (1704), and she created many parts in the 'genteel comedy' of the period, though she long felt a reluctance to tragedy. Yet she created the rôle of *Jane Shore* (1714), and was a superb Cleopatra in Cibber's *Cæsar in Egypt* (1724), and her acting of Sophonisba (1730), her last new rôle, was said to have thrilled even the actors upon the stage. Her private life furnished occasion to the gossips, and she was the acknowledged mistress of Arthur Mainwaring, and after his death of Gen. Charles Churchill. She was nevertheless on intimate terms with the great ladies of her day, and she was buried in Westminster Abbey. Consult: the *Authentic Memoirs of the Life of that Celebrated Actress, Mrs. Ann Oldfield* (London, 1730); Geneste, *History of the English Stage* (Bath, 1832); Doran, *Annals of the Stage*, ed. by Lowe (ib., 1888); Baker, *English Actors from Shakespeare to Macready* (New York, 1879); Russell, *Representative Actors* (London, 1872?).

OLD-FIELD LARK. A local name in the Southern United States for the meadow-lark (q.v.).

OLD FOLKS AT HOME. One of the most famous of Southern plantation songs (1850). First line: "'Way down upon the Suwanee Ribber." Both words and music are by Stephen Collins Foster, and were written before the author reached the age of twenty years. He realized the sum of \$15,000 for the song, which still continues in undiminished popularity.

OLD FORGE. A borough in Lackawanna County, Pa., four miles southwest of Scranton; on the Lackawanna River, and on the Delaware, Lackawanna and Western, the Lehigh Valley, and the New York, Susquehanna and Western railroads (Map: Pennsylvania, F 2). It is in the anthracite region and is principally engaged in coal-mining. There are also a silk mill, large chemical and fertilizer works, and a glass-blowing plant. The high-school building is one of the finest in the county. The government is veated in a burgess, elected every three years, and a borough council. Settled in 1830, Old Forge was incorporated in 1899, having been organized from a part of the township of the same name. Population, in 1900, 5630.

OLD GRIMES. A poem and popular song by the American writer Albert G. Greene (1802-68), the name being taken from one of Crabbe's metrical tales.

OLD GUARD, THE. The name borne by a select body of French troops during the First Empire. It was created by Napoleon I. in 1804 out of the preëxisting Consular Guard and comprised picked men from every arm of the service. The Old Guard had its own general staff and received orders only from its own commander. Subsequently the name was usually restricted to a body of infantry consisting of three regiments of grenadiers and two regiments of chasseurs. The Old Guard played a leading part in the Napoleonic battles and suffered proportionately, its numbers after the Russian campaign being reduced to 500 men. In 1812 the Young Guard was created to act as a source of supply for the Old Guard. The latter, greatly increased in number, ended its career in glory in the last desperate charge at Waterloo.

OLDHAM, old'am. A manufacturing town in Lancashire, England, on the Medlock, seven miles northeast of Manchester (Map: England, D 3). The parish church, the town hall, the Blue-Coat and the grammar schools, are the chief edifices. With its incorporation as a town in 1849, its municipal activity commenced. It owns its gas and water since 1853, electric lighting plant, tramways, baths, wash-houses, hospitals, cemeteries, markets, libraries, art gallery, technical school, and the Alexander Park of 60 acres. Modern destructors and installations dispose of refuse and sewage. Oldham owes its rapid increase in population and wealth to the extensive coal mines in the vicinity, and to its cotton manufactures, which engage 300 mills with more than 12,000,000 spindles. The damp air of the region gives the humidity necessary for the spinning of yarn. It is also celebrated for its manufactures of machinery for cotton-spinning and wool-weaving. In 1760 it was a village of 60 houses. Population, in 1801, 12,000; in 1851, 52,800; in 1891, 131,500; in 1901, 137,200.

OLDHAM, JOHN (c.1600-1636). An early settler in New England. He was born in England

in 1600, and emigrated to Plymouth in 1623. In 1624 he and an Episcopalian minister named John Lyford conspired against the Government of Plymouth and dispatched letters containing charges against the established authorities to England. The plot was detected, and Oldham was banished from the colony, although he later became reconciled with the inhabitants and rendered them some services. Settling in the Massachusetts Bay Colony, he became a man of prominence, and was a deputy from Watertown to the first General Court of Magistrates and Representatives. In 1636, while he was on a trading expedition, his pinnace was treacherously captured near Block Island by Indians, and he was killed. His murder was the immediate cause of the famous Pequot War.

OLDHAM, JOHN (1653-83). An English satirical poet, born at Shipton-Moyne, near Tetbury, in Gloucestershire. He graduated at Saint Edmund Hall, Oxford, in 1674, and the next year became usher in a school at Croydon. Four years later he left Croydon to become tutor to the grandsons of a retired judge named Sir Edward Thurland, with whom he remained until 1681, when he became tutor to the son of Sir William Hickes. During his latter years he was aided by William Pierrepont, Earl of Kingston, at whose home he died. Oldham's poems, some of which possess real merit, had considerable influence on Pope and other English poets of the succeeding century. Among them are the satires *To a Friend About to Leave the University*, which he wrote while occupying his position at Croydon; *Satires upon the Jesuits* (1681), which reflect the panic-stricken condition of the people after the alleged discovery of 'the Popish plot'; and a *Satire Against Virtue* (1681), which was taken so literally by the public that its author was compelled to explain in an *Apology* and a *Counterpart*. Though Oldham produced poems other than satirical, these and some adaptations of Horace and Juvenal are the works on which his reputation rests. Consult Thompson, *The Compositions in Prose and Verse of Mr. John Oldham, to Which are Added Memoirs of His Life* (3 vols., 1770).

OLDHAMIA (Neo-Lat., named in honor of Thomas Oldham, an English geologist of the nineteenth century). The oldest known fossil alga, found in Cambrian rocks of Ireland. The type species, *Oldhamia antiqua* of Forbes, appears to be a coralline alga, while another species, *Oldhamia radiata*, is of uncertain affinity and may be a worm trail or even a series of minute wrinkles produced by distortion of the slate rocks upon which it is found. *Oldhamia* is of very doubtful occurrence in the Cambrian of America.

OLD HICKORY. An affectionate nickname of Andrew Jackson, given because of his tough and unbending characteristics.

OLD HUNDRED. A favorite hymn tune. By some the music is credited to Guillaume le Franc, a musician of Rouen, but is probably an adaptation of a popular tune of the fifteenth century. The melody was adapted to Beza's version of Psalm cxxxiv., included by him in the Geneva Psalter, the first copy of which, with his additional tunes, was printed in 1554. It was arranged by Louis Bourgeois, the musical editor of that book. The tune is found with different endings in the Flemish Psalter (Antwerp, 1540);

in the Dutch Psalter (London, 1561); in the Psalms with music by Marot and Beza (Lyons, 1563); in Claude Goudimel's famous collection of tunes (Paris, 1565); and also in English and German tune-books. In England it was sung to Kethe's version of the hundredth Psalm, "All people that on earth do dwell," and called the "Hundredth Tune." The word 'old' was added in Brady and Tate's new version of the Psalter (London, 1596). Another name is "Savoy." Consult: Bovet, *Histoire du psautier des églises réformées* (Neuchâtel and Paris, 1872); and Fitzgerald, *Stories of Famous Songs* (London, 1897).

OLD IRONSIDES. The name popularly given to the United States frigate *Constitution* (q.v.).

OLD JEWRY. A street in London, near Mercer's Hall, deriving its name from the Jews, who were settled there before their persecution in 1291. On the site of their former synagogue stands Grocers' Hall.

OLD KENTUCKY HOME. A well-known plantation melody by Stephen Collins Foster (1850), beginning: "The sun shines bright in the old Kentucky home."

OLD LADY OF THREADNEEDLE STREET. In popular language, a name frequently given, from its location, to the Bank of England.

OLD LAW, THE, OR A NEW WAY TO PLEASE YOU. A comedy by Middleton, Massinger, and Rowley, published in 1656. An earlier version was written by Middleton in 1599, and was altered by Massinger and Rowley into the later form. The 'law' was the compulsory removal of all aged men and women, which was modified in the course of the play.

OLD LIGHT ANTIBURGHES. See BURGHES AND ANTI-BURGHES.

OLD LINE STATE. Maryland. See STATES, POPULAR NAMES OF.

OLD MAN OF THE MOUNTAIN. See ASSASSINS.

OLD MAN OF THE SEA. A monster in the form of an old man, described in the *Arabian Nights' Entertainments*. Sindbad the Sailor met him and took him on his shoulders in order to assist him, but was unable to release himself from the clutch of the old man until he made him drunk and so released his hold. The expression is used to describe any bore or incubus from which release is difficult.

OLD MAN'S BEARD. See FRINGE TREE.

OLD (WISLER) MENNONITES. See MENNONITES.

OLDMIX'ON, JOHN (1673-1743). An English historian, born at Axbridge in Somerset. During his early life he wrote a number of poems and plays, but in 1708 turned his attention to more serious work and published *The British Empire in America*. For a number of years he enjoyed the perquisites of the post of collector of the port at Bridgwater, but spent three years in London writing one of his histories, and then found that his deputy at Bridgwater had involved him in a debt for £360; whereupon he turned over the arrears of his salary and resigned. His histories are now of little value, as they were written for party purposes. His attacks on Pope led the latter to give him a place

in the *Dunciad*. The titles of some of his works are: *The Secret History of Europe* (1712-15); *The History of England During the Reigns of the Royal House of Stuart* (1730); and *The Arts of Logick and Rhetorick* (1728).

OLD MORTALITY. A novel by Sir Walter Scott (1816). The title is taken from the nickname of Robert Paterson, who for years kept in order the tombstones of the Covenanters. The story purports to have been told by him to the author as Cleishbotham, and describes the conflict of the Covenanters with the royal forces under Claverhouse, about 1670.

OLD NICK. See NIX.

OLD OAKEN BUCKET, THE. A very popular song by Samuel Woodworth, written in New York in 1817 and first published under the title of *The Bucket*. The air is an adaptation by Frederick Smith of Kiallmark's music composed for Moore's "Araby's Daughter."

OLD PERSIAN. The ancient Iranian language of Persia. Its entire grammatical structure is closely akin to Avesta (q.v.). The inadequacy of the alphabet in which it is written (see CUNEIFORM INSCRIPTIONS) and the scantiness of the remnants of the language, however, prevent a complete knowledge either of its phonology or morphology. Its principal phonological characteristics are as follows: Indo-Germanic *r* is represented by *ar*, as Skt. *kṛta*, 'deed,' Old Pers. *karta*; Indo-Germanic nasalized vowels lose their nasalization, at least in the script, as Skt. *āśamsam*, 'I said,' Old Pers. *ašaham*; epenthetic *u* is developed between *d* and *r*, and between *g* and *d*, as Skt. *adruhyat*, 'he deceived,' Old Pers. *adūrujiya*, Av. *Suṛda*, 'Sogdiana,' Old Pers. *Sugūda*, *Suguda*; Indo-Germanic *tr* becomes *θ*, as Skt. *putra*, 'son,' Old Pers. *puθa*; Indo-Germanic *i*, *u*, are written *iy*, *uv* after consonants, as Skt. *yadi*, 'if,' Old Pers. *yadiy*, Skt. *dadātu*, 'let him give,' Old Pers. *dadātuv*; Indo-Germanic *ti* becomes *š*, as Skt. *mṛtyu*, 'man,' Old Pers. *mašiya*; Indo-Germanic final *t* and *d*, the only final consonants remaining in Iranian, are lost in Old Persian, as Skt. *abharat*, 'he bore,' Old Pers. *abara*, but Av. *baraṭ*; Indo-Germanic *s* is lost, at least in the script, before *u*, *r*, and *m*, as Skt. *śaśva*, 'rich in horses,' Old Pers. *uvaspa*, Skt. *asmi*, 'I am,' Old Pers. *amiy*, Skt. *srōtas*, 'river,' Old Pers. *rauta*; Iranian *s* and *z* become *θ* and *d* before vowels and *r*, as Av. *sarōda*, 'sort,' Old Pers. *θarda*, Av. *nirinaomi*, 'I restore,' Old Pers. *niryaθ arayam*, 'I restored.' The inflection, so far as it can be reconstructed, does not differ essentially from the Avesta, except that the imperfect tense of the Old Persian verb invariably has the augment which is usually lacking in Avesta, as Old Pers. *adadd*, 'he gave,' Av. *daθāt*. The attempt which has been made by certain scholars to prove the existence of various dialects in the extant Old Persian texts can scarcely be regarded as successful.

The Old Persian records, apart from glosses and proper names, consist of a number of cuneiform inscriptions carved by the Achæmenian Kings Cyrus, Darius I., Xerxes I., Artaxerxes I., Artaxerxes Mnemon, and Artaxerxes Ochus. These inscriptions are chiefly at Behistun, Persepolis, Naks-i-Rustam, Elvand, Van, Susa, and Suez. Of them by far the most important are the five tablets, amounting to 410 lines,

and a few minor texts, carved by order of Darius I. on the mountain-side at Behistun (q.v.). Here the King relates his history in a dignified tone, which in the fourth tablet rises to some degree of literary merit. Next in importance is the inscription of Darius at Naks-i-Rustam (see PERSEPOLIS) in sixty lines, conspicuous for its stylistic merit, and two briefer texts, of 24 lines each, of the same King at Persepolis. The texts of Xerxes and the three Artaxerxeses are little more than replicas of the minor tablets of Darius. In the latest inscriptions, especially in the single one of Artaxerxes Mnemon, set up by him at Susa, a decay in grammar seems evident. The style of the Old Persian inscriptions, which shows marked traces of literary influence from the Assyro-Babylonian tablets, is simple narrative, and in general the meaning of the words is tolerably certain. There are, however, a number of difficult passages, where the Babylonian and New Susian versions carved side by side with the Persian inscription of Behistun give no help. This Babylonian translation is, unfortunately, very fragmentary, while the New Susian, interpreted only by identifying words in it which correspond to known Old Persian terms, is not a safe guide in doubtful passages. There are a number of gaps in the Old Persian inscriptions, and the reading of several words is not yet determined. It is almost certain that there are other Old Persian inscriptions which have not yet been discovered, and which when found may give a solution of at least some of the problems which now beset the interpretation of these texts.

Consult: Rawlinson, "The Persian Cuneiform Inscription at Behistun," in *Journal of the Royal Asiatic Society*, old series, vols. x., xi. (London, 1846-49); Benfey, *Die persischen Keilinschriften* (Leipzig, 1847); Oppert, "Mémoire sur les inscriptions achéménides conçues dans l'idiome des anciens Perses," in *Journal Asiatique*, fourth series, vols. xvii.-xix. (Paris, 1851-52); Kossowicz, *Inscriptiones Palæo-Persicæ Achæmenidarum* (Saint Petersburg, 1872); Spiegel, *Die altpersischen Keilinschriften* (2d ed., Leipzig, 1881); Tolman, *Grammar of the Old Persian Language with the Inscriptions* (Boston, 1892); id., *Guide to the Old Persian Inscriptions* (New York, 1893); Weissbach and Bang, *Die altpersischen Keilinschriften* (Leipzig, 1893); Hülsing, *Die iranischen Eigennamen in den Achæmenideninschriften* (Norden, 1897); Spiegel, *Vergleichende Grammatik der alterânischen Sprachen* (Leipzig, 1882); Bartholomæ, *Handbuch der altiranischen Dialekte* (ib., 1883); id., "Awestisch und Altpersisch," and Weissbach, "Die altpersischen Inschriften," in Geiger and Kuhn, *Grundriss der iranischen Philologie* (Strassburg, 1895-1903); Pizzi, *Grammatica elementare dell' antico iranico* (Turin, 1897); Lagarde, "Die persischen Glossen der Alten," in his *Gesammelte Abhandlungen* (Leipzig, 1866); Justi, *Altiranisches Namenbuch* (Marburg, 1895).

OLD POINT COMFORT. A frequented watering place in Elizabeth City County, Va., six miles north of Norfolk (Map: Virginia, II 5). Its location on a small peninsula, where Hampton Roads and Chesapeake Bay join the Atlantic Ocean, is one of great natural beauty. A fine beach for bathing and good boating and fishing, together with the activities of garrison life at Fort Monroe (q.v.), situated here, are prominent

attractions. The climate is remarkably mild and equable. There is a large hotel, besides several cottages, and the resort is frequented in both summer and winter.

OLD PROBABILITIES. A popular American nickname for the head of the Weather Bureau, or loosely for the personification of weather prophecies in general.

OLD PRUSSIAN LANGUAGE. An extinct member of the Baltic group of Indo-Germanic languages which was spoken until the seventeenth century in Prussia. The remnants of the language are very scanty, and are too meagre to permit a reconstruction of the grammar. The Old Prussian fragments consist of translations of two catechisms, printed in 1545, and of the Short Catechism of Luther (1561). There are also two Old Prussian-German vocabularies, that of Elbing, compiled in the first half of the fifteenth century, containing 802 words, some of which, however, are loan-words, and that of Grunau, who composed a list of 100 words between 1517 and 1526. This vocabulary of Grunau is so inaccurate as to be of little value. The Elbing list, on the contrary, if used with caution, is the most valuable source of our knowledge of the language next to Luther's catechism. The chief phonological characteristics of Old Prussian are as follows: Indo-Germanic *ē* remains *ē* in Old Prussian under the circumflex accent, but becomes *i* under the acute, as *semmē*, 'earth,' accented on the ultimate like the equivalent Russian *zemlyā* but with the circumflex like Lithuanian *duktō*, 'daughter'; *turrit*, 'to do,' Lithuanian *turėti*. Indo-Germanic *o* becomes *a* in Old Prussian as in the other Baltic dialects (Lettic and Lithuanian), as Latin *oculus*, Old Church Slavic *oko*, 'eye,' but Old Prussian *ackis*, Lithuanian *akys*, Lettic *azs*, while *ō*, like *ā*, is represented by *ā* or, after gutturals, by *ā* in Old Prussian, *o* (*ū*) in Lithuanian, and *ā* (*ū*) in Lettic, as Gothic *frōps*, 'wise,' Old Prussian *prātin*, 'counsel,' Lithuanian *prōtas*, 'understanding,' Lettic *prāts*, 'will,' but Old Latin *hemōn*, 'man,' Old Prussian *smāni*. Indo-Germanic *f*, *l*, *m*, *n* become in Old Prussian as in the other Baltic dialects *ir*, *il*, *im*, *in*, as Sanskrit *erthā*, 'in vain,' Old Prussian *prācilts*, 'to betray,' Lithuanian *vilstu*, Lettic *wilt*, 'to deceive.' In script at least there is no distinction between *s* and *z*, as Skt. *daśa*, Latin *decem*, Old Prussian *dessimtons*, Lithuanian *dėszimtis*, 'ten,' Old Church Slavic *deseti*, but Sanskrit *jñā*, Greek *γινώσκειν*, Old Prussian *posinnāt*, Lithuanian *zinōti*, Lettic *šināt*, Old Church Slavic *znati*, 'to know.' In accent Old Prussian seems to have resembled Lettic rather than Lithuanian. The Old Prussian long diphthongs, long vowel plus liquid, and nasal plus consonant, therefore correspond, like the Lettic acute accent, to the Lithuanian circumflex, while like combinations with unlengthened vowel correspond, like the Lettic lengthened vowel, to the Lithuanian acute. The noun had five cases, nominative, accusative, genitive, dative, and vocative, as well as a few traces of an instrumental. The original Indo-Germanic terminations are, in general, well preserved, as dative singular *icirdai*, 'to the word,' Lithuanian *raĩdui*, cf. Avesta *rəhrkai*, Greek *λόγῳ*, 'to the word'; accusative plural *icirdans*, 'words,' cf. Cretan Greek *λόγους*, Gothic *iculfana*, 'wolves'; genitive plural, as *grikan*, 'of sins,'

Lithuanian *grėkū*, Lettic *griku*, cf. Vedic Sanskrit *vrkam*, 'of wolves,' Greek *λύκων*, Latin *deum*, 'of gods.' On the other hand, the genitive singular of *s*-stems is borrowed from those in *-ā*, as *Deicas*, 'of God' (cf. *gennas*, 'of a woman,' Greek *χώρας*, 'of a country'), but Lithuanian *vilko*, 'of a wolf,' Lettic *vilka*, Old Church Slavic *vlāko*, and the dative plural receives an *s* from the accusative plural, as *auschautenikamans*, 'to debtors,' but Lithuanian *raĩkomus*, *raĩkoms*, 'to hands,' Lettic *rōkeem*, Old Church Slavic *raikomā*. The verb has a present and past indicative, an imperative (optative), an optative of secondary formation, present and past active and passive participles, and an infinitive. The third person plural, as in the other Baltic dialects, coincides in form with the singular. The ending is *a*, as *senrinka*, 'he gathers,' Lithuanian *reĩka*, and is a relic of the Indo-Germanic present injunctive, as Sanskrit *codayat*, 'he is to rouse.' The first person singular is also old, as *imma*, 'I take,' Greek *ἔγω*, 'I loose.' The infinitive appears in three forms, undifferentiated in meaning, as *dātwei*, *dāton*, *dāt*, 'to give.' The form *dātwei* is usually compared with such Vedic Sanskrit infinitives as *dhātavē*, 'to place,' while *dāton*, like Lithuanian *dety*, and Old Church Slavic *dētū*, is to be compared with Sanskrit *dhātum*, Latin *con-ditum*, 'to place.' The explanation of such infinitives as *dāt* is not yet clear. Consult: Neesemann, *Die Sprache der alten Preussen* (Berlin, 1845); id., *Thesaurus Linguae Prussicae* (ib., 1873); Bernker, *Die preussische Sprache* (Strassburg, 1896).

OLD RED SANDSTONE. The name given to a large series of Paleozoic rocks, of which red sandstones are the most conspicuous portions, but which contain also white, yellow, or green sandstones, as well as beds of clay and limestone. The group lies below the Carboniferous strata, and was called 'Old' to distinguish it from a newer series of similar beds which occur above the coal measures. The discovery that the highly fossiliferous calcareous rocks of Devonshire and the Continent occupied the same geological horizon, showed that the name was very far from being descriptive of all the deposits of the period, and suggested to Murchison and Sedgwick the desirability of giving them a new designation. They consequently proposed Devonian, which has been extensively adopted. The name has been rendered classical by Hugh Miller in his books, *The Old Red Sandstone*, and *Footprints of the Creator*. The formation which has been laid down in inland seas is noted for its abundant fish remains. See DEVONIAN SYSTEM.

OLD ROWLEY. A popular name of Charles II. The name is derived from Rowley, a favorite horse of the monarch, and is also explained as alluding to the saying "A Roland for an Oliver," referring to the relations of Oliver Cromwell and Charles.

OLD SCHOOL (or PRIMITIVE) BAPTISTS. See BAPTISTS.

OLD SLOVENIAN. See OLD CHURCH SLAVIC LANGUAGE AND LITERATURE.

OLD SQUAW, or OLD WIFE. A sea-duck (*Clangula hyemalis*) of all northern regions, easily recognized by its much elongated tail feathers; the 'long-tailed duck.' See DUCK.

OLDSTYLE, JONATHAN. The pseudonym under which Washington Irving contributed to the *New York Morning Chronicle*, in 1802.

OLD TOWN. A city in Penobscot County, Maine, 12 miles north-northeast of Bangor; on the Penobscot River, and on the Maine Central and the Bangor and Aroostook railroads (Map: Maine, F 6). It has a public library and a city hospital; and among the prominent buildings are the city hall, high school, and Odd Fellows Block. The lumber interests of the city are very important, and there are also manufactories of wood pulp, bateaux and canoes, boots and shoes, woolens, patent medicines, chemical fibre, and machinery and foundry products. Under a revised charter of 1895, the government is administered by a mayor, annually elected, and a unicameral council. Settled about 1820, Old Town was set off from Orono and incorporated as a town in 1840, and in 1891 was chartered as a city. Population, in 1890, 5312; in 1900, 5763.

OLD UNCLE NED. One of Stephen Collins Foster's popular negro songs (1847), beginning "There was an old darky and his name was Uncle Ned."

OLD WIVES' TALE, THE. A farce or interlude by George Peele, printed in 1595, but acted probably in 1590. The plot of this lively farce is taken from Ariosto, but its chief interest is the fact that it suggested to Milton the plan of *Comus*. The troupe who act part of the *Tale* are transformed into the Lady, the Brothers, and Spirit of the poem.

OLD WOMAN'S SUMMER. See INDIAN SUMMER.

OLDYS, ol'dis, WILLIAM (1696-1761). An English antiquary; natural son of Dr. William Oldys, a civil lawyer. He seems to have been born in London. He inherited some property from his father, but lost heavily through connection with the 'South Sea Bubble' in 1720. For several years he aided Dr. Knowles in editing the *Earl of Strafforde's Letters and Despatches* (2 vols., 1739). During this time, also, he collected a valuable library, which he sold in 1731 to the Earl of Oxford, whose literary secretary he became in 1738. After Oxford's death, in 1741, Oldys's life became one of drudgery and hardship. For a number of years he collaborated with Dr. Johnson in preparing a catalogue of the Oxford library, which had been purchased by Thomas Osborne, the bookseller; but in 1751 he was imprisoned in the Fleet for debt, and remained there two years before friends came to his aid. In 1755 the Duke of Norfolk secured for him the post of Norroy king-at-arms, which he kept until shortly before his death. His works, which have been often used by later writers, show deep learning and thorough research. Among the best known is the *Life of Raleigh*, originally prefixed to the *History of the World* (2 vols., 1736), and later to the collected edition of Sir Walter's *Works* (8 vols., Oxford, 1829). Another valuable work is his *British Librarian* (1737), a critical catalogue; and almost equally useful are his annotations and notes on the works of earlier writers. Consult Yeowell, *A Literary Antiquary: Memoir of William Oldys, Norroy King-at-Arms* (London, 1862).

OLEAN, ol'-an'. A city in Cattaraugus County, N. Y., 70 miles south by east of Buffalo; at the confluence of the Allegheny River with Olean Creek, and on the Erie, the Pennsylvania, and the Pittsburg, Shawmut and Northern railroads (Map: New York, B 3). It has the Foreman Library, General Hospital, a State armory, a fine high-school building, and City Park. The driving park here has been the scene of famous races; and in the vicinity is the well-known 'Rock City,' a collection of massive conglomerate rocks. Olean is noted for its extensive oil and lumber interests. Owing to the proximity of the Pennsylvania oil fields, it is a storage place for large quantities of petroleum, and the terminus of several pipe lines. Leather interests also are prominent, and great hemlock forests are near by. The industrial establishments include oil refineries, tanneries, planing mills, stave, heading, and barrel factories, carriage and wagon works, railroad shops, marble works, foundries, glass factories, brick yards, flouring mills, a brewery, and bicycle works. Settled in 1804, Olean was chartered as a city in 1893, the charter of that date now being in operation, and providing for a government vested in a mayor, elected biennially, and a unicameral council. The water-works are owned and operated by the municipality. Population, in 1890, 7358; in 1900, 9462.

OLEANDER (Fr. *oléandre*, Sp. *oleandro*, *eloendro*, ML. *arodandrum*, corrupted by popular etymology with Lat. *olea*, olive tree, from Lat. *rhododendron*, Gk. *ῥοδόδενδρον*, oleander, from *ῥόδον*, *rhodon*, rose, + *δένδρον*, *dendron*, tree), *Nerium*. A genus of plants of the natural order Apocynaceæ. The species are evergreen shrubs with leathery leaves, which are opposite or in threes; the flowers in false umbels, terminal or axillary. The common oleander (*Nerium Olean-*



OLEANDER.

der), a native of the Mediterranean region and many of the warmer temperate parts of Asia, is frequently planted in many countries as an ornamental shrub, and is very common in northern latitudes as a house plant. It has beautiful red or sometimes white flowers. The English call it rose bay, and the French rose laurel (*laurier rose*). It attains a height of 8 to 10 feet. Its flowers give a splendid appearance to many ruins in the south of Italy. It delights in moist situations, and is often found near streams.

The charcoal obtained from the tender, light wood is used in Algeria in the manufacture of powder. The propagation of the plant is readily effected by layers and cuttings. The cuttings are taken from leading shoots, potted singly, and placed in a warm frame. A very common practice is to start the roots of the cuttings in bottles of water and to pot them afterwards.

OLEARIUS, ō'la-ā'rē-us, ADAM (c.1600-71). A German author, who introduced Persian poetry into the literature of the seventeenth century. He was born at Aschersleben; Latinized his family name Oelschlager; and studied at Leipzig. In 1633, with the poet Fleming (q.v.), he was sent to Russia and Persia with an embassy from Frederick III. of Holstein-Gottorp, as secretary and counselor, but more especially for scientific and linguistic research. He made several valuable maps; studied the customs, literature, and language of Persia; and became the greatest Persian scholar of contemporary Europe. He was a member of the famous literary association the *Fruchtbringende Gesellschaft*, and an elegant prose writer. His fame rests on his *Beschreibung der neuen orientalischen Reise* (1647, translated into French and Dutch, and in an English version, 1661), a work valuable alike as a literary production and as a source of scientific knowledge. Olearius also made a rather free, yet forcible and adequate, version of Saadi's *Gulistan*, under the title of *Persianisches Rosenthal* (1654 and 1660). Consult: Grosse, *Adam Olearius* (Aschersleben, 1867), and the sketch "Olearius," by Ratzel, in the *Allgemeine deutsche Biographie*.

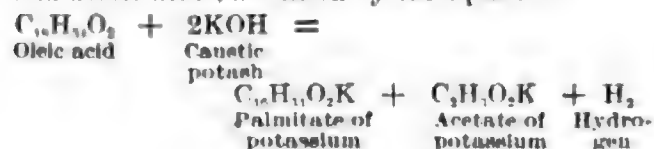
OLE'AROS. The ancient name of Antiparos (q.v.), one of the Cyclades.

OLEASTER. A shrub. See ELEAGNUS.

OLE BULL. See BULL, OLE BORNEMANN.

OLE'FIANT GAS. See ETHYLENE.

OLEIC ACID (from Lat. *oleum*, oil), $C_{18}H_{34}O_2$. A colorless liquid of an oily consistence, devoid of smell and taste, and (if it has not been exposed to air) exerting no action on vegetable colors. At low temperature it solidifies to a firm, white, crystalline mass, and in this state it undergoes no change in the air; but when fluid it readily absorbs oxygen, becomes yellow and rancid, and exhibits a strong acid reaction with litmus paper. The melting-point of the pure acid is $14^{\circ}C.$ ($57^{\circ}F.$). It is not a volatile acid, and on the application of a strong heat, under ordinary atmospheric pressure, it breaks up into several substances; it may, however, be distilled under reduced pressures, or in a current of superheated steam, when it passes over undecomposed. If oleic acid be exposed to the action of nitrous acid, it is converted into another acid, termed *elaidic acid*. The latter is a crystalline substance melting at about $46^{\circ}C.$ ($115^{\circ}F.$) and having the same molecular composition as oleic acid. A very small quantity of nitrous acid is sufficient to effect this remarkable change, the nature of which is unknown. When heated with caustic potash, oleic acid breaks up into palmitic and acetic acids, as shown by the equation:



Oleic acid is a component of *olein* (q.v.), which exists in most of the fats and fatty oils of the animal and vegetable kingdoms, and most abundantly in the liquid fats or oils, whence its name. It may be readily prepared in a pure state from fats rich in olein. For this purpose the fat employed is saponified by heating with a solution of caustic potash, and the soap thus obtained is decomposed with hydrochloric acid, which sets free the acids originally contained in the fat. The mixture of acids is then treated with lead oxide at $100^{\circ}C.$ ($212^{\circ}F.$), and the oleate of lead is dissolved out of the mixture of lead salts obtained, by means of ether. On filtering and distilling off the ether, the oleate of lead is decomposed with hydrochloric acid, and the oleic acid is purified by cooling to about 6° or 7° below zero centigrade (about $20^{\circ}F.$), and removing the impurities, which remain liquid, by pressure and washing with small quantities of alcohol.

With reference to the chemical constitution of oleic acid, it is known to contain a normal chain of eighteen carbon atoms and one double bond; but which two of the carbon atoms are linked to each other by that double bond has not yet been exactly ascertained. By the action of nascent hydrogen, oleic acid is readily converted into stearic acid (q.v.).

Of the *oleates*, or salts of oleic acid, the most important are the alkali salts, which are among the constituents of soap; they are soluble in water and in alcohol, and are precipitated from their aqueous solution by common salt. The lead salt, used as 'lead plaster' (diachylon plaster), may be obtained by adding lead acetate to an aqueous solution of sodium oleate; its formula is $(C_{18}H_{33}O_2)_2Pb$; it melts at $80^{\circ}C.$ ($176^{\circ}F.$).

OLEIN, ō'lē-in (from Lat. *oleum*, oil), or **TRI-OLEIN**, $C_{54}H_{98}(C_{18}H_{33}O_2)_3$. The glyceride of oleic acid. Pure olein is a colorless and inodorous oil, insoluble in water, and only slightly soluble in cold alcohol, but dissolves in ether in all proportions. By exposure to the air it darkens in color, becomes acid and rancid, and finally assumes a resinoid appearance. Nitrous acid converts it into an isomeric white solid fat named *elaidin*—the glyceride of elaidic acid. (See OLEIC ACID.) Pure olein is obtained by cooling olive oil to $0^{\circ}C.$ ($32^{\circ}F.$), which occasions the separation of the stearin and palmitin in a solid form. The fluid portion is then dissolved in alcohol, which on being cooled to $0^{\circ}C.$ ($32^{\circ}F.$) deposits in a solid form everything but olein, which is obtained in a pure state by driving off by heat the alcohol from the decanted or filtered solution.

Olein is one of the three constituents common to all fats, the other constituents being palmitin and stearin. It forms the predominating constituent of liquid fats, such as olive oil and oil of almonds. See FATS; OILS; GLYCERIN; OLEIC ACID.

OL'ENEL'LUS (Neo-Lat., diminutive of *ole-nus*). An important genus of trilobites characteristic of the Lower Cambrian series, for which reason these beds are termed the 'Olenellus zone.' The animal had a flat, tapering body covered by a hard shell like that of a crab, made up of 14 loosely jointed segments, a broad head with large kidney-shaped eyes and long slender cheek

spines, and there was a long slender spine at the end of the tail or pygidium. See TRILOBITA.

OLENUS (Neo-Lat., from Lat. *Olenos*, Gk. Ὀλένος, name of a man changed to stone). A trilobite from the Upper Cambrian and Lower Ordovician formations of Europe. See TRILOBITA.

OLEOGRAPH (from Lat. *oleum*, oil + Gk. γράφειν, *graphein*, to write). A chromo-lithograph which has been 'roughed' on a lithographic stone engraved so as to imitate canvas. The resemblance to oil-painting is further increased by mounting the oleograph on canvas, sizing and varnishing. The colors used in printing oleographs are a little darker than in the case of chromo-lithographs in imitation of water-color paintings.

OLEOMARGARINE, ὀλέ-δ-μάρ-γά-ριν (from Lat. *oleum*, oil, Eng. *margarine*, from Lat. *margarita*, from Gk. μαργαρίτης, *margaritēs*, pearl, from μαργαρος, *margaros*, pearl-oyster), **ARTIFICIAL BUTTER**, or **BUTTERINE**. An artificial or manufactured substitute for dairy butter, made from 'oleo-oil' and other fatty substances worked together with coloring matter. The material originated in France, as the result of a prize offered at the instance of Napoleon III. for the best substitute for butter. This was awarded in 1869 to Hippolyte Mège, whose process, considerably modified, is still employed in the manufacture of oleomargarine. In preparing oleo-oil, the fat that is removed from beef animals at the time of slaughtering is thoroughly washed in warm water, and chilled and hardened by means of ice water. It is then finely cut up by machinery and melted in steam-jacketed caldrons at about 160° F. (71° C.), after which it is allowed to settle. Salt is scattered over the surface of the fat, which accelerates the settling of the fibre or membrane. After the first settling the clear oil is siphoned to a second series of jacketed caldrons, where more salt is added and the temperature controlled until the second settling is completed, when it is siphoned into vats, in which it is allowed to stand from three to five days at a temperature favorable to the crystallization of the stearin. The mass is then thoroughly mixed, wrapped in cloths and submitted to powerful pressure, which separates the oleo-oil from the stearin. Several grades of oleo-oil are made, the quality depending upon the grade of animals and the part of the body from which the fat is obtained. Neutral lard, or 'neutral,' another important constituent of oleomargarine, is prepared from the leaf and the back fat of the hog, the best grade coming from the leaf. Cottonseed oil enters quite largely into the composition of oleomargarine, especially of the cheaper grades. These fats are mixed in various proportions by different manufacturers, each having his own working formula. So much depends on the handling of the oils and the regulation of the temperature at each successive stage, that different manufacturers using the same grade of oils in similar combinations will secure quite different results. The oleo-oil and the neutral lard are each melted in separate tanks, and are piped into a mixing tank mounted on scales, so that the exact proportions called for by the formula may be used. If cottonseed oil is used, it is added at this stage. The mixed fats are piped to the churn, where the

melted butter, cream or milk, and the coloring matter are added. Milk is used much more commonly than butter or cream, and this is 'ripened' or fermented with a special culture of bacteria to give a pronounced lactic-acid flavor resembling that of butter. The mixture is then churned, and the liquid oleomargarine is drawn into a vat of ice water, which chills and hardens it before it can crystallize; after which it is softened by standing in the 'tempering room,' worked in a machine butter-worker, salted, and put up in tubs or rolls.

There are various grades of oleomargarine, depending upon the grades and proportions of the materials used. The cheapest grades are made from low-grade oils obtained from 'scrap' fat and made firm by the addition of stearin or similar substance, so that a greater proportion of cottonseed oil can be employed. Such grades are churned with skim milk, or buttermilk, and glycerin is sometimes added to improve the appearance of the product. The highest grades are made from pure oleo-oil and neutral lard of the best quality, with little or no cottonseed oil, and are churned with whole milk, cream, or creamery butter.

Butterine is a commercial name for oleomargarine, which was originally used to indicate a product of a higher grade or containing a considerable proportion of butter. The term now has no special significance in trade, and is not used in the oleomargarine laws, although still employed by some dealers for obvious reasons.

When made from good stock, oleomargarine is a cleanly, wholesome, and nutritious article of food. Numerous experiments have shown it to possess a food value practically equal to that of butter, and it has the advantage of keeping better and longer than butter, as it does not tend to become rancid. It has not the delicate flavor of the best butter, but with most people the objection to it is founded on sentiment and on its fraudulent sale, a large proportion of it being sold to the retail consumer as butter. Stringent laws have been made to regulate its manufacture and sale, requiring it to be labeled and taxing it heavily when colored in imitation of butter. The object of these laws has, however, been very largely defeated by the ingenuity of manufacturers, and oleomargarine is now placed on the market which apparently contains no artificial coloring matter, and yet imitates the color of butter very closely.

The production of oleomargarine in the United States has increased enormously in recent years. In 1890 there were, according to the census, 12 factories. In 1900 there were 24. The output for the fiscal year 1890, as shown by the returns of the Treasury Department, was 32,324,032 pounds; in 1900 it was 107,045,028 pounds; and in 1902, 126,316,436 pounds. In the fiscal year 1900 the taxes paid into the Treasury Department by the industry amounted to \$2,543,785. The exports of oleomargarine in the fiscal year 1900 amounted to 4,182,536 pounds, valued at \$409,083; and of oleo-oil, 146,739,681 pounds, valued at \$10,503,856. The oleomargarine went largely to the British West Indies, Germany, and the United Kingdom; the oleo-oil, for use in manufacture of oleomargarine, was taken by Holland (over 60 per cent.), Germany, Norway, Sweden, Denmark, the United Kingdom, and Belgium. Consult reports of the United States

Treasury Department, and Census Bulletin No. 138 (1902), on Oleomargarine.

O'LEOMETER (from Lat. *oleum*, oil + Gk. μέτρον, *metron*, measure), or **ELAÏOMETER**. An areometer used for ascertaining the densities of fixed oils.

OLEO-OIL. See **OLEOMARGARINE**.

OLÉRON, *ô'la'rôn'*. An island on the west coast of France, belonging to the Department of Charente Inférieure (Map: France, E 6). It lies opposite the mouth of the river Charente, 10 miles north of the Gironde estuary, is 19 miles long, and has an area of 65 square miles. It is low, and for the greater part covered with sand dunes and salt lagoons, but some portions are well cultivated, producing grain, vegetables, and grapes. Salt is one of the chief products of the island, and ship-building is carried on at the harbor of Le Château, which has steamship communication with Rochefort and other coast towns. The population of the island in 1901 was 17,033. The principal town is Saint-Pierre-d'Oléron, with a population of 1338.

OLÉRON, LAWS OF, etc. A mediæval code of maritime laws promulgated and published some time during the twelfth century, by Eleanor, Duchess of Guienne (Aquitaine). These laws consisted of a collection of the judgments of the maritime court of Oléron, together with a compilation of the customs and usages of the sea having the force of law among the mariners of that island, which was a shipping centre. Some years after this codification was made and published in Oléron, Richard I., son of Eleanor, introduced the whole body of these laws into England. They were one of the sources of the maritime laws of Wisby, and were published in and had an important influence on the maritime laws of probably all the countries of Europe. The modern English and American maritime law has been developed from these laws as a basis, influenced by the Rhodian maritime laws, the laws of Wisby, the civil law, and the customs and usages of those engaged in shipping. See **ADMIRALTY LAW**; **MARITIME LAW**; **RHODES, LAWS OF**; **WISBY, LAWS OF**. Consult the authorities referred to under **ADMIRALTY LAW**, and Twiss, *Monumenta Juridica. The Black Book of the Admiralty* (London, 1871).

OLEVIANUS, *ô'la-vê-â'nus*, **KASPAR** (1536-8)). A German Church reformer. He was born in Treves and studied law in Paris, Orleans, and Bourges, where he became acquainted with the works of Calvin, of whom, after having continued his theological studies at Geneva, he became an ardent follower. In 1559 he obtained the post of teacher at a high school in Treves, and here he explained in popular lectures the principles of the Reform. He thus came into collision with the archbishop of the diocese, who had him imprisoned. On the payment of a large sum he was released, but was expelled from the town together with his followers. At the invitation of the Elector Frederick III., Olevianus became teacher and in 1561 professor of theology in Heidelberg, where, in conjunction with Ursinus, he remodeled the Church of the electorate according to the principles of Calvin, and also worked out what is known as the 'Heidelberg Confession.' Upon the accession of Louis VI. Olevianus was deprived of his position and banished from the land. He

then took up his quarters in Berleburg, where he subsequently wrote his work on the covenant of grace, *De Substantia Fœderis Gratuiti*. He was also successful in introducing the Reformed Church in Nassau-Siegen, Solms, Wied, and elsewhere. Consult Cuno, *Blätter der Erinnerung an Olevianus* (Barmen, 188).

OL'GA, SAINT (?-969). A saint of the Russian Church. She was the wife of Prince Igor of Kiev, who, having undertaken an expedition against Constantinople, which proved unsuccessful, was slain on his return to his own dominions (945). His widow avenged his death, assumed the government in his stead, and governed with much prudence and success until her son Sviatoslav came of age (955), when she repaired to Constantinople, where she was baptized by the Patriarch Theophilaktes, and received into the Church, assuming at baptism the name of Helena, in honor of Saint Helena, mother of Constantine. She returned to Russia, and labored with much zeal for the propagation of her new creed. She is held in high veneration in the Russian Church. Her festival is on July 11th (24th), and the practice of venerating her appears to date from the early period of the Russian Church, before the schism between the Eastern and Western churches. Consult D'Elissalde Castremont, *Histoire de l'introduction du christianisme sur le continent russe, et la vie de Sainte Olga* (Paris, 1879).

OLIB'ANUM (ML. *olibanum*, probably from Ar. *al-lubân*, the incense, from *al*, the + *lubân*, incense, connected with Heb. *lebônâ*, incense, from *laban*, to be white, Aramaic *lebûnetâ*, Syriac *lebontâ*, Phœnician *lebônât*, incense, whence Gk. λίβανος, Lat. *libanus*, frankincense). A gum resin that flows from incisions made in certain species of *Boswellia* (q.v.), growing in Northeastern Africa and on the southeastern coast of Arabia. It occurs in commerce in semi-transparent yellowish tears and masses; has a bitter nauseous taste; is hard, brittle, and capable of being pulverized; and diffuses a strong aromatic odor when burned. It was formerly used in medicine, chiefly to restrain excessive mucous discharges; but its use for such purposes is now rare. It sometimes enters as an ingredient into stimulating plasters. It is chiefly employed for fumigation, and is used as incense in Roman and Greek Catholic churches. Large quantities of it are used in China. Practically all the olibanum of commerce passes through Aden.

OLIER, *ô'lyâ'*, **JEAN JACQUES** (1608-57). A French priest, founder and first head of the famous Seminary of Saint Sulpice in Paris, and of the congregation of that name. (See **SULPICIANS**.) He studied at the Sorbonne, and then entered into close relations with Saint Vincent de Paul, whose zeal for the conversion of souls he shared. He was ordained priest in 1633, and Cardinal Richelieu later offered him the bishopric of Châlons-sur-Marne, but he declined it, having already formed his plans for raising the spiritual and mental tone of the clergy by the foundation of a seminary. In 1642 he collected a few clerics about him at Vaugirard near Paris, and a few months later transferred his small community to Saint Sulpice, a parish in the Faubourg Saint-Germain which was in a very bad condition. Olier, however, instituted all manner of reforms and incentives to holiness, and by the aid of

zealous colleagues transformed the neighborhood. Having built a new church, he established his seminary in connection with it. In 1652, being in very poor health, he resigned his parochial charge and devoted himself altogether for the next five years to the upbuilding of the seminary and of the growing community of associates. He also founded seminaries at Montreal and several other places, as well as schools and institutions for the care of the poor and infirm. He died April 2, 1657. By far the best *Life* of him is that of Faillon (3 vols., Paris, 1873); an excellent English one, based upon it, is by Healy Thompson (London, 1885).

OLIGARCHY (Gk. *ὀλιγαρχία*, *oligarchia*, from *ὀλίγος*, *oligos*, few, little + *ἀρχεῖν*, *archein*, to rule). A form of government in which the supreme power is vested in a small class of persons. (See **ARISTOCRACY**.) It is a term applied by Greek political writers to that perversion of an aristocracy in which the rule of the dominant part of the community ceases to be the exponent of the general interests of the State, owing to the cessation of those substantial grounds of preëminence in which an aristocracy originated. The governing power in these circumstances becomes a faction, whose efforts are chiefly devoted to their own aggrandizement and the extension of their power and privileges.

OLIGOCENE EPOCH (from Gk. *ὀλίγος*, *oligos*, few, little + *καινός*, *kainos*, new). A subdivision of the Tertiary epoch, preceding the Miocene epoch. The term is seldom used in the United States for the reason that rocks of this age attain only limited development. The White River formation of Colorado comprising fresh-water strata is referred to this epoch, and there are smaller areas of contemporaneous beds in North Dakota and in the Northwest Territory of Canada. Oligocene strata cover wide areas in Central and Southern Europe. See **TERTIARY SYSTEM**.

OLIGOCHÆTA, *ol'ŭ-gō-kē'tā* (Neo-Lat., from Gk. *ὀλίγος*, *oligos*, few, little + *χαίτη*, *chaitē*, mane). A suborder of chaetopod annelids, of which the common earthworm (q.v.) is a good example. The head is not well marked, and there are no tentacles or eyes. The locomotive appendages are in the form of simple bristles attached in rows to the sides and ventral surface of the body; there are no branchiæ or parapodia. All are hermaphrodite, and the young pass through no metamorphosis. The species are mostly fresh-water or terrestrial.

OLIGOCLASE (from Gk. *ὀλίγος*, *oligos*, few, little + *κλάσις*, *klasis*, fracture). A mineral sodium-calcium-aluminum silicate, intermediate between albite and anorthite, and belonging to the feldspar group. Its crystalline form is of the triclinic system, its color is generally white, though sometimes shaded with gray, green, or red tints, and it has a vitreous lustre. It occurs in the older rocks such as granite, and also in various eruptive rocks, such as andesite; it is found in Sweden, Finland, Germany, Switzerland, and in the United States at various localities in New Hampshire, Connecticut, New York, Pennsylvania, and North Carolina. Certain varieties of this mineral, especially those of a reddish color, show internal fire-like reflections that are due to finely disseminated crystals of iron

oxide, and when polished form the gems known as *sun stones*.

OLINDA, *ō-lēn'dā*. A town in the State of Pernambuco, Brazil, situated on the coast $4\frac{1}{2}$ miles north of Pernambuco, with which it is connected by a street railway (Map: Brazil, L 5). It was founded in 1535, being the first settlement and for a long time the most important commercial city of Northern Brazil. It was the capital of the Province of Pernambuco, and of the Dutch colony established there in the seventeenth century. The Dutch burned the town and made the neighboring Recife (now Pernambuco) the capital. Olinda long remained a favorite place of residence of wealthy Pernambucans, but it has now fallen into decay. Population, about 8000.

OLIPHANT, *ol'ŭ-fant*, LAURENCE (1829-88). An English author and traveler, son of Sir Anthony Oliphant. He was born at Cape Town in 1829. Laurence Oliphant passed his early boyhood in England, but in 1841 he went to Ceylon, where his father was Chief Justice; traveled with his parents in Europe (1846-47); returned to Ceylon as private secretary to his father; practiced as criminal lawyer; went on a hunting excursion in Nepal; returned to England, and was called to the English and the Scotch bar. He was in Russia and the Crimea (1852); in Canada and the United States as secretary to Lord Elgin, Governor-General of Canada (1853-54); at Sebastopol, and served under Omar Pasha at the battle of Ingour (1855); at New Orleans, engaged in a filibustering expedition (1856); in China and Japan with Lord Elgin (1857-59); with Garibaldi in Italy (1860); envoy to the British legation in Japan, where he was dangerously wounded by assassins (1861); and afterwards he traveled in Egypt, Poland, and Palestine. He was elected to Parliament in 1865, but two years later he resigned to join the brotherhood founded by T. L. Harris (q.v.) at Brocton in western New York. He married in 1872, and his wife and mother joined the community. For years the Oliphants were the spiritual slaves of Harris; but they finally came to distrust him. After breaking with him, Oliphant settled for a time at Haifa in the Bay of Acre, where he devised schemes for restoring the Jews to the Holy Land. He died at Twickenham, near London, December 23, 1888. Oliphant served as special correspondent for the *Times* on various occasions and was a brilliant journalist. His many published books are mostly accounts of his travels. Among them are: *A Journey to Khatmandu* (1852); *The Russian Shores of the Black Sea* (1853); and *Earl of Elgin's Mission to China and Japan* (1859). His strange erratic character is boldly displayed in *Episodes in a Life of Adventure* (1887); his religious opinions in *Sympneumata* (1886); *Scientific Religion* (1888); and his novel *Massollam* (1886). What he might have been may be seen in his novel *Piccadilly* (*Blackwood's Magazine*, 1865), one of the most brilliant satires on English life ever written. With less success he worked the same vein in *Altiora Peto* (1883). Consult the *Memoir of Laurence Oliphant and His Wife, Alice Oliphant*, by Margaret Oliphant (Edinburgh, 1891).

OLIPHANT, MRS. MARGARET (born a Wilson) (1828-97). An English novelist and miscellaneous writer, born in Wallyford, near Mussel-

burgh, Midlothian, Scotland, April 4, 1828. In 1852 she married her cousin, Francis Oliphant, who died at Rome in 1859, leaving her penniless with three children to support. Already favorably known as a novelist, she could gain a livelihood with her pen, but the story of her efforts to rear her children and look after her helpless kinsfolk is a painful one. Her work during the next forty years, in spite of the speed with which it was done, is of a good quality, both in fiction and literary history. In 1864 she again went to Italy, and in 1890 she visited the Holy Land. In 1868 she was granted a civil list pension of £100. She died at Windsor, June 25, 1897. Her first novel, *Passages in the Life of Mrs. Margaret Maitland of Sunnyside* (1849), won instant attention and approval. Its most distinctive charm is the tender humor and insight which regulate its exquisite delineation of Scottish life and character at once on their higher and lower levels. It was followed by *Merkland* (1851); *Adam Graeme of Mossgray* (1852); *Henry Muir* (1853); *Magdalen Hepburn* (1854); *The Quiet Heart* (1854); *Zaidee* (1856); and several other novels, some of which originally appeared in *Blackwood's Magazine*. It was, however, by the *Chronicles of Carlingford* that Mrs. Oliphant's reputation as a novelist was first assured. In the first of them, *The Rector and the Doctor's Family* (1863), aside from its other merits, which are great, the character of Netty, the heroine, enlivens the whole work, and may rank as an original creation. The other, *Salem Chapel* (1863), perhaps indicates a wider and more vigorous grasp than is to be found in any other work of the authoress. Among succeeding novels are: *Three Brothers* (1870); *Squire Arden* (1871); *A Rose in June* (1874); *The Primrose Path* (1878); *Kirsten* (1890); *The Marriage of Elinor* (1892); and *A Widow's Tale* (1898). Other works are the *Life of Edward Irving* (1862); *Saint Francis of Assisi* (1868); *Memoir of the Comte de Montalembert* (1872); *The Makers of Florence* (1874); *The Literary History of England from 1790 to 1825* (1882); *The Makers of Venice* (1887); *Royal Edinburgh* (1890); *Life of Laurence Oliphant* (1891); *The Victorian Age of English Literature* (1892); *The Reign of Queen Anne* (1894); *The Makers of Modern Rome* (1895); and *William Blackwood and His Sons* (1897). Although most of these afford sober entertainment, none of them is deep enough to give Mrs. Oliphant the highest rank as a critic or as an historian. Consult the *Autobiography*, ed. by Coghill (New York, 1899).

OLIPHANT, THOMAS LAURENCE KINGTON (1831—). An English biographer and philologist. He was born near Bristol, was educated at Eton and Oxford, and studied in the Inner Temple. Besides his historical works, *The Emperor Frederick the Second* (1862), *The Jacobite Lairds of Gask* (1870), and *The Duc de Luynes* (1875), he wrote excellent sketches of the historical development of English, among which the more important are: *The Sources of Standard English* (1873); *The Duke and the Scholar* (1875); *Old and Middle English* (1878; 2d ed. 1893); and *New English* (1886).

OLIVAREZ, 6'le-vii'rath, GÁSPARO DE GUZMAN, Count, Duke of San Lucar de Barrameda (1587-1645). Prime Minister of Philip

IV. of Spain. He was born at Rome, where his father was Ambassador. He received an excellent education at Salamanca, became the friend of Philip IV., his confidant in his amours, and (1621) his Prime Minister, in which capacity he exercised almost unlimited power for twenty-two years. Olivarez was able, and earnestly desirous of improving the condition of his country; but he yielded to the ambitions of Philip, which plunged Spain into the Thirty Years' War. The war for the subjugation of the Netherlands, which had been resumed in 1621, was waged without success. Resorting to any means to raise money, his oppressive measures caused insurrections in Catalonia and Naples, and roused the Portuguese to shake off the Spanish yoke in 1640. Repeated defeats encountered by Spain forced the King to dismiss Olivarez in 1643. He died at Toro.

OLIVE (Lat. *oliva*, from Gk. *ἐλαία*, *elaia*, olive). A plant of great economic value which has been in cultivation from prehistoric times, belonging to the genus *Olea*, of which there are some 30 species. The cultivated sorts originated from *Olea Europæa*. The nativity of the olive is accredited to Southern Europe and Asia Minor, and by some authorities to Syria. The tree is of great vitality, specimens being known which are said to be 1000 years old. It sometimes attains a height of 40 feet; has opposite, leathery, grayish-green smooth evergreen leaves, and drupaceous fruits which vary in color from waxen



OLIVE

yellow to black. The area for successful olive culture is restricted by its heat requirements more than by soil or moisture. It enjoys a dry climate, and will thrive on a thin soil and produce well if only the pomace is returned to the land from the oil press. Since this contains all the compounds derived from the soil, fertilization and cultivation increase the yield. The trees should be planted at least 33 feet apart each way, and if given the culture usually given prunes or plums will thrive well. The olive thrives best in dry climates like that of Syria and Assyria. It succeeds at the Cape of Good Hope, in Australia, and in California, where it was introduced at an early date by the Spanish missionaries, from which fact the variety most extensively cultivated in California has been called 'Mission.' Areas which were considered unfit for the industry have proved well suited to some of the early sorts lately imported from Spain and Italy, and the industry is an important factor in the horticultural resources of the State.

The tree is propagated either from twig-cuttings, sprouts or truncheons of old wood set in

moist ground, or from gnarled, woody buds that form near the base of the trunk. Such plants begin to bear when from seven to nine years old, and yield crops either annually or in alternate years, the crop reaching its maximum when the trees are about 30 years of age. The fruits are the chief commercial product of the olive. They are used for pickling, drying, and for oil production. In the Mediterranean countries this oil takes the place of butter and the animal fats used by other nations in culinary operations. The wood of the olive tree is very hard, possesses a beautiful grain and color, and is used for ornamental cabinet work. Among the Greeks the olive was sacred to Pallas Athene (Minerva), who was honored as the bestower of it; it was also the emblem of chastity. A crown of olive-twigs was the highest distinction of a citizen who had merited well of his country, and the highest prize of the victor in the Olympic games. An olive branch was also the symbol of peace; and the vanquished, who came to supplicate for peace, bore olive branches in their hands.

OLIVES, FOOD VALUE. Two food products of considerable importance are made from olives, viz. olive oil or salad oil, and pickled olives. A third product, little known in the United States, is the dried olive, much eaten in Greece and some other neighboring countries. Different varieties of olives vary greatly in size, ranging from less than 100 to over 400 to the pound, the majority, perhaps, ranging from 150 to 250 to the pound. The pit constitutes about 20 per cent. of the whole fruit, but here a considerable range is also found. Both pulp and pit contain oil. The amount of oil in the pulp in Californian olives ranges from 13 to about 88 per cent.; that in the pit from 0.36 to 1.52 per cent.

Whether used for oil-making or for pickling, the olive should be carefully gathered. The ripe fruit is used for oil-making and for pickling, the exact stage when it is best suited for this purpose being a matter which must be learned by experience. The green fruit used for pickling should be gathered when full grown and just before it begins to color and soften. The pickled olives usually found in the American market are made from the green fruit. The pickled ripe olives are also met with and may be recognized by their dark color.

The best oil is made by crushing the carefully picked fresh olives. To facilitate the extraction of the oil, the olives are often partially dried before crushing. In California old-fashioned stone mills are commonly used to crush the fruit, although bronze crushers are being tried with good results. The ground mass is pressed to extract the liquid portion, which contains watery plant juices in addition to the oil and more or less pulpy matter. Various devices are used to separate the oil and to purify it. It is said that the best oil is obtained by allowing the pulp, etc., to settle, and decanting the clear oil. It generally takes about one month for oil to settle the first time. Three rackings are usually sufficient. The oil thus obtained is almost as bright as can be produced by the most effective filtration, and it has, besides, the distinctive olive flavor and lacks the greasiness characteristic of all filtered oils. Great cleanliness must be observed in oil-making and every precaution taken to prevent rancidity.

In making pickles from ripe and green olives

essentially the same process is followed. The unpleasant acid and bitter flavor is removed by soaking the fruit in a solution of potash lye for a short time or by a longer soaking in water. In addition to removing the unpleasant flavor, the lye softens the skin of the fruit, so that the undesirable substances may be more readily extracted by water. Olives treated with lye must be soaked in clear water, which is frequently changed, to remove the potash. They are then placed in weak brine for a short time and afterwards in stronger brines. The details of each step of the process vary considerably, and much depends upon skill and experience. An abundant supply of pure water is of the first importance, and great care must be exercised to prevent the growth of molds, etc.

The uses of olive oil and olives as articles of diet are familiar. The former is used chiefly for dressing salads and for frying, the latter as a relish, for seasoning sauces, etc., and for garnishing various foods. The oil, like all fats, has a high fuel value, and on this its value as a food depends. The average percentage composition of pickled ripe olives follows: Water, 65.1; fat, 25.5; carbohydrates, 3.8; protein, ash, etc., 5.6; of pickled green olives, water, 78.4; fat, 12.9; carbohydrates, 1.8; protein, ash, etc., 6.9. It has been claimed that while the pickled green olive is chiefly valuable as a relish, the pickled ripe olive is really worthy of attention as a wholesome and fairly nutritious food. In Southern Europe and other regions the ripe olive is used as a staple article of diet.

OLIVE-BACKED THRUSH. See THRUSH.

OLIVENITE (from Ger. *Oliven-erz*, olive-ore, from *Olive*, olive). A hydrated mineral copper arsenate that crystallizes in the orthorhombic system. It has a vitreous lustre, and is of various shades of green to brown in color. The crystallized varieties are found in Cornwall, Devonshire, and Cumberland, England, in the Tyrol, and in the Ural district, while in the United States it occurs in the Tintic district of Utah, both crystallized and in the fibrous form, the last named being known as 'wood copper.'

OLIVENZA, ô'lê-vân'thâ. A town of Spain, in the Province of Badajoz, situated near the Portuguese frontier, 15 miles southwest of Badajoz (Map: Spain, B 3). It was formerly a garrison town, but its fortifications have been razed. The town manufactures leather, earthenware, and hats, and has steam flour mills. It was ceded to Spain by Portugal in 1801. Population, in 1900, 8933.

OLIVE OIL. A vegetable oil expressed from the fruit of *Olea Europea*, and in its purest state an inodorous, pale-yellow oil, with a specific gravity of .918 at 15° C. The olive oil of commerce differs greatly in quality. The seed yields about 32 per cent. of oil, of which 21 per cent. is furnished by the pericarp, and the remainder, which is much inferior, by the seed and woody matter of the fruit. In Sicily, where large quantities of olive oil are produced, the operation is performed in the following primitive fashion: The olives are first placed on a circular platform of masonry, about seven feet in diameter, upon which a heavy millstone is turned by means of a pole and donkey. The mass, which has been thoroughly pulped by this process, is now placed in soft rush baskets and put under a press which

is compressed by means of a wooden screw worked by five or six men. By this means the cold oil is expressed, heat being used to extract the remainder. The oil is allowed to settle and clarify for several days before it is ready for use.

Olive oil is used as a food or condiment, in pharmacy, as an illuminant and lubricant, and in the manufacture of soap. The olive oil of commerce is much adulterated, especially with cottonseed oil. The lowest grade is known as *tournant oil*. *Galipoli oil* is made from the fruit after it has been allowed to ferment. It is chiefly used in dyeing. See OILS.

OLIVER, ANDREW (1706-74). A Lieutenant-Governor of Massachusetts. He was born in Boston, and graduated at Harvard in 1734. In 1743 he was elected to the Massachusetts General Court, in 1746 was chosen a member of the Council, and in 1756 became Secretary of the Colony. Upon the passage of the Stamp Act in 1765, he was appointed distributor for Massachusetts, and thus incurred the displeasure of the people. On August 14, 1765, he was hanged in effigy on the 'Liberty Tree,' and a mob destroyed a new building which, it was thought, was intended for his office. So great was his danger that a few days later he promised he would not receive the stamps. In the following December, upon a rumor that he still intended to serve, he was taken by a mob to the 'Liberty Tree' and there compelled to swear that such had never been his purpose. He continued, however, to uphold the cause of the Crown, and in 1770, on the promotion of his brother-in-law, Hutchinson, to the Governorship, Oliver was made Lieutenant-Governor in his stead. In 1773 certain letters written by Oliver in which he recommended changes in the Massachusetts charter and hinted at the desirability of taking off the 'principal incendiaries,' came into the hands of Benjamin Franklin, the agent of the colony in England; and these letters, together with some from Hutchinson and others, were published in Massachusetts and aroused such a storm of indignation against Hutchinson and Oliver that a petition was sent to England for their removal.

OLIVER, GRACE ATKINSON (1844-). An American author, whose maiden name was Little. She was born in Boston, was educated in private schools there, and married J. H. Ellis in 1869. After his death (1871) she began to write for the press under his name, and her published works are *lives of Mrs. Barbauld* (1873), *Maria Edgeworth* (1882), and *Dean Stanley* (1885). She also edited the *Poems of Ann and Jane Taylor* and wrote their memoirs (1883). She married Dr. J. P. Oliver in 1879.

OLIVER, HENRY KEMBLE (1800-85). An American musician, born at Beverly, Mass. He graduated at Dartmouth College in 1818, and after teaching school for a number of years settled in Lawrence, Mass., of which city he became Mayor in 1859. From 1861 to 1865 he was Treasurer of the State of Massachusetts. He founded several musical societies, but was better known as the composer of the hymn-tunes, "Federal Street," "Morning," and "Beacon Street." He also composed motets, chants, and songs, and published: *The National Lyre* (1848); *Collection of Church Music* (1860); *Original Hymn Tunes* (1873).

OLIVER, JAMES EDWARD (1829-95). An American mathematician, born at Portland, Maine. He graduated at Harvard in 1849, and in 1850 was appointed assistant in the office of the newly established *Ephemeris and Nautical Almanac*, from which he resigned in 1867. After three years of research in chemistry and physics, he was chosen professor of mathematics in Cornell, where, in 1873, he became senior professor. He was an able teacher and with lectures and his own unsparring devotion to study seemed long on the point of ruining his health. He wrote *A Treatise on Trigonometry* (1886), and edited a series of mathematical text-books. As a mathematician he was reckoned by Peirce of Harvard the ablest in America.

OLIVER, PETER (1713-91). An American jurist, a brother of Andrew Oliver. He was born in Boston, and graduated at Harvard in 1730. After holding various minor offices, he was, in 1756, although not a lawyer, made a justice of the Superior Court of Massachusetts, and in 1771 was raised to the position of Chief Justice. Like his brother Andrew, he was a Loyalist, and in 1774 was the only one of the judges to refuse to decline the offer of a fixed salary from the King. Because of his refusal he was impeached by the House. He upheld the royal cause with considerable skill in *The Censor*, a Loyalist paper, and upon the evacuation of Boston by the British in 1776 he quitted the town with them. The remainder of his life was spent in England.

OLIVERS, THOMAS (1725-99). A Methodist preacher. He was born at Tregynon, Wales, received little schooling, and became a wandering cobbler. Being in Bristol, he went to hear Whitefield, was converted, and was made by John Wesley an itinerant preacher. In 1775 he became coeditor of *The Arminian Magazine*, but was removed in 1789 on the charge of carelessness. He died in London. His repute rests upon his hymns, one of which, "The God of Abraham praise," is deservedly famous. It is, however, not original, but a paraphrase from the Hebrew doxology of Daniel ben Judah, which summarizes the thirteen articles of the Hebrew creed. Consult the article on the hymn in Julian's *Dictionary of Hymnology* (London, 1892); and Rev. John Kirk's *Memoir of Olivers* (London, 1868).

OLIVER TWIST. A novel by Charles Dickens (1838). It appeared serially in "Bentley's Miscellany" between January, 1837, and March, 1839. It describes the evils of the workhouse, in which Oliver's childhood was passed, and the degraded and vicious life in London to which he was exposed during his apprenticeship to Fagin, the thief-trainer. Brutal Bill Sykes, Nancy, the Artful Dodger, and pompous Bumble, the parish beadle, are other leading characters.

OLIVES, MOUNT OF (also called Mount Olivet). The mountain east of Jerusalem, separated from the city by the Kidron Valley. It is, properly speaking, but one of a range of hills which starts out from the central highland about two miles north of Jerusalem. Just north of the city is the high elevation known in ancient times as Scopus, where the Roman army under Titus encamped. After a depression the range deflects and is continued southward for about two miles by the Mount of Olives. Farther



THE MOUNT OF OLIVES

south (and southeast of Jerusalem) is a third hill, the Mount of Offense, where, according to tradition, Solomon erected altars for the heathen gods of his foreign wives (I. Kings xi. 7-8; II. Kings xxiii. 13). On the steep western slopes of the Mount of Offense lies the village of Siloam and in the valley between this mount and the Mount of Olives is one fork of the road to Jericho, on which lay Bethany, whence Jesus started on His triumphant entry into Jerusalem (Matt. xxi. 1 and parallels). The height of the Mount of Olives averages over 2600 feet, about 200 feet higher than the city. The name has come down from early times (cf. II. Sam. xv. 30), and there is thus reason to believe that it was once largely covered with olive trees. It was even called (II. Kings xxiii. 13) the Mount of Anointing, symbolical of the oil produced on it (cf. also Neh. viii. 15). During the siege by the Romans (A.D. 70) the trees were all cut down, and it has since been almost treeless.

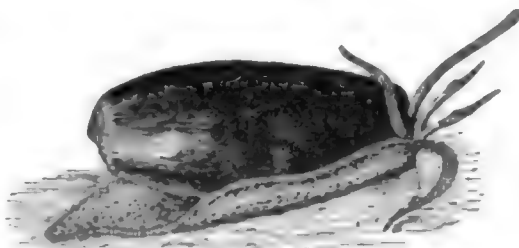
As early as the days of David the mount appears to have had on it a sanctuary, perhaps originally instituted by the Canaanites and afterwards appropriated by the Israelites. From its commanding situation, east of the temple hill, as a great protecting wall before the city, the Mount of Olives was regarded with veneration by the Jews. It was called the Mountain of the Three Lights, since it was lighted up at night by the altar fire of the temple opposite, and by the first rays of the rising sun, and because it furnished the oil for the temple lamps. In prophecy (Zech. xiv. 4; Esek. xi. 23) and in Rabbinic teaching it plays a rôle in the scenes of judgment connected with the Messianic era.

The mountain was the scene of several important incidents in Jesus' ministry. On its western slope, near the road leading down to the main eastern gate of the city, lay the Garden of Gethsemane, whither He often resorted for prayer, and where He was arrested. Somewhere on the same roadside He sat and discoursed to the disciples concerning the coming doom of the city opposite, and in His triumphal entry He passed down its slope on the same highway.

Christian tradition has altered and amplified the notices in the Bible by transferring the scene of the Ascension from near Bethany to the summit of Olivet (Luke xxiv. 50; cf. Acts i. 12), where two different spots claim the honor. One of these, an elevation directly east of the old temple site, is occupied by the Church of the Ascension, a small modern building, but on the ruins of a church built in the fourth century. It is in possession of Moslems, but Christians are permitted to use it on certain occasions. The rival spot is on a second eminence farther north, called Viri Galilæi (Acts i. 11), also (but wrongly) Scopus, now the property of the Greek Catholic Bishopric of Jerusalem and well cared for. On this hill extensive catacombs have been recently discovered, indicating that it was once a Jewish burial place, afterwards appropriated and enlarged by Christians. Near the Church of the Ascension is a wretched village, Kafr et-Tur. A little to the east on Russian property a fine observation tower has been erected. South of the Church of the Ascension are the possessions of the Latin Church, with the two chapels, that of the Creed, where the Apostles are said to have formulated the Apostles' Creed, and the Pater Noster, built by

a French princess in 1865. Deep down in the valley, just east of the bridge across the Kidron, is a chapel over the legendary site of the grave of Mary, mother of Jesus, whence her body was carried by the angels to heaven. Consult the works treating of the city of Jerusalem (see JERUSALEM); reports of the Palestine Exploration Fund, especially volumes for 1889 and 1896; and Baedeker, *Palestine and Syria* (Leipzig, 1898).

OLIVE-SHELL. A mollusk of the gastropod family, Olividae, which has a beautiful shell that resembles an olive in general shape. Many species, whose shells are brilliantly ornamented, inhabit the Indian Ocean and Australian seas. They occur at various depths down to fifty feet or so, and creep about the bottom, seizing and feeding upon small animals and carrion, from which they suck the juices.



BLACK OLIVE (*Olea Maura*).

OLIVE-SIDED FLYCATCHER. A migratory tyrant-flycatcher (*Contopus borealis*) of North America, which is slaty-brown above, with darker streaks, and olive-gray below, with the median line of the abdomen white. It frequents mountains and northern pine forests, and makes its nest on the branch of a pine or similar tree. The eggs are cream-colored, marked with reddish-brown and lavender spots. Few breed south of Canada, except in Northern New England. Consult Baird, Brewer, and Ridgeway, *North American Birds*, vol. ii. (Boston, 1874). See Colored Plate of EGGS OF SONG BIRDS.

OLIVÉTAN, ô'le-vâ'tân', or **OLIVETANUS**, PIERRE ROBERT (?-1538). A French Reformed theologian, born at Noyon. He was a kinsman of Calvin and is credited with stimulating him to theological studies. Olivétan taught at Geneva for a year (1532-33), and was then banished to Neuchâtel. His great work was a version of the Bible, a basis for the work of subsequent scholars; it was published at Neuchâtel (1535) and at Geneva (1540). He was a painstaking, but not a great scholar.

OLIVET'ANS. A religious Order of the Roman Catholic Church, one of the many remarkable products of the great spiritual movement which characterized the twelfth and thirteenth centuries. The Olivetans, or Brethren of Our Lady of Mount Olivet, are an offshoot of the great Benedictine Order (q.v.), and derive their origin from Giovanni de' Tolomei, a native of Siena, born in the year 1272. Tolomei had been a distinguished professor of philosophy in the university of his native city; but his career was suddenly interrupted by the loss of his sight. Although he was cured of his blindness (and, as he himself believed, miraculously), this visitation convinced him of the vanity of earthly things; and in company with some friends he withdrew to Monte Oliveto, near Accona, between

Siena and Arezzo, where he devoted himself to prayer and religious exercises. After this he took the name of Bernard. By the direction of the Pope, John XXII., the new brethren adopted the Benedictine rule; but they chose as their especial province the cultivation of sacred science and the duty of teaching. In the year 1319 Tolomei was chosen as the first general; and even before his death, in 1348, the institute had made rapid progress, especially in Italy. It numbered at one time eighty-three houses, but at present the number is reduced to about a dozen, including one in Rome, which contains the grave of Saint Frances of Rome. The ancient mother house of Monte Oliveto and the beautiful cloister at Florence have been appropriated by the Italian Government, which uses the latter for barracks.

OLIVET COLLEGE. A coeducational institution at Olivet, Mich., established by a colony of citizens from Oberlin, Ohio, under the leadership of Rev. John J. Shepherd, the founder of Oberlin College. The school was opened in 1844, and continued as Olivet Institute until 1859, when a charter was obtained. The institution comprises collegiate and preparatory departments and a conservatory of music, with a total registration in 1902 of 260 and a faculty of 23. The library contained 28,000 volumes. The college has a campus of 15 acres, valued, with the buildings, at \$158,757, the value of all the college property being \$355,940, and its endowment \$150,000. The income for the year was \$55,120.

OLIVIA. (1) In Shakespeare's *Twelfth Night*, a countess sought by Duke Orsino. She falls in love with Viola, disguised as a page, and marries Viola's brother Sebastian, mistaking him for Viola. (2) In Wycherley's *Plain Dealer*, a hypocritical character loved by Manly. (3) In Goldsmith's *Good-Natured Man*, the daughter of Sir James Woodville. She is confined by her scheming guardian in a Paris convent, and is released by Croaker, whom she marries. (4) In Goldsmith's *Vicar of Wakefield*, the Vicar's elder daughter. She elopes with Squire Thornhill. (5) In Mrs. Cowley's *Bold Stroke for a Husband*, the daughter of Don Cesar, who by various pretenses drives away other suitors in order that she may marry Julio de Melessina.

OLIVIER, ô'lê'vyâ', JUSTE DANIEL (1807-76). A Swiss poet, born at Eysins (Vaud). He studied at the Academy of Lausanne, and afterwards taught literature there for several years. After the political troubles of 1845 he went to Paris and remained there until 1871, when he returned to Geneva, where he died. His poems include: *L'avenir* (1831); *Les chansons lointaines* (1847); *Dernières chansons*; *Théâtre de société fantaisies dramatiques* (1870); and some studies in natural history: *Le canton de Vaud* (1837-41); *Etudes d'histoire nationale* (1842); and *Mouvement intellectuel de la Suisse* (1845).

OLIVINE. See CHRYSOLITE.

OLLA PODRIDA, ô'l'yâ pô-drê'dâ (Sp., putrid pot). Originally an accumulation of remains of flesh, vegetable, etc., thrown together into a pot, but generally employed to designate a favorite national dish of the Spaniards, consisting of a mixture of different kinds of meat and vegetables stewed together. It has also come

to be figuratively applied to literary productions of very miscellaneous contents.

OLLIER, ô'lyâ', LEOPOLD LOUIS XAVIER EDOUARD (1830—). A French physician, specialist on the pathology of the bones. He was born at Vans, Department of Ardèche; studied medicine at Lyons, and was professor of clinical surgery there, after several years as chief surgeon to the Hôtel Dieu (1860-77). He wrote: *Traité expérimental et clinique de la régénération des os* (1867); and *Traité des résections et des opérations conservatrices* (1885-90).

OLLIVIER, ô'lê'vyâ', EMILE (1825—). A French statesman. He was born at Marseilles, and studied there for the bar. Ledru-Rollin made him Commissary General at Marseilles in 1848, and Cavaignac appointed him Prefect of the Department of Bouches-du-Rhône the next year. He soon resumed his law practice, however, and was elected to the Legislative Assembly from Paris in 1857. As one of the 'Five' that constituted the opposition during the early Empire, he gained great reputation as an orator. Gradually he became a Conservative, and finally a Bonapartist. On January 2, 1870, Napoleon called him to be head of a constitutional Cabinet. Whether duped or bought, he became subservient to the Emperor, and lost the support of his fellow Ministers. He entered upon the Prussian War 'with a light heart,' and after the first disasters, discredited, with all his colleagues, he retired, August 9, 1870. He became a member of the French Academy in 1870. He wrote: *Démocratie et liberté* (1867); *Lamartine* (1874); *L'église et l'état au concile du Vatican* (1879); *Thiers à l'académie et dans l'histoire* (1879); *Nouveau manuel de droit ecclésiastique français* (1885); *Le concordat et le gallicanisme* (1885); *L'empire libéral* (1894-98).

OLMEDO, ôl-mâ'dô, JOSÉ JOAQUIN (1782-1847). A Spanish-American poet, born at Guayaquil, Ecuador. He was educated for the bar and practiced law in his native city. Afterwards he took a prominent part in politics, was a member of the Junta de Gobierno of Guayaquil (1820), the Constitutional Assembly of Peru (1823), Minister Plenipotentiary to London, Vice-President of Ecuador, and Governor of the Department of Guayas. He was one of the leaders in the revolution of 1845, but did not receive the expected election to the Presidency. His best known poem is an ode addressed to General Bolívar, as the deliverer of Peru. The works of Olmedo are very popular in South America, though his style is a little antiquated. They are to be found in Gutierrez, *América Poética* (1846); the *Poesías inéditas de Olmedo* (1861); and Herrera's *Apuntes biográficos de D. J. J. Olmedo* (Quito, 1887).

OLMSTED, ôm'stêd or ùm', DENISON (1791-1859). An American physicist and astronomer, born at East Hartford, Conn. He graduated at Yale in 1813, was chosen professor of chemistry, mineralogy, and geology at the University of North Carolina in 1817, and in 1825 was called to Yale as professor of mathematics and natural philosophy. He published a number of works that had a wide circulation, among which were the *Student's Commonplace Books* (1828); *Introduction to Natural Philosophy* (1832); and *Introduction to Astronomy* (1839).

OLMSTED, FREDERICK LAW (1822—). A great American landscape architect. After special studies at Yale University (1845-46), he sought practical knowledge of agriculture by working on a farm in central New York and subsequently on Staten Island, contributing on rural subjects to technical periodicals. In 1850 he made a tour afoot in England and on the Continent for the study of landscape gardening and agricultural methods. His observations are found in *Walks and Talks of an American Farmer in England* (1852). He then went on a similar quest through the Southern and Southwestern States, studying also the effects of slavery on production, and embodying his experience in *A Journey in the Seaboard Slave States, with Remarks on Their Economy* (1856); in *A Journey Through Texas; or, a Saddle Trip on the Southwestern Frontier, with a Statistical Appendix* (1857); and in *A Journey in the Back Country* (1860). The three volumes were re-issued as *The Cotton Kingdom* (2 vols., 1861), were much quoted in the controversies that arose out of the Civil War, and are still valuable as authorities. In 1856 Olmsted was made superintendent of the New York Central Park Commission, and a plan for this park, prepared by him and Calvert Vaux, was adopted in 1857. In 1861 he was appointed member of a commission of inquiry and advice on the sanitary condition of the United States troops. Of this commission he became general secretary and was active in Washington from 1861 to 1864, visiting also the armies in the field. Later he was prominent on the Southern Famine Relief Commission and in the organization of the New York State Charities Aid Association. In 1871 he presented to the Territorial Government of the District of Columbia the plans, since in large measure executed, for the 'parking system' of the streets of the capital. He helped also to found in New York the Metropolitan Museum of Art and the American Museum of Natural History. In 1872 he was made president of the Department of Public Parks in New York, and devised the plan, in large measure carried out, of the street system of New York north of the Harlem River, as well as for Riverside and Morningside parks in New York, Prospect and Washington parks in Brooklyn, Washington and Jackson parks in Chicago, and many others. He planned also the approach from Pennsylvania Avenue to the Capitol in Washington, was first commissioner of the Yosemite Park, and prominent in the Niagara Falls Reservation Committee, and in devising the system of parks and parkways in and around Boston. Important public works were conducted by him also in Bridgeport, Trenton, Montreal, Buffalo, Milwaukee, and Louisville.

OLMÜTZ, ól'múts. The second town of Moravia, Austria, situated on an islet of the river March, about 40 miles northeast of Brünn (Map: Austria, E 2). It was formerly strongly fortified, but its works have been converted since 1886 into promenades and parks. The chief square of the town is the Oberring, adorned with a column dating from 1742, and two fountains. Facing the Oberring is the town hall, with its astronomical clock, constructed in 1422, and an interesting chapel now serving as an historical museum. The cathedral is a Gothic edifice

of the fourteenth century, and the Church of Saint Mauritius, dating from the eleventh and twelfth centuries, is noted for its fine organ. Among the other interesting buildings may be mentioned the old Jesuit monastery, now used as barracks, the cloth hall, the buildings of the former university, and the archiepiscopal residence. Olmütz is well supplied with educational institutions. Besides the theological faculty (the remnant of the university founded in 1581 and abolished in 1855), there are two higher gymnasia, a higher *Realschule*, three training schools for teachers, a commercial school, an historical and an industrial museum, a library of about 75,000 volumes, with a considerable number of incunabula and manuscripts. The town is the seat of an archbishop. The archbishops of Olmütz are elected by the cathedral chapter—a distinction enjoyed by no other archbishop in the Kingdom.

Olmütz has a number of breweries, manufactures of hardware, chemicals, and flour. The commerce in agricultural products is of some importance. Olmütz is mentioned as a town with a castle in 863. In 1063 it became the seat of a bishopric (changed to an archbishopric in 1777), whose incumbents later attained princely rank. Until 1640 the town was the capital of Moravia. In 1848 it was the scene of the abdication of Ferdinand I. in favor of Francis Joseph. Olmütz is noted for the conference held there in 1850 between the representatives of Austria, Prussia, and Russia for the adjustment of the difficulties which had arisen between Austria and Prussia as a result of the convulsions of 1848-49. In this conference the policy of Austria triumphed completely, and all hopes of a liberal Germany under Prussian leadership disappeared for the time. Population, in 1890, 19,761; in 1900, 21,933, mostly Roman Catholics, and over 50 per cent. German. Consult Müller, *Geschichte der königlichen Hauptsadt Olmütz* (Olmütz, 1895).

OLNEY. A city and the county-seat of Richland County, Ill., 118 miles east of Saint Louis; on the Baltimore and Ohio Southwestern, the Illinois Central, and other railroads (Map: Illinois, D 5). It is interested mainly in agriculture, and in exporting the fruit, hay, and seed of this region, and has flouring mills, brick and tile works, cold storage plant, and a creamery. There are a public library and a sanatorium. Olney, first settled in 1843, is governed by a mayor, biennially elected, and a unicameral council. The water-works are owned and operated by the municipality. Population, in 1890, 3831; in 1900, 4260.

OLNEY, JESSE (1798-1872). An American educator, born at Union, Tolland County, Conn. He taught in northern New York and in the Hartford Grammar School; was a member of the Connecticut Legislature for ten terms; and in 1867 was elected State Comptroller. Olney was one of the most prominent educators of his time and is especially well known for his reforms in the methods of teaching geography, which he began by studying the home of the pupil and sweeping outward in wider circles to township, county, State, and so on. He published: *A Geography and Atlas* (1828); *The National Preceptor* (1831); and many other text-books.

OLNEY, RICHARD (1835—). An American politician, born in Oxford, Mass. He graduated

at Brown University in 1856, studied law in Harvard Law School, was admitted to the Boston bar in 1859, and immediately became associated with Judge Benjamin F. Thomas, whose daughter he married in 1861. Olney rose rapidly in his profession, and was for many years chief counsel for the Eastern Railroad, and later for the Boston and Maine, as well as for other roads. Until 1893 he was not particularly active in public affairs, although he was a Democratic member of the Lower House of the Massachusetts Legislature in 1874, and was once an unsuccessful candidate for the office of State Attorney-General. In 1893 he was offered the place of Attorney-General of the United States by President Cleveland and accepted it. His most important act while occupying this office arose out of the great railroad riots of 1894. In June of that year he applied to the United States Circuit Court for the Northern District of Illinois for an injunction to prevent the strikers from interfering with the United States mails or with interstate commerce. The injunction was granted, it was enforced by United States troops, and the strike was broken. The action of the Circuit Court was later sustained by the Supreme Court, and as this was the first instance in which the power of injunction had been used for such a purpose, it furnished a precedent of the utmost importance. Upon the death of Gresham, in 1895, Olney became Secretary of State, and continued to hold that position until the end of Cleveland's Administration in 1897. In this period it fell to him to conduct the negotiations with England growing out of the disputed boundary between Venezuela and British Guiana, and his famous letter to Bayard, Minister to England, for the information of the English Government as to the American position in the matter, attracted great attention both in this country and in Europe. Previous to the Democratic Convention of 1896, Olney was much talked of as a possible candidate for the Presidency. Upon the nomination of Bryan and the adoption of the free-silver plank, Olney refused to support the Democratic ticket. In 1900, however, he advised the election of Bryan, and gave as his chief reason for so doing the imperialistic tendencies of the Republicans.

OLONETZ, ȃ-lŏ/nyĕts. A northern government of Russia, bounded by the Government of Archangel on the north, by Vologda on the east, by Novgorod on the south, and by Finland on the west (Map: Russia, D 2). Area, about 57,500 square miles. The northwestern part belongs orographically and geologically to Finland. It is traversed in different directions by rocky ridges not exceeding 1000 feet in altitude, and separated from each other by lakes and marshes. The southeast part is flat, with the exception of the northern portion, which is somewhat elevated.

Many of the lakes and marshes contain iron ore, and the Devonian formations near Lake Onega yield marble and sandstone. There are also found some copper, clays, and mineral springs. Olonetz belongs to the basins of the Baltic and the White seas. Its chief rivers are the Svir; the Vytegra, which communicates with the Mariinsk Canal system; the Sunna, belonging to the basin of the Baltic; the Onega; and the Vyga, flowing into the White Sea. The number of lakes is estimated at over 2000, the largest of

them being the Onega (q.v.), Sego, Vigo, and Vadlo.

The climate is harsh and moist. The mean annual temperature varies from 34° to 37° F. The natural conditions are unfavorable for agriculture, and the local crops only partially suffice for domestic demands. Fishing is carried on extensively. Many of the inhabitants are engaged in lumbering. The manufacturing industries are insignificant, and mining is in a state of decline. Population, in 1897, 366,175, or less than seven inhabitants to a square mile. The population is composed chiefly of Great Russians, but there is also a perceptible admixture of Karelians (a race allied to the Finns) and Tchuds. Capital, Petrozavodsk.

OLORON-SAINTE-MARIE, ȃ-lŏ'rŏn' sãnt' má'rŏ'. The capital of an arrondissement in the Department of Basses-Pyrénées, France, 15 miles southwest of Pau (Map: France, F 8). Its principal buildings are the eleventh-century Church of Saint Croix, and in the residential suburb of Sainte Marie, a Romanesque Gothic cathedral also dating from the eleventh century. The town is in an agricultural region, and manufactures leather, flour, and woollens. It is the Roman Iluro; during the Reformation it was a stronghold of Catholicism. Population, in 1901, 9078.

OLOT, ȃ-lŏt'. A small town of Northeastern Spain, in the Province of Gerona, situated among the foothills of the Pyrenees (Map: Spain, G 1). It is the centre of an interesting volcanic region, and is surrounded by 14 volcanic cones. The lava in and around the town is perforated in many places by blowholes, through which continuous currents of cool air are expelled. Population, in 1900, 8017.

OLOZAGA, ȃ-lŏ-thã'gã, SALUSTIANO (1803-73). A Spanish politician, born at Logroño. He studied law, practiced in his native district, Logroño, and in 1831 conspired with other Liberals to assassinate King Ferdinand VII. He fled to France, but returned to Spain after the King's death, was elected to the Cortes, and became a leader of the followers of Queen Maria Christina. In reward for his services, the Queen sent him to Paris as Ambassador (1840). In 1843 he formed a Progressist Ministry, from which opposition on the part of the Cortes forced him to resign. He was threatened with a judicial inquiry into his actions, and again escaped to France, returning to Spain in 1846. Olozaga took a prominent part in the adoption of the Constitution of 1855; received his Ambassadorship in Paris again and held it for ten years, when he was ousted by O'Donnell's revolution. After the deposition of Isabella in 1868, for which Olozaga had striven, he was for the third time appointed French Ambassador.

ÖLS, or **OELS**, ȃls. The capital of a circle in the Province of Silesia, Prussia, and formerly capital of a principality on the Olsbach, 17 miles northeast of Breslau (Map: Prussia, G 3). Its castle, built in 1558, is the property of the Prussian Crown Prince. Among its churches are the Schlosskirche, from the twelfth century, and the Gothic Propstkirche, from the fourteenth century. There are manufactures of agricultural machinery, cloth, wagons, and shoes. Population, in 1900, 10,580. Oels was founded in the tenth century.

OLSHAUSEN, ôls'hou'zen, HERMANN (1796-1839). A German theologian. He was born at Oldesloe, in Holstein, entered the University of Kiel in 1814, and two years later went to the University of Berlin, where the teaching of Schleiermacher and Neander gave direction to his life studies and writings. In 1817 he was awarded the prize at the festival of the Reformation for an essay, *Melanchthons Charakteristik aus seinen Briefen dargestellt* (1818). This essay brought him to the notice of the Prussian Minister of Public Worship, and he was made privat-docent at Berlin in 1820, passing the next year to Königsberg as professor extraordinary, and in 1827 was elected full professor. He removed from Königsberg to Erlangen in 1834. His most notable work is his *Commentar über sämtliche Schriften des Neuen Testaments* (4 vols., 1830; completed and revised by Ebrard and Wiesinger; Eng. trans., 1847-49). An earlier work adducing from the writings of the first two centuries historical proofs of the genuineness of the Gospels is *Die Echtheit der vier kanonischen Evangelien, aus der Geschichte der zwei ersten Jahrhunderte erwiesen* (1823). His method of exegesis is presented in *Ein Wort über tieferen Schriftsinn* (1824), and *Die biblische Schriftauslegung*. In these latter works he rejects the doctrine of verbal inspiration.

OLSHAUSEN, JUSTUS (1800-82). A German Orientalist, brother of the preceding, who made contributions to Semitic and Iranian philology. He was born at Hohenfelde; studied at Kiel, Berlin, and Paris (under De Sacy); and from 1830 to 1852 was professor at Kiel. Removed in the latter year by the Danish Government, which he had energetically opposed, he became professor at Königsberg (1853-58), then councilor in the Ministry of Education, and retired in 1874. Olshausen's more important works are: *Emendationen zum Alten Testament* (1826); *Fragments relatifs à la religion de Zoroastre* (1829), written in collaboration with Julius von Mohl (q.v.); *Die Pehlewi-Legenden auf den Münzen der letzten Sassaniden* (1843); *Lehrbuch der hebräischen Sprache* (1861); *Prüfung des Charakters der in den assyrischen Keilinschriften enthaltenen semitischen Sprache* (1864). Consult Schrader, *Gedächtnisrede auf Fustus Olshausen* (Berlin, 1883).

OLSHAUSEN, ROBERT (1835-). A German gynecologist, son of the Orientalist Justus Olshausen. He was born in Kiel, studied medicine there and at Königsberg, and taught at Halle (1862-77) and at Berlin. He is especially famed as an able operator; as the author of *Diseases of the Ovaries* (Eng. trans., 1887), and of *Klinische Beiträge zur Gynäkologie* (1884); and as the editor of the *Zeitschrift für Geburtshilfe und Gynäkologie*.

OLSHAUSEN, THEODOR (1802-69). A German author and politician, prominent in the Patriotic Party in Schleswig-Holstein, brother of Justus Olshausen. He was born at Glückstadt, studied law at Kiel and Jena, and, for his part in the demagogic disturbances, was forced to live in France and Switzerland until 1830. Then he settled in Kiel, and became an ardent advocate of the independence of the provinces. He was imprisoned in 1846 for his bold opposition, but his influence was all the stronger in the Revolution of 1848, and he became a member of the provisional Government, resigning to enter the Diet. In 1851

he was excluded from the amnesty, went to America, and lived in New York City and Saint Louis until 1865, when he returned to Hamburg. He wrote two popular works on America, *Geographisch-statistische Beschreibung der Vereinigten Staaten* (1853-55, incomplete), and *Geschichte der Mormonen* (1856).

ÖLSNITZ, ôls'nîts. A town in the Kingdom of Saxony, Germany, on the White Elster, 25 miles southwest of Zwickau (Map: Germany, E 3). The ancient Jakobskirche and a handsome Rathaus are the only buildings of note. The town has one of the largest carpet factories in Germany. Corsets, curtains, machinery, varnish, and dyes are also manufactured; and there is considerable trade, especially in cattle. Population, in 1900, 13,606.

OLSSON, ôl'son, OLOF (1841-1900). An American theologian and educator, born in Vermeland, Sweden. He studied at Upsala, became a Lutheran minister in 1863, and in 1869 came to the United States and received a charge in McPherson County, Kan. In 1891, Olsson left his congregation at Woodhull, Ill., to return to Augustana College, Rock Island, Ill., in which he had been professor (1877-88), and of which he now became president.

OLTEN, ôl'ten. A town of the Canton of Solothurn, Switzerland, 36 miles northeast of Bern, on the left bank of the Aar (Map: Switzerland, B 1). The town is an important railway junction, with railway shops, extensive shoe and felt factories, and wool and linen weaving, and is a noted tourist resort. Population, in 1900, 6969.

OLYMPIA (Lat., from Gk. Ὀλυμπία). The scene of the celebrated Olympic games, held every four years by the Greeks. It was situated in the Pisatis, the southeastern district of Elis, at the junction of the Cladeus with the Alpheus. It was never a town, but only a sanctuary with the buildings connected with the worship and the games. The central spot was the *Altis*, or sacred inclosure, an irregular quadrangle about 200 meters from east to west and 175 meters from north to south. On the west and south it was inclosed by a wall in Roman times, and at this period was somewhat enlarged, as there are traces of an earlier inner Greek wall. On the north was the hill of Cronos, the Prytaneion, and the row of *Treasuries*; on the east the *Stadium*, to which a vaulted passage led, the *echo portico* opening into the Altis and southeast building, which seems to have been demolished to make room for a Roman house built for the Emperor Nero. Within the inclosure the chief structures were the temples of Zeus and Hera, the Metroon, the Pelopion, the Philippeion, and the great altars. The oldest place of worship seems to be marked by the remains of a great altar south of the Heraeum, and evidently antedating that temple, as the earth and ashes containing very rude bronzes extended under the foundations. The *Heraeum*, or Temple of Hera, was the oldest temple, and is probably the oldest Doric building known. It was a hexastyle peripteros with sixteen columns at the sides. The walls were of crude brick on a stone foundation and the colonnade was originally of wood, though these columns were gradually displaced by stone, a fact which has led to a great variety in the capitals. In the second century after Christ the building seems to have contained many

ancient relics and works of art, among them the venerable chest of Cypelus, covered with scenes from Greek legend in early Corinthian style, and the Hermes of Praxiteles, the great prize of the German excavations. In the southwestern part of the Altis was the great Temple of Zeus, erected by the Eleans about B.C. 460, and containing the colossal statue of the god in gold and ivory by the Athenian Phidias. The sculptures of the pediments and metopes, though the artists are unknown, and the very school is disputed, are valuable examples of Greek art just before its full development at Athens and Argos. The *Pelopion* was an irregular inclosure consecrated to Pelops. The *Philippeion* was a circular Ionic building, erected by Philip of Macedon after the battle of Chæronea, and containing statues of Philip, his parents, his wife Olympias, and his son Alexander, all by the Athenian Leochares. Besides the buildings, the whole inclosure was filled with statues of victors and votive offerings, conspicuous among which was the Nike of Paionias, on a triangular basis about 30 feet in height, erected by the Messenians and Naupactians shortly after B.C. 425. Outside of the Altis lay the *Palæstra*, or wrestling-school, and the great Gymnasium where all competitors were obliged to train for at least one month. After the suppression of the games (A.D. 394) the decline of Olympia was rapid. To provide a defense against the barbarian invaders, a fort was built in the Altis, of which the Temple of Zeus formed the northwest corner, while to provide material for the wall the other buildings were ruthlessly destroyed. Early in the sixth century of our era the Temple of Zeus seems to have been overthrown by earthquakes, and inundations of the Cladeus covered the plain with gravel. Though a scanty population still inhabited the place, the rivers frequently flooded it, and finally buried the whole field, in some places to a depth of twenty feet. Suggestions as to excavations were made by Montfaucon and Winckelmann, and in 1829 the French expedition to the Morea worked for a time at the Temple of Zeus and secured a few sculptures. The final excavation was due to Ernst Curtius, who aroused the interest of the Prussian Crown Prince (afterwards the Emperor Frederick) and secured the support of the German Government. From 1875 to 1881 the work was carried forward in a masterly fashion, and finally, at an expense of 800,000 marks, the entire Altis and a great part of the surrounding buildings were cleared. Preliminary reports were published yearly under the title *Die Ausgrabungen zu Olympia* (Berlin, 1876-82), but the authoritative publication is *Olympia, die Ergebnisse der von dem deutschen Reiche veranstalteten Ausgrabungen*, 5 vols. text and 4 vols. plates (Berlin, 1891-97). A popular account is Bötticher, *Olympia* (Berlin, 1882). Consult also: Flach, in Baumeister, *Denkmäler des klassischen Altertums*, s. v. Olympia (Munich, 1889); Gardner, *New Chapters in Greek History* (London, 1892); Diehl, *Excursions in Greece* (Eng. trans. London and New York, 1893). Ancient Olympia is described by Pausanias (Books v. and vi.), best consulted in the edition of Hitzig and Blümner (Leipzig, 1901), or the translation and full commentary of Frazer (London, 1898). An attempt at reconstruction is found in Laloux et Monceaux, *La restauration d'Olympie* (Paris, 1889).

OLYMPIA. A city, county-seat of Thurston County, Washington, and capital of the State, 65 miles southwest of Seattle; on the southernmost inlet of Puget Sound, at the mouth of the Deschutes River, and on the Northern Pacific Railroad (Map: Washington, C 2). The new State Capitol is a handsome structure, costing \$400,000, and among other prominent buildings are the county court house, Saint Peter's Hospital, McKenny Block, and the Capital National Bank building. The State Library contains 27,000 volumes. There are two bridges here, that across Budd Inlet being over 2000 feet in length. Olympia is a commercial centre of importance, the port for a considerable area rich in timber, agricultural, and mineral resources. The oyster industry is extensive, and much fruit is grown in the vicinity. The manufacturing interests are promoted by abundant water power, the river, with a succession of three falls, making a descent of more than 80 feet. Lumber is the chief manufactured product, but the city has also iron works, a brewery, a salmon cannery, etc. Settled in 1846, Olympia was laid out in 1851 and was chartered as a city in 1859. Population, in 1890, 4698; in 1900, 3863.

OLYMPIAD (from Gk. Ὀλυμπιάς, *olympias*, from Ὀλυμπία, *Olympia*, Olympia). The period of four years that elapsed between two successive celebrations of the Olympic games (q.v.). The use of Olympiads as a convenient system of chronological reckoning among the Greeks was of comparatively late date. Timæus (c.300 B.C.) seems to have been among the first to date events by Olympiads, and after him the addition of the separate years in the period was introduced. The name of the winner of the foot-race in the games was frequently used with or instead of the number of the Olympiad. The first Olympiad, or that of Coræbus, corresponds with B.C. 776. As the Olympic games did not coincide with the beginning of any calendar year in use among the Greeks, most of the writers call the Attic or Macedonian or some other year in which the games fell the first year of the Olympiad, though even here there are many variations, and the usage of each author must be determined separately. This system is confined to literature, and never appears on coins and only very rarely in late inscriptions. It is sometimes used now by historians in dating Greek events, though commonly the year according to our era is added. The ordinary rule for changing Olympiads to years before or after Christ is as follows: Multiply one less than the number of the Olympiad by 4, add the number of the year in the Olympiad, and subtract this from 777 for dates before Christ, or subtract 776 for dates after Christ. Thus Ol. 81.3 is reduced $(80 \times 4) + 3 = 323$; $777 - 323 = \text{B.C. } 454$; Ol. 218.2 is reduced $(217 \times 4) + 2 = 870$; $870 - 776 = 94 \text{ A.D.}$ Simpler is Unger's rule: to find the first year of any Olympiad multiply the number of the Olympiad by 4 and either subtract from 780 or subtract 779, as the case requires. It should be noted that if the date is from an author who reckons by Attic years allowance must be made for the fact that such years begin about July 1st, so that dates in the spring are in a later Julian year than those in the autumn.

OLYMPIAS (Lat., from Gk. Ὀλυμπιάς). The wife of Philip II., King of Macedonia, daughter of

Neoptolemus I., King of Epirus, and mother of Alexander the Great. She was married to Philip in B.C. 359. When Philip, after neglecting her, separated from her and married Cleopatra, niece of Attalus (B.C. 337), she withdrew from Macedonia and went to reside with her brother Alexander, King of Epirus. It is generally believed that she was implicated to a greater or less degree in the assassination of Philip (B.C. 336). After Philip's death she returned to Macedonia, where she enjoyed great influence under Alexander and helped to bring about the death of Cleopatra and her infant daughter. After the death of Alexander (B.C. 323) she again withdrew from Macedonia to Epirus, where she stayed several years, until the death, in B.C. 319, of Antipater, who had been at the head of affairs in Macedonia, brought her a new opportunity to assert her pretensions to the Macedonian throne. Joining forces with the new regent, Polysperchon, she invaded Macedonia and in B.C. 317 defeated Arrhidæus, the weak-minded stepbrother and successor of Alexander, and his wife, Eurydice, both of whom she caused to be put to death. Being now in power, she followed up her vengeance and executed wholesale slaughter on the Macedonian nobles who had shown themselves hostile to her. Thereupon Cassander (q.v.), her principal adversary, who had previously been in alliance with Eurydice and whose brother Nicanor was one of those put to death by Olympias, marched northward from the Peloponnesus, forced her to take refuge in Pydna, and there besieged her throughout the winter. In the spring of B.C. 316 she was at length compelled to surrender, and was immediately after put to death. Olympias was a woman of fierce and ungovernable passions, jealous, ambitious, and cruel, but having withal something of the spirit and impetuosity of her son Alexander.

OLYMPIC GAMES. The most famous of the four great national festivals of the Greeks. They were celebrated in the sanctuary of Zeus at Olympia (q.v.) every four years, but, owing to the fluctuations of the Greek lunar calendar, the time varied from the beginning of August to the middle of September. At first the contests only occupied a single day, but in later times five or six days were needed to complete the sports. The origin of the games was lost in antiquity, and legend attributed the foundation to Hercules, Pelops, who was worshiped with special honor as a hero at Olympia, and other mythical characters. They were said to have fallen into neglect until King Iphitus of Elis and Lycurgus of Sparta established the 'truce of God' at the celebration of the games and restored them to honor. It was not till much later, however, that the official list of victors began with Coræbus, who won the foot-race in B.C. 776. The authority of the list, however, is small for any period before the fifth century, as it does not seem to have been compiled before that time, and there are many indications that it was not based on ancient records. According to the accepted belief, the earliest and for long the only contest was the *stadion* or short foot-race. In Olympiad 14 (B.C. 724) the *diaulos*, or race of two *stadia*, was introduced, and at the next celebration the *dolichos*, or long run. In the same year the contestants abandoned the loin cloth and appeared naked, a

custom which prevailed ever after. In B.C. 708 the *pentathlon* and wrestling were introduced, in B.C. 688 boxing, and in B.C. 680 the race for four-horse chariots, to which were added in B.C. 648 the race for ridden horses, and the *pancratium*, a combination of boxing and wrestling. In B.C. 632 contests for boys were established, which from B.C. 616 consisted of running, wrestling, and boxing. In B.C. 520 the foot-race for men in armor was added, and in the fourth and third centuries other novelties, especially in horse-racing, were from time to time attempted. From B.C. 396 there was a contest of trumpeters and heralds, and the successful competitor in the latter was allowed to show his skill in announcing the victors in the other contests. During the greater part of their existence the games were in charge of the Eleans, though the city of Pisa, in whose ancient territory Olympia was situated, frequently disputed this right, until early in the sixth century Pisa was destroyed by Elis and Sparta. The chief officials were the *Hellenodikai*, whose number varied from one or two to twelve, though the usual number seems to have been ten. Early in the year of the games envoys from Elis were sent throughout the Greek world to invite the States to join in honor to Olympian Zeus, but at first the games seem to have had merely a local character, though they soon became a national festival. To them the States sent *Theoria*, sacred embassies, to bring their offerings and vie with one another in the splendor of their equipment and entertainment. The crowd of spectators included representatives of all branches of the Greek race, and many barbarians were drawn by the reputation of the spectacle. Merchants and traders were there in abundance, while poets, orators, and artists exhibited their powers to a gathering which could easily secure a world-wide fame to a successful display.

The competitions were open only to those of Greek descent, and free from taint of impiety, blood-guiltiness, or grave breach of the laws. All contestants were required to train faithfully for ten months before the games, while the last thirty days must be spent at Elis under the eyes of the officials, though it is possible that this was only required of novices. Just before the games the list of entries was prepared, and from that time withdrawal was punished with heavy fines. The order of the events is uncertain, and possibly varied at different times, but the first athletic contest was almost certainly the *stadion*, and the name of this victor served to designate the Olympiad. The first day of the festival was given to sacrifices, especially to Zeus, while the officials and contestants took a solemn oath, the former to judge fairly, the latter that they had observed the prescribed training and would compete with fairness. The second day probably began with the foot-races, and for these the crowd gathered in the *Stadion*, an oblong plain inclosed by sloping banks of earth. The course was marked at both ends by a marble sill, about 80 feet long and 18 inches wide, in which were two grooves to give a foothold in starting. The finish was always at one end, but the starting point varied for the single and double courses. The length of the course was 600 Olympic feet of 0.32045 meter, or about 630 English feet. In the long run the double course seems to have

been covered twelve times. Another group of contests was formed by wrestling, boxing, and the pancratium. In the first, the object was to throw the antagonist three times, but the struggle was not continued on the ground. Boxing became more and more brutal, for while at first the pugilists wound straps of soft leather over the fingers as a shield and to deaden the blows, in later times hard leather, sometimes even weighted with metal, was used. Still the highest praise was won by athletes who owed their success to such perfect defense that they exhausted their opponents without striking a blow or receiving a scratch. In the pancratium, the most severe of the sports, both wrestling and boxing were employed, and the contest continued until one of the contestants acknowledged his defeat. For these contests the competitors were paired by lot, and it was regarded especially creditable to pass through the successive rounds without the rest afforded by drawing a bye, which might occur whenever the number of contestants was uneven. The horse-races were run in the Hippodrome (q.v.), of which no traces have been discovered, but which is said to have had a length of four stadia. As this would mean that a complete circuit was nearly a mile, and as we are told that the four-horse chariots made twelve circuits, it follows that the race must have been far more a test of endurance than of speed, or else, which is more probable, that these figures have suffered in transmission. This sport was naturally confined to the wealthy, but was very popular, and the successful owner received high honor in his State, while princes commemorated their victories on their coins. After the horse-racing came the *pentathlon*, or five-fold competition in running, jumping, throwing the javelin and the discus, and wrestling. The exact order of the competition and the method of determining the winner are unknown, but it is clear that it was necessary to show decided all-round ability. The running was the short race, or Stadion, and the jumping was for distance, not height, but was probably analogous to the modern hop, step, and jump, for the ground was softened to a distance of 50 feet, and we hear of two men who cleared 52 and 55 feet, respectively. The javelin was a light spear, and was thrown with the aid of a strap which was wrapped about the shaft, by which a rotary motion and greater distance and accuracy was secured. The discus was a plate of bronze, probably lens-shaped, and much heavier than the one now in use in athletic games ($4\frac{1}{2}$ pounds), as the best throw recorded is 95 Olympic feet. The last event of the games seems to have been the race in armor, twice the length of the Stadion. At first the runners wore the full armor of a hoplite, but later they carried only the shield. On the last day of the festival the victors received in front of the temple the crowns of wild olive from the sacred tree, which were the only prize, and afterwards were banqueted by the State of Elis at the Prytaneion. The victor returned home in triumph to enter the city in a chariot, often through a breach in the walls, with songs and processions. His praises were sung by poets, and in many cities he lived thereafter at public expense.

The games were at their height during the fifth and fourth centuries, when the contestants

were of the best blood in Greece. Gradually, however, a change took place, as the training became more and more a profession, and in Roman times, although the crowds and the splendor continued, the competitors were nearly all the professional athletes against whose mode of life physicians and moralists alike directed their censure. Yet the games continued until A.D. 394, when they were finally suppressed by the Emperor Theodosius, supposedly on the ground that they were opposed to the interests of Christianity.

MODERN OLYMPIC GAMES. Largely owing to the efforts of the Baron Pierre de Coubertin, a number of individuals banded themselves together and organized an International Athletic Committee, which held its first meeting in Paris in 1895. The object of the committee was to reestablish the Olympian games by organizing a series of athletic contests to be held once in every four years, and to take place at such time and in such country as the International Committee might decide. The first games in the modern series were held at Athens in 1896, the ancient Stadium, which had been specially prepared for the purpose, serving as the theatre. The patriotic munificence of a wealthy Greek of Alexandria (George Abéroff), together with the efforts of the Greek national committee, under the Crown Prince Constantine, alone made this possible. The different competitions were for the most part open to the world. The second and more important festival was held at Paris in 1900, the games being divided into ten sections, as follows: Athletic sports and games; gymnastics; fencing; shooting; equestrian sports; cycling sports; motor car racing; aquatic sports; firemen's drill; and ballooning. A conspicuous feature was the large number of American entries, to secure which the authorities had purposely delayed the date of the games. It was announced that the 1904 games would be held in the United States. Consult: Krause, *Olympia, oder Darstellung der Olympischen Spiele* (Vienna, 1838), which is still of value; Bötticher, *Olympia; Das Fest und seine Stätte* (2d ed., Berlin, 1886); Mommsen, *Ueber die Zeit der Olympien* (Leipzig, 1891); Stengel "Die griechischen Kultusaltertümer," in Müller's *Handbuch der klassischen Altertumswissenschaft* (Munich, 1898); Gardner, *New Chapters in Greek History* (London, 1892).

OLYMPIODORUS (Lat., from Gk. Ὀλυμπιόδωρος). (1) An historian of the fifth century A.D., born at Thebes in Egypt, who continued the work of Eunapius. In his history (*Ἱστορικὸι λόγοι*), in twenty-two books, he covered the period A.D. 407-425. Only a fragment has been preserved to us by Photius.

(2) An Alexandrian philosopher of the fifth century A.D., famous for his knowledge of Aristotelianism and as the master of Proclus.

(3) One of the latest of the Alexandrian Neo-Platonists who lived in the sixth century A.D., during the reign of the Emperor Justinian. Of the details of his life we know nothing. Of his writings we possess a life of Plato with commentaries on several of the Platonic dialogues. In these he shows himself to have been a man of large learning and of acute thought. His *Life of Plato* is best edited by Westermann

(Berlin, 1850). The scholia are edited by Fincke (Heilbronn, 1847).

(4) An Alexandrian Peripatetic who flourished in the latter half of the sixth century A.D. His commentary on Aristotle's *Metecorology* is still extant, edited by Stüve (Berlin, 1900).

OLYMPUS (Lat., from Gk. Ὀλυμπος). The ancient name of several mountains or chains of mountains—e.g. of one in northeastern Mysia, of two peaks in the island of Cyprus, of others in Lycia, Lydia, Cilicia, Lesbos, Elis, another in Laconia, commonly called Lycaon, and, most famous of all, one on the boundary between Thessaly and Macedonia. The last is the highest peak (9754 feet) and greatest mountain mass in Greece, and early appears as the seat of the gods. The mountain is precipitous and rugged, especially toward the sea, but on the lower slopes is well wooded, though the upper part is bare rock, which is snow-covered during a large part of the year. Even in the Homeric poems is found a transference of the Olympus of the gods from the actual summit of the Thessalian mountain to a heavenly region free from snow and storm, and filled with dazzling light. It lies above the heaven, though in later usage it seems often indistinguishable from it. This begins in Æschylus and Pindar, and characterizes the later poets, except when they are copying Homer. Traces of the old belief are still found among the peasants who live at Olympus, and who tell of strange palaces on the mountain, or magic virtues in its air. Consult Henzey, *Le Mont Olympe et l'Acarnanie* (Paris, 1860).

OLYNTHIAC ORATIONS. Three speeches of Demosthenes in warm support of the citizens of Olynthus who besought Athens for aid when Philip laid siege to the city. The orations were delivered in Athens in B.C. 349.

OLYNTHUS (Lat., from Gk. Ὀλυνθος). A Greek city in Chalcidice (q.v.), at the northern end of the Toronaic Gulf. It was one of the numerous colonies sent out to that region by the Chalcidians and Eretrians of Eubœa. In the autumn of B.C. 480 it was sacked by Artabazus, the Persian general who had accompanied Xerxes in his retreat. Reestablished by Chalcidians of Torone, it first became prominent as the head of the Chalcidians in their revolt from Athens (B.C. 432). The inhabitants of neighboring villages gathered within its walls, and when Brasidas appeared the town supported him heartily. During the Peloponnesian War and the early part of the fourth century the region was little disturbed, and Olynthus became the head of a confederacy, which can almost be called a federal State. Treaties and wars with the Macedonians resulted in such an increase of power that Apollonia and Acanthus, which the Olynthians wished to force into the league, and Amyntas of Macedon appealed to Sparta for support. A powerful Spartan force invaded the Chalcidian Peninsula, and after some reverses the city was forced to surrender (379), and the confederacy was broken up. Olynthus still remained powerful, but the chief check to the growth of Macedon was removed. Philip, son of Amyntas, at first won the friendship of Olynthus by the gift of Potidæa, which he had taken from Athens, but later hostility arose, and the Olynthians sought an alliance with Athens. Though Demosthenes in his three famous Olynthiacs urged prompt and energetic

action, the Athenian succors were inadequate and tardy. In 348 Philip, aided by traitors within, seized the city, leveled it to the ground, and sold the inhabitants into slavery.

OLYPHANT, ɔl'f-ant. A borough in Lackawanna County, Pa., five miles northeast of Scranton; on the Lackawanna River, and on the Delaware and Hudson and the New York, Ontario and Western railroads (Map: Pennsylvania, F 2). It is engaged extensively in mining and shipping coal, being in the heart of the anthracite region of the State, and in manufacturing blasting powder. Settled in 1857 and incorporated twenty years later, Olyphant is governed by a burgess, elected every three years, and a borough council. The electric light plant is owned by the municipality. Population, in 1890, 4083; in 1900, 6180.

OM, ɔm. A Sanskrit sacred syllable, to which especial sanctity and mystic significance is attached. It seems originally to have been an exclamation, an emphatic assent, or solemn affirmation, and instances of its use in that way may be cited early in connection with Vedic literature. Perhaps it was primarily nothing more than an emphatic *o* with gradual lip-closure ending in a nasal murmur. According to Manu, the syllable must be uttered at the beginning of every Vedic recitation and pronounced again at its close; otherwise the sacred knowledge and its merit will slip away, be lost, or prove of no avail. Indian tradition plainly looks upon the word *om* as a composite of three elements (*a-u-m*), and as containing the very essence of the three canonical Vedas, and especially in later times *om* was regarded as the equivalent or mystic designation of the Hindu Trinity, symbolizing in a word the union of the three great divinities, Vishnu, Siva, and Brahma. See also OM MANI PADME HUM.

OMAGH, ɔ-mä' (Ir. *Oigh magh*, Seat of the chiefs). The capital of Tyrone County, Ireland, on the Strule, 34 miles south of Londonderry (Map: Ireland, D 2). Its public buildings include a handsome court house, where the county assizes are held, endowed and national schools, a district lunatic asylum, a workhouse, and a barrack station. Its trade is chiefly in brown linens, corn, and agricultural produce. Omagh grew up around an abbey founded in the year 792, but is first heard of as a fortress of Art O'Nial at the end of the fifteenth century, about which time it was forced to surrender to the English. Population, in 1901, 4789.

OMAGUA, ɔ-mä'gwä, or CAMBEVA. A famous and powerful tribe of Tupian stock (q.v.), formerly centring chiefly about the Marañon (Amazon) from the Javary to the Ica, on the Peru-Brazil frontier, but now mostly retired to the headwaters of the Yapura and Uaupes, South-eastern Colombia. Both names signify 'Flat-heads,' in allusion to a custom practiced in the tribe. At the time of the Spanish conquest the Omagua were reputed to be the richest and most civilized tribe east of the Cordilleras, with cities, temples, and stores of golden treasure. Three successive attempts were made to conquer their country in 1536, 1541, and 1560, but in each case the invaders were driven back with loss. In 1645 the Jesuit missionary Cujia entered their territory, and after several years of hard work succeeded in gathering them into

villages along the Amazon. Forty years later these mission villages numbered forty, all in flourishing condition, and continued to prosper in spite of attacks by Portuguese slave-hunters, until the expulsion of the Jesuits from the Spanish colonies in 1767. The mission settlements were gradually broken up, and the Indians retired to the forests and relapsed into their original condition.

They still maintain their reputation as a superior tribe, being of fine physique and light complexion, intelligent, industrious, honest, kindly, and cleanly in house and person. They bury their dead in large earthen jars beneath the floors of their huts, the relatives wailing constantly for a month after the funeral. Young men are subjected to a whipping ordeal to try their fortitude, while girls are hung up in a net over a smoldering fire. They have long since abandoned the practice of head-flattening. Our knowledge of caoutchouc or india-rubber was derived first from this tribe.

OMAHA, ó'mà-ha. An important Siouan tribe, formerly claiming an extensive territory on the west side of the Missouri, between the Platte and Niobrara, within the present limits of Nebraska, and now gathered, together with the Winnebago, upon a reservation in the north-eastern part of that State. The name signifies 'upper-stream' people, in distinction from the Quapaw, or 'down-stream' people. They speak a dialect of the same language used also by the Ponca, Quapaw, Kaw, and Osage, from whom, according to their tradition, they separated at no very distant period. They made a treaty of peace and alliance with the Pawnee in 1800, but were constantly at war with the Sioux, from whom they repeatedly suffered until the United States Government interfered and put a stop to hostilities. In spite of war and smallpox, they have held their own in population, and number now about 1200, being slightly on the increase, while the Winnebago, on the contrary, are decreasing. Their agent reports them as prosperous and steadily improving in industry and civilized habit. The majority still occupy the circular long house, covered with earth, formerly common to the semi-sedentary tribes of the Upper Missouri region.

OMAHA. The largest city of Nebraska and the county-seat of Douglas County, 492 miles west by south of Chicago, Ill.; on the Missouri River, opposite Council Bluffs, Iowa, and on the Burlington Route, the Chicago, Milwaukee and Saint Paul, the Chicago, Rock Island and Pacific, the Chicago, Saint Paul, Minneapolis and Omaha, the Fremont, Elkhorn and Missouri Valley, the Chicago and Northwestern, the Illinois Central, the Missouri Pacific, and the Union Pacific railroads (Map: Nebraska, J 2). The great bridges across the Missouri are among the sights of the city. These unite it, through Council Bluffs on the east side, with a great radiating system of railways to all points eastward. A belt line encircles the city, affording railway intercommunication.

Omaha is finely situated on a plateau, rising into bluffs which are largely used for residence sites, the business district lying adjacent to the river. From its important position, with reference to the West, it has been called the 'Gate City.' It occupies an area of 24½ square miles

at an elevation of about 1030 feet above sea level, and 80 feet above the river, and has broad streets, of which 85 miles are paved. The public park system, nearly 600 acres in extent, includes the more notable Hanscom, Riverview, Bemis, Miller, and Elmwood parks, and Jefferson Square. Omaha is the seat of Creighton University (Roman Catholic), founded in 1879, of Bellevue College Theological Seminary, Creighton Medical College, Omaha Medical College, Nebraska College of Pharmacy, Brownell Hall, Academy of the Sacred Heart, and Saint Catherine's Academy, and has several libraries. The Public Library contains more than 55,000 volumes, and is located in one of the prominent buildings of the city. Other architectural features are the city hall, county court house, United States Government Building, high school, New York Life Insurance Building, office of the *Omaha Bee*, Paxton Block, the Exposition Building, the Coliseum (a large convention hall), and Protestant Episcopal and Roman Catholic cathedrals. The State School for the Deaf is in the city, and there are also several well-equipped hospitals, among which particular mention may be made of Saint Joseph's, Presbyterian, Methodist, and Immanuel (Swedish) hospitals. Omaha is the seat of the United States military headquarters of the Department of the Platte. The city has extensive shops of the Union Pacific Railroad, and one of the most complete establishments in the country for smelting and refining the ores of gold, silver, copper, lead, and zinc which come from the mining regions along the line of the Union Pacific and other railways. The meat-packing industry, represented by five separate plants located in South Omaha (q.v.), has assumed an extent excelled only by Chicago and Kansas City. Other manufactures include linseed oil, white lead, carriages, malt and distilled liquors, boilers and steam-engines, and bricks. The trade in live stock, grain, lumber, dry goods, and groceries is enormous, due to the city's excellent facilities for transportation.

The government is vested in a mayor, chosen every three years; a unicameral council; and in subordinate administrative officials, appointed by the executive with the consent of the council. The board of education, composed of 15 members, is independently elected by popular vote. Omaha spends annually, in maintenance and operation, nearly \$1,500,000, the principal items being about \$375,000 for schools, \$295,000 for interest on debt, \$120,000 for the fire department, \$80,000 for the police department, and \$80,000 for municipal lighting. The city carries (1901) a bonded debt of over \$5,600,000. Population, in 1860, 1883; in 1870, 16,083; in 1880, 30,518; in 1890, 140,452; in 1900, 102,555, including 23,600 persons of foreign birth and 3400 of negro descent.

In 1804 Lewis and Clark held a council with the Indians on or near the present site of Omaha, and in 1825 J. B. Royce, a fur-trader, built here a stockade and trading station, which, however, soon fell into decay. The first permanent settlement was made in 1854, and from that date to 1867 Omaha (so called from the Omaha Indians, a tribe of the Dakotas) was the capital of Nebraska. It was incorporated as a city in 1857. The growth of Omaha was greatly accelerated by the construction of the Union

Pacific Railroad, work on which was begun here in 1864. Previous to its completion Omaha was the most northerly outfitting place for overland wagon trains to the 'far West.' From June 1 to November 1, 1898, the great Trans-Mississippi and International Exposition was held here. Consult: Savage and Bell, *History of the City of Omaha* (New York, 1894); Sorensen, *Early History of Omaha* (Omaha, 1876); Powell, *Historic Towns of the Western States* (New York, 1901).

O'MAHONY, ô-mă'ô-nă. JOHN FRANCIS (1816-77). An Irish politician, born at Kilbeheny, County Limerick. He received a good education at a classical school in Cork and at Trinity College, Dublin, though he never took a degree. Early in his career he became deeply impressed with a sense of the wrongs of Ireland, and practically his whole life was devoted to efforts to free her. He was a 'repealer,' but was more radical than O'Connell, and in 1845 seceded with the 'Young Irelanders.' He joined in the insurrection of Smith O'Brien in 1848, and after its failure fled to France, where he lived for some years in great poverty. In 1852 he went to New York, and there in 1858 was a member of the committee that sent a delegate to James Stephens in Dublin with proposals for the founding of the secret society later known as the Fenian Brotherhood. O'Mahony was one of the most active and influential promoters of the organization, and was for a time its president. In his later years he had a hard struggle to secure the bare means for subsistence. He died in New York in 1877, and his body was taken back to Ireland and buried in Glasnevin Cemetery, near Dublin, with great honors. In 1857 he published *The History of Ireland by Geoffrey Keating, D.D., Translated from the Gaelic and Copiously Annotated*. Consult Webb, *Irish Biography* (Dublin, 1888), and articles in the *Celtic Magazine* (New York).

OMALIUS D'HALLOY, ô-mă'lă-ys' dă'lwă', JEAN BAPTISTE JULIEN, Baron d' (1783-1875). A Belgian administrator and geologist, born at Liège. He was appointed successively sub-intendant of the Arrondissement of Dinant (1814), general secretary of the Province of Liège (1815), and Governor of the Province of Namur (1815), and in 1848 was elected to the Senate. Geology was his avocation, and in recognition of his scientific work he was elected in 1816 a member of the Academy of Brussels, and in 1842 a corresponding member of the Academy of Sciences at Paris. In addition to many contributions to the bulletins of the Academy of Brussels and to technical journals, he published a *Description géologique des Pays-Bas* (1828); *Éléments de géologie* (1831; 3d ed. 1839); *Introduction à la géologie* (1833); *Coup d'œil sur la géologie de la Belgique* (1842); and other volumes.

O'MALLEY, CHARLES. The hero of Charles Lever's novel of the same name. The original of the character was an officer in an Irish regiment, Francis G. Keogh, who came to America after the appearance of the book, and is buried in Toronto, Canada.

O'MALLEY, GRACE. An Irish chieftainess. See GRAINNE NI-MHAILE.

O'MALLEY, THADEUS (1796-1877). An Irish Roman Catholic priest and political writer, born at Garryowen, near Limerick. After his ordina-

tion in 1819 he went to America. In 1827 he was suspended on account of his ecclesiastical views, and returned to Dublin to be assistant priest of the cathedral. The first object of his pamphleteering was to obtain a poor law for Ireland, the second to improve the national school system, of which he published his opinion in *A Sketch of the State of Popular Education in Holland, Prussia, Belgium, and France* (2d ed. 1840). Founder of the *Social Economist* (1845), he used a later newspaper which he started, called the *Federalist*, for the advocacy of his views, which differed from O'Connell's in their disapproval of complete severance from England and belief that recourse to arms was necessary to accomplish the ideal federal union. O'Malley tried unsuccessfully to unite O'Connell's Old Ireland Party with his own Young Irelanders, and after 1870 he was a conspicuous home rule advocate, but, though orthodox in faith, was frequently rebuked by his superiors in the Church for the freedom with which he criticised their discipline in such works as his *Harmony in Religion* (1870). His last book was *Home Rule on the Basis of Federation* (1873).

OMAN, ô-măn'. An independent sultanate occupying the southeastern end of the peninsula of Arabia. It reaches along the Persian Gulf, the Gulf of Oman, and the Arabian Sea from El Hasa to the Hadramaut region (Map: Asia, E 6). The area is about 80,000 square miles. The boundaries in the interior are very indefinite, the authority of the ruler of Oman being recognized only over a small portion of the territory nominally embraced in the sultanate. The region along the coast is very mountainous, rising in its highest peaks probably to about 10,000 feet. Behind the mountain chains the country gradually passes into the great desert of Arabia. The most favorable part of the country is in the central valleys, which are characterized by a temperate climate and rich vegetation. The chief products are dates, which constitute the main article of export, and other fruits. Pearls and mother-of-pearl and fish are also of some commercial importance. The chief port is Muscat (q.v.). The exports and imports of Oman amounted in 1900-01 to \$1,359,893 and \$3,365,883, respectively. The imports consist of rice, cotton goods, coffee, sugar, silk, arms, ammunition, etc.

The population is estimated at 1,500,000, and consists of several tribes of Arab origin, partly nomadic. The negro element is very numerous. At present Oman is practically under the protection of Great Britain. A British resident is stationed at Muscat, the capital.

HISTORY. Muscat was taken by the Portuguese in 1508 and remained in their hands until the middle of the seventeenth century, when the Arabs of the interior secured possession of it. The imams or sultans of Muscat afterwards made extensive conquests in Eastern Africa, including Zanzibar, Mombas, and Quiloa. Oman was at the climax of its power and commercial prosperity in the first half of the nineteenth century, when the authority of the imams or sultans of Muscat extended over the Persian territories of Laristan and Mogistan, the islands of Kishm, Bahrein, and Ormuz, the important town of Bender Abbas, part of the coast of Baluchistan, and a long strip of African coastland, including Zanzibar, Mombasa, and Quiloa, together with the

island of Socotra. The present ruling family originated in Yemen and was first established in the imamate in the person of Ahmed ibn Said in 1741. The rise of the Wahabi power in Nedjed (see ARABIA) resulted in considerable loss of territory. In 1856, on the death of Sultan Said, his possessions were divided between his two sons, one receiving the African territories and the other Muscat with the Persian possessions. These last were lost in 1875. Sultan Thuwany, who succeeded in Muscat, was assassinated in 1866 by his son Selim, who reigned but a short time, and was driven out by his uncle, Seyyid Turki ibn Said. In 1888 the latter was succeeded by his son, Seyyid Feisal ibn Turki. The relations of Oman with Great Britain have been most friendly. The power of the Imam is exercised very little beyond the capital, Muscat, the name of which is therefore probably better known in popular usage than that of the whole State. Consult *Sahib-ibn-Razik, History of the Imams and Seyyids of Oman*, from the Arabic by Badger (London, 1781).

O'MAN, CHARLES WILLIAM CHADWICK (1860—). A British historian, born at Mozufferpore, India. He was educated at Winchester and at New College, Oxford, in 1883 became a fellow of All Souls' College, Oxford, and in 1900 deputy professor of modern history in the university. Among his published works are: *A History of Greece* (1888); *A Short History of the Byzantine Empire* (1892); *A History of Europe 476-918* (1893), in the "Periods of European History" Series; *A Short History of England* (1895); *A History of the Art of War in the Middle Ages* (1898); and *Seven Roman Statesmen* (1902).

O'MAR (Ar. 'Umar ibn al-Khaṭṭāb). The second Mohammedan Caliph. He was born about 581. Before the year 617 he opposed the Prophet, but in that year he was won over to the new faith and became one of its ablest supporters. He was associated with Abu-bekr as one of his principal advisers, and on the death of Abu-bekr in 634 succeeded as Caliph, and pushed on the wars of conquest which had been undertaken by his advice, with increased vigor. The beginning of his reign was signalized by the victory of Cadesia (635) over the Persians. By 637 Omar had completed the conquest of Syria and Palestine. In 639 he sent Amru to invade Egypt. In 641 Alexandria fell, and the country passed from the Greeks to the Saracens. He was summoned to Jerusalem in 637 to receive the keys of that city. Barca and Tripoli were next subdued by Amru. Armenia was overrun in 641, and about the same time the victory of Nehavend brought Persia under the sway of the Arabs. In 644 Omar was assassinated in the mosque of Medina by a Persian slave from motives of revenge. He lingered five days after receiving the wound, but refused to appoint a successor, and named six commissioners who were to choose one from among themselves. He was buried in the mosque of Medina, near the Prophet and Abu-bekr, and his tomb is still visited by pilgrims. Omar may be called the organizer of the Mohammedan power, as from a mere sect he raised the followers of Islam to the rank of a conquering nation, and left to his successor an empire. He was the founder of many excellent institutions; he assigned a regular pay to his soldiers, and made

some excellent regulations for the more lenient treatment of slaves. He originated the practice of dating from the era of the Hejira (q.v.). See references under CALIPHS and MOHAMMEDANISM.

OMAR, MOSQUE OF. A structure on the site of the ancient temple on Mount Moriah at Jerusalem (q.v. for illustration), said to have been built by the Caliph Omar. It is octagonal and constructed of colored marbles and tiles. It contains the 'Sacred Rock,' formerly looked upon by the Jews as the site of the intended sacrifice of Isaac and of the altar on which the sacrifices of the temple were offered. In Mohammedan belief, the rock was the scene of the Prophet's ascension to heaven and bears the imprint of his feet.

OMAR KHAYYAM, ō'mār kī-yām' (?-1123). A Persian poet and astronomer. He was a native of the city of Nishapur in Khorasan. The date of his birth is not known, but it was probably before the middle of the eleventh century. His full name is given as Ghiyath ad-Din Abul-Fath Umar ibn Ibrahim-al-Khayyami. The name Khayyam, 'tent-maker,' seems to have been derived from his father's occupation.

There are a few general points known about his life. He had a good education for his time, and the excellence of his memory is proved by a report that he could recite by heart, without a mistake, a book when he had read it over seven times. His special training was acquired from an aged teacher of Nishapur, the Imam Muaffak. There is a persistent tradition that two of Omar Khayyam's fellow-students were Nizam ul-Mulk and Hassan ben Sabbah; the former of these was destined to become famous as the Grand Vizier of Alp Arslan, the latter infamous as the founder of the order of 'Assassins.' There are chronological difficulties in the way of making these three persons contemporaries in their youth, and this has led generally to a rejection of the story. The tale runs thus: The three collegians entered into a compact that whichever should first attain to fortune should aid the other two likewise to success. Nizam ul-Mulk's talents and skill elevated him to the position of Grand Vizier to Alp Arslan. Not forgetful of the pledge, he raised Hassan to a position at Court which the latter soon abused. On Omar Khayyam, apparently by Omar's own preference, Nizam ul-Mulk arranged to bestow an annual stipend of 1200 *mithkals*, or about \$3000 a year, to enable him to follow his chosen pursuits. On the death of Alp Arslan and the accession of Jalal ad-Din Malik Shah, Omar Khayyam repaired from Nishapur to the new Sultan's capital, which was then at Merv, and received the appointment of Astronomer Royal to the Court. He was engaged with seven other scientists to reform the calendar, which resulted in the adoption of a new era, the Jalalian, or in Persian *Tarikh-i-Jalāl*, or *Malik-Shāhi*. This mode of reckoning dated from March 15, 1079 (tenth Ramazān, A.H. 471). His work on this commission was doubtless in large part only through collaboration, but the results of it are embodied in a series of astronomical tables known as *Zij-i Malik-Shāhi*. Besides this work three other mathematical contributions bear Omar Khayyam's name: an unedited monograph on extracting the square and cube roots, and another on 'Some Difficulties of Euclid's Definitions,' while his Algebra, translated by Wærpeke in 1851, was important in the history of mathe-

matics. It was as an algebraist that Omar made his most noteworthy contribution to science. In this respect, he stands out as the most notable mathematician of his time. He was the first to attempt a systematic classification of types of equations of the first three degrees, and to consider cubics from the standpoint of the general equation, rather than as means for solving specific geometric problems. While he could solve certain cubics, he was not able to find a general solution. Biquadratics he asserted to be insoluble by geometry, the method always thought necessary for the cubic until after his time. He also knew the rule for expanding a binomial for positive integral powers, a rule afterwards perfected by Newton as the binomial theorem (q.v.).

In still other scientific lines Omar Khayyam's intellectual activity found expression; he composed three different books on subjects of natural science, and three likewise on metaphysics. But it is on his verses as the author of the *Rubā'iyāt*, or quatrains, that his name will live.

The first Occidental mention of the *Rubā'iyāt*, or renowned collection of quatrains, is found in Hyde, *Historia Religionis Veterum Persarum*, pp. 498-500 (Oxford, 1700), but neither this allusion nor notices by Sir Gore Ouseley and others attracted any special attention. It remained for Edward FitzGerald (q.v.) to introduce Omar to the West through a version of a hundred of the quatrains. The version is indeed a paraphrase, yet often very close, and it has caught almost exactly the spirit of the original. FitzGerald boldly ventured to rearrange the hundred stanzas that he chose so as to give in a sort of sequence the development of the poet's changing moods. There is no standard manuscript to serve as a norm, and in the manuscript the quatrains are simply arranged in the alphabetic order of the final letter of the rhyme without reference to content. It is not even actually known how many of the quatrains are really Omar's. Over five hundred of these four-line stanzas are found, in different works and manuscripts, ascribed to him. Their tone is varied. In some the note is that of revolt against the Divine Master, whose power the slave must nevertheless acknowledge. A number of the quatrains revile the Sufis, yet after all Omar had been trained under Sufi influence, and so may not be wholly free from the mystic tinge. A strain of pantheism runs through many quatrains; while the song of the nightingale, its devotion to the pallid rose whose cheek the spring-time causes to blush; the pleasures of love; and the joy of the fleeting hour darkened by the knowledge of inevitable death, give a tenderness to others that is truly poetic. The tone of much of Omar's verse was justly regarded as heretical by orthodox Mohammedan Persia; it is often debatable in the West whether the wine and the wine cup be symbolic or Anacreontic. Perhaps the latter is nearer the truth, although some allowance will be made by those who are acquainted with the mystic poetry of Hafiz, Jami, Nizami, or Jalal ad-Din Rumi.

The date of Omar Khayyam's death is not certain. The year is given as A.D. 1111 (A.H. 505) or as A.D. 1123 (A.H. 517); the latter, however, is much more probable. The story goes that he had prophesied that his grave would be at a place where a fruit tree should shower blossoms

upon it; and this has been fulfilled, for his tomb at Nishapur is in the midst of a garden of roses, sheltered by fruit trees and bays.

BIBLIOGRAPHY. The Algebra of Omar Khayyam was edited and translated by Wæpke, *L'algebre d'Omar Alkhayyâmê* (Paris, 1851). An almost complete bibliography of manuscripts, editions, translations, and imitations of the Quatrains is given by Dole, *Rubaiyat of Omar Khayyam* (Boston, 1896). FitzGerald's rendering into English verse has been constantly reproduced since the first edition at London in 1859. More important from a scholarly point of view are the edition of five hundred quatrains with a metrical text translation, by Whinfield (2d ed., London, 1893), and the elaborate translation, keeping the metrical tricks of the original, by Payne, *The Quatrains of Omar Khayyam, Now First Completely Done into English Verse from the Persian, with a Biographical and Critical Introduction* (ib., 1898); and Heron-Allen, *The Rubaiyat of Omar Khayyam: A Facsimile of the Manuscript in the Bodleian Library, Translated and Edited* (Boston, 1898). The convenient reissue of FitzGerald with a commentary by Batson, and a biographical introduction by Ross, *The Rubaiyat of Omar Khayyam* (New York, 1900), is also of considerable interest. The mysticism of Omar's poetry is ably treated by Bjerregaard, *Sufi Interpretations of the Quatrains of Omar Khayyam and FitzGerald* (ib., 1902).

OMAR PASHA, ô'mâr pâ-shâ'. A Turkish general. See OMER PASHA.

OMBAY, ôm-bî'. One of the smaller of the Sunda Islands, situated near the eastern end of the group, 40 miles north of Timor and 200 miles southeast of Celebes (Map: Australasia, E 3). Area, 892 square miles. It is mountainous and volcanic, and inhabited almost exclusively by savage tribes of a mixed Malay and Papuan race. At Allor, on the northwest coast, is a Dutch settlement with some trade in wax, pepper, and edible birds' nests.

OMBOS (Gk. Ὀμβοι, *Omboi*). An ancient Egyptian town on the eastern bank of the Nile in latitude 24° 28' N., about ten miles south of the Jebel Silsileh. The site, which has long been uninhabited, bears the modern Arabic name of Kôm Ombô, 'the hill of Ombo.' The top of the hill forms a broad plateau upon which are the ruins of the town and of its fine temple buildings. In spite of its excellent strategic position upon an elevation commanding both the river and the route to Nubia, Ombos seems to have been a town of no special importance in the earlier period of Egyptian history. Under the Ptolemies, however, it advanced rapidly, was made the capital of the newly formed nome of Ombites, and continued to flourish down to a late period under the Roman Empire. The temple buildings, which date from the Ptolemaic period, formerly stood within an inclosure surrounded by a brick wall. Traces of this wall and a portion of the pylon forming the entrance to the inclosure yet remain. The court of the great temple, dedicated to the crocodile god Sobk and to Haroeris, was formerly colonnaded on three sides, and at its upper end, several doors give entrance to a hypostyle hall opening by two doors into a smaller hall, from which three successive antechambers lead to the two sanctuaries. The latter are placed side by side, that of Sobk on the right and that

of Haroeris on the left. Adjoining the antechambers and sanctuaries are a number of smaller chambers and corridors. A long corridor, starting from the upper end of the hypostyle hall, surrounds the inner portion of the temple, and outside of this a similar corridor runs parallel to it between the outer and the inner walls of the edifice. The reliefs adorning the walls and columns of the temple are inscribed with the names of Ptolemaic kings and Roman emperors. In front of the great temple stands the ruined birth-house built by Ptolemy Euergetes II.; to the right is a small temple dedicated to the goddess Hathor by the Emperor Domitian. Consult: *Déscription de l'Égypte* (Paris, 1820-30); Dümichen, *Geschichte des alten Aegyptens* (Berlin, 1878); Mariette, *Monuments of Upper Egypt* (London, 1877); De Morgan, *Kom Ombo* (Vienna, 1894).

OMDURMAN, ʾom-dūr'mān. The former capital of the successor of the Mahdi, situated on the left bank of the White Nile opposite Khartum (q.v.) (Map: Africa, H 3). It extends for a long distance along the river, and is believed to contain a population of 60,000. Omdurman is noted as the place where the Dervishes were overwhelmed by the Anglo-Egyptian troops under Lord Kitchener on September 2, 1898.

O'MEARA, ʾo-mā'rā, BARRY EDWARD (1786-1836). An Irish surgeon, notable from his connection with Napoleon I., whom he accompanied to Saint Helena as household physician. At the age of eighteen he entered the British Army as assistant surgeon, afterwards transferring to the navy. He was serving with Captain Maitland in the *Bellerophon* when the Emperor Napoleon surrendered to that officer. He was introduced to Napoleon, on whom the impression he produced was favorable, leading to a proposal that he should accompany the Emperor into exile as private physician, an arrangement to which he acceded, stipulating that he should retain his rank in the navy, and be permitted to return to it at pleasure. Of his conversations with Napoleon, during a period of about three years, O'Meara took notes, which he afterwards published. Meantime he became involved, in the interest of Napoleon, in the series of squabbles which he waged with the Governor, Sir Hudson Lowe (q.v.). In 1818, after a violent altercation with Sir Hudson, O'Meara was committed to close arrest, and was authorized by the Emperor to resign his post. On his return to England he addressed a letter to the Admiralty, in which, among other things, he accused Sir Hudson Lowe of intentions against the life of his captive, and even of having, by hints, insinuated a desire for his services as secret assassin. For this he was instantly dismissed the service. After Napoleon's death O'Meara published *Napoleon in Exile* (1822) by which book alone he is now remembered.

OMENS (Lat. *omen*, OLat. *osmen*, prognostic, from *os*, mouth; connected with *auris*, Gk. *oēs*, *ous*, Lith. *ausir*, OChurch Slav. *ucho*, Goth. *ausō*, Ger. *Ohr*, AS. *fære*, Eng. *ear*). Events supposed to presage a future event. From prehistoric time it has been a universal belief that any important occurrence is preceded by omens, or, to use the traditional English word, by 'signs,' which will allow any observer to forecast what is to be. The notion may be regarded as an an-

ticipation of modern science, but in the absence of adequate knowledge, attempts at prediction were of necessity fantastic, and any phenomenon was supposed to indicate good or evil, according to the effect which it produced on the imagination. Hence arose a mass of popular rules, handed down from generation to generation, and which exhibit all over the world great similarity. The signs noted in Anglo-American folk-lore are as old as any, and in part date back to a period antedating civilization. Among these omens a great number relate to the principal events of life, birth, marriage, and death. The last, especially, as the chief object of anxiety, has occupied a share of attention sufficiently proved by the bad sense attached to the terms fatal and ominous, while a multitude of occurrences, frequently of an insignificant character, are popularly held to betoken the speedy ending of life. Thus, it is said in popular lore that a death will occur if a batch of bread, in baking, cracks across the top, if the flame of a candle exhibits the excrescence called a 'winding-sheet,' if a person carries through the house a hoe or spade, or if a rose or other plant blossoms in the fall. Again, if during a funeral any one passes between the carriages, or if the procession returns by the same road as that which conducted it to the cemetery, another death will occur. In undertaking a journey, good or ill luck is conjectured from the animals encountered on the path. If a rabbit or (in other localities) a squirrel cross the track, the expedition will be fortunate if the creature pass from left to right, the reverse if from right to left; in the latter case, the misfortune can be averted by making a cross-mark with the feet. The passage of a cat, especially a black cat, is bad luck, unless the traveler immediately turns. So omens are taken from the flight of birds. If, as one leaves his house, a crow flies in front, it is said to be an evil portent, while the sight of a redbird is held to be a token of lovers' meeting. Hearing the cry of a whippoorwill when about to start on a journey indicates danger. Such beliefs are entirely in the spirit of ancient augury, according to which especial attention ought to be paid to the position and the notes of birds who may be met on the way. Other omens are taken from insects and plants. Thus, the color of the first butterfly seen in the spring is said to show the color of the first new dress, the chirping of a cricket to foretell sorrow, the advent of a bumblebee into the house to be a sign of news or company. Marks about the person of babes are supposed to be significant of character. Thus in English nursery lore, a straight line on the palm is regarded as a token of early death, while white and blue spots on the nails are taken to denote good or evil fortune. From such notions, originally of a simple nature, came to be developed an elaborate science of palmistry. When systems of rules had once been established, and connected with life, they continued with great obstinacy, so that the perception of failure in the validity of such expectations was met, not by discrediting the theory, but by increasing the complication of the maxims. A large mass of popular sayings relate to the determination of the weather, supposed to be predictable by means of signs often of a nature highly fantastic. The weather in each of the twelve days after Christmas is said to indicate that to be expected for

every month in the year. Omens are derived from the actions of animals; if the winter is to be severe, they lay up additional supplies, or are more careful in constructing their habitations. The collection and classification of omens belonging to all countries has not yet proceeded far enough to determine how far they agree in different regions.

OMENTUM. See PERITONEUM.

OMER PASHA. ô'mër pâ-shû' (1806-71). A celebrated Turkish general, born of Christian parents at Plasky, an Austrian village in the former Croatian Military Frontier. Michael Latas (this was his real name) was educated at a military school, and joined a frontier regiment, but fled in 1828 to Bosnia, turned Mohammedan, and became tutor in the household of Hussein Pasha, Governor of Widdin. In 1834 he was made writing master in a military school at Constantinople, and instructor to Abd-ul-Medjid, heir apparent to the throne. Omer was made Governor of Lebanon in 1842, and successively repressed insurrections in Albania, Kurdistan, and Bosnia. In 1853 he defeated the Russians at Oltenitza, and in 1854 at Silistria, gaining possession of Bucharest. Later he repulsed the Russians at Eupatoria, in the Crimea, and set out to relieve Kars, but failed. He became Governor of Bagdad in 1857, but was dismissed in 1859 on account of maladministration. In 1862 he repressed the insurrection in Montenegro and took Cetinje. In 1864 he was made field-marshal, and in 1867 was sent to put down the rebellion in Crete. From 1869 he was Minister of War. As a commander Omer was noted especially for his excellent strategy.

OM MANI PADME HUM, ô'm mû'nê pâd'mê hû'm. A sacred formula in Buddhism, the so-called formula of six syllables, well known from the part which it plays in the Buddhist religion, and especially in that form of it called Lamaism (q.v.). The reputed author of this formula is the Dhyana-Bodhisattva, or deified saint, Avalokitesvara, or, as the Tibetans call him, Padmapani, the lotus-handed, or Amitabha. He is the Buddha of Eternal Light, the heavenly ruler of the Western paradise. Like Buddha, he is represented as sitting or standing within a lotus, and apparently there is an allusion to this in the sacred formula itself, *Om mani padme hum*, 'O, the Jewel in the Lotus, Amen!' The sacredness of this formula is sufficient when recited to secure exemption from the cycle of reincarnation, and final rebirth in the celestial paradise over which Amitabha rules. It would appear not to belong to the earliest stage of Buddhism, nor to the oldest Buddhistic works of the north of India, nor to those of Ceylon. Consult: Burnouf, *Introduction à l'histoire du Bouddhisme indien* (Paris, 1844); Koeppen, *Die Religion des Buddha* (Berlin, 1857-59); Schlagintweit, *Buddhism in Thibet* (Leipzig, 1863); Waddell, *The Buddhism of Tibet, or Lamaism* (London, 1895).

OMMIADS, ô'm-mî'adz, **OMAYYADS,** or **OMMEYADES.** A dynasty deriving its name from an ancestor, Omayya (Arabic *Umayyah*), which succeeded to the Arabian caliphate on the death of Ali, the fourth Caliph (661), and possessed it till superseded by the Abbassides (q.v.) in 750. Moawiyah (q.v.), the founder of the dynasty, was the son of the Koreish leader Abu-Sofian, who defeated Mohammed at Bedr,

and his mother was the notorious Hinda. After the death of Othman, the third Caliph (656), Moawiyah, who was his cousin, claimed the throne, and during the whole of Ali's reign ruled over the western provinces of Syria and Egypt; but it was not till the death of that Caliph, and the abdication of his son Hassan, that Moawiyah's authority as Caliph was recognized (661). He transferred the seat of the caliphate to Damascus, Kufa having been the residence of Ali, and Medina of the first three caliphs. The Arabs continued to extend their conquests during his reign; the Turks in Khorasan were subdued, Turkestan was invaded, and several important acquisitions were made in Asia Minor. The Caliph neglected no means of consolidating the Empire, and partly for this reason he made the succession hereditary, and caused his son YEZID (680-83) to be recognized as his heir. The reigns of Yazid and his successors, MOAWIYAH II. (683) and MERWAN I. (683-685), are devoid of importance, as their sway extended only over Syria and Palestine. ABD-EL MELEK (685-705), an able and warlike prince, succeeded in rendering himself undisputed ruler of the Mohammedan world (692), but the latter part of his reign was much disturbed by rebellions in the eastern provinces. He was the first Caliph who interested himself in the promotion of liberal knowledge, causing the most celebrated poetical and other works of the Persians to be translated into Arabic. Four of his sons, WALID I. (705-716), SULAIMAN (716-717), YEZID II. (720-724), and HISHAM (724-743), successively occupied the throne. Under Walid, the Ommiad caliphate reached the summit of its power and grandeur; Northern Africa (709), Spain (711-714), Turkestan (707), and Galatia (710) were conquered; while toward the close of his reign his empire was extended even to the Indus. OMAR II. (717-720), who, in the justice and mildness of his government, surpassed the whole of the race of Omayya, was appointed to succeed Sulaiman; but having excited discontent among his relatives by suppressing the formula of malediction against Ali and his descendants, which had hitherto been regularly pronounced at all public ceremonies, he was poisoned. The invasion of the country of the Franks and a siege of Constantinople in his reign marked the limits of the Ommiad power. Hisham, though, like his immediate predecessor, fond of pleasure, possessed all the qualities necessary for a sovereign. The Greeks, who still strove for the possession of Asia Minor, were repeatedly defeated; the Turks of Northern Persia and Turkestan were kept in stern subjection, and the civil affairs of the Empire carefully and strictly administered. Nevertheless the power of the dynasty now began to decline. The march of conquest in the West was arrested by Charles Martel (q.v.) at Poitiers (732), the discontented descendants of Ali raised the standard of revolt, and Ibrahim, the fourth in direct descent from Abbas, the uncle of Mohammed, invested Abu-Moslem with the arduous duty of enforcing his long-agitated claims to the throne. The reigns of WALID II. (742-743), YEZID III. (743-744), and IBRAHIM (744), though of ephemeral duration, were long enough to produce a complete disorganization of the Empire; and though Ibrahim's successor, MERWAN II. (744-750), was both an able and politic ruler, and a skillful warrior, the declining fortune of his family was beyond remedy.

Abu-Moslem, who had proclaimed the claims of the Abbassides amid the ruins of Merv in 747, took the field at the head of a small but zealous band, and carried the black flag of the Abbassides from victory to victory, till before the close of the following year the whole of Khorasan acknowledged his authority. Irak was subdued in 749; and though Ibrahim, the Abbasside claimant, was seized by Merwan, and executed in the same year, his brother, Abul-Abbas, succeeded to his claims, and the unfortunate Caliph, defeated in two engagements, fled to Egypt (750), whither he was pursued and slain. Abdallah, the uncle of the successful claimant, treacherously invited the remaining members of the House of Omayya to a conference, and ordered a general massacre of them. Two only escaped: the one to the south-east of Arabia, where he was recognized as Caliph, and where his descendants reigned till the sixteenth century; the other, Abderrahman, to Spain, where he founded the Emirate or Kingdom (afterwards Caliphate) of Cordova in 756.

OMMIADS OF SPAIN. ABDERRAHMAN I. (756-787) accepted the Spanish throne, which was offered him by the Arab chiefs of the West. In spite of numerous revolts, he strengthened and extended his power in Spain, till, with the exception of Asturias and the country north of the Ebro, his authority was everywhere acknowledged. He divided his kingdom into six provinces, whose rulers, with the *alcas* of the twelve principal towns, formed a sort of national diet. His successors, HISHAM I. (787-796) and AL-HAKEM I. (796-821), were troubled with internal revolts, under cover of which the Christians established in the northwest what was known as the 'Spanish March.' ABDERRAHMAN II. (821-852) reestablished internal quiet, and occupied his subjects with incessant wars against the Christians. These conflicts developed among the Arabs that chivalrous heroism which is found nowhere else in the Mohammedan world. Abderrahman II., himself a man of learning, greatly encouraged the arts and sciences, and diffused information among his people; he also attempted, by regulating the laws of succession to property, to constitute his kingdom on a basis similar to that of other European nations. During his reign Mohammedan Spain was the best governed country in Europe. His successors, MOHAMMED I. (852-880), MONAYYIR (880-882), and ABDALLAH (882-912), followed in his footsteps. ABDERRAHMAN III. (912-961), who assumed the title of Caliph, in opposition to the Abbasside caliphs of Bagdad, after suppressing some dangerous revolts which had gathered head during his minority, conquered the Kingdom of Fez from the Edrisites, and brought a long and exhausting war with the powers of Asturias and Leon to a victorious conclusion. This period is justly termed the golden age of the Arab domination in Spain, for at no period was their power so consolidated, and their prosperity so flourishing. (See CORDOVA.) Abderrahman III., like his predecessors, was a great patron of learning, and a poet of no mean ability. He founded schools which far surpassed those in other parts of Europe. His son, AL-HAKEM II. (961-976), was in every way worthy to be his successor. HISHAM II. (976-about 1009), a child of eight years, now occupied the throne; but fortunately his mother, Sobeiha, possessed the abilities necessary for such an emergency, and appointed as her son's vizier

Mohammed ibn Abdallah, surnamed Al-Mansur, who had originally been a peasant. His administration was equally just and judicious, and his encouragement of literature, science, and art alike liberal and discriminating. But it is as a warrior that he is chiefly remembered. The lost provinces were recovered; Castile, Leon, and Barcelona were conquered; and Navarre was on the point of sharing the same fate, when a rebellion in Fez compelled him to detach a portion of his forces for service in Africa, and the combined armies of the four Christian monarchies, seizing this opportunity, inflicted upon the Arabs a sanguinary defeat in 1001. Mohammed's spirit was completely broken by this blow, and he died a few days afterwards. With him the star of the House of Omayya set forever. The rest of Hisham's reign was a scene of disorder and civil war. Pretenders to the caliphate arose, while the *alcas* of the various provinces set up as independent rulers, and the invasions of the Christians added to the confusion. With the expiration of the brief reign of HISHAM III. (1027-31), the family of Omayya disappears from history. The three centuries of Ommiad rule in Spain is the period which gives lustre to the name. Consult Dozy, *Histoire des Musulmans d'Espagne* (Leyden, 1861); Viardot, *Histoire des Arabes et des Maures d'Espagne* (Paris, 1851). See references under MOORS.

OMNIBUS BILL. A term frequently applied to single legislative acts in which are incorporated a number of loosely related or wholly disconnected measures. The term probably first applied to a bill proposed in Congress in 1850 for the admission of California to the Union with a Constitution prohibiting slavery; for the organization of New Mexico and Utah without reference to slavery; for the abolition of the slave trade in the District of Columbia; for the payment of \$10,000,000 to Texas for her claim to a part of New Mexico; and for the more efficient rendition of fugitive slaves. (See COMPROMISE MEASURES OF 1850.) As each of these matters was finally covered by a separate bill, it is incorrect to speak of the compromise measures of 1850 as the 'omnibus bill,' as is frequently done. A more recent instance of the kind was the Springer 'omnibus bill' of February, 1889, for the admission of Washington, Montana, and the Dakotas to the Union. Omnibus bills were formerly passed with some frequency by State Legislatures, but in recent years provisions have found their way into a number of Constitutions requiring that single statutes shall deal with but one main subject, which shall be clearly indicated in the title. This has proved fatal to the 'omnibus bill' in most cases.

O'MORE, ð-mōūr', ROGER, or RORY (?-1652). An Irish patriot. He was the principal conspirator with Sir Phelim O'Neill in the attempted seizure of Dublin Castle in 1641, and as colonel of Ulster troops won a victory at Julianstown Meath. He fought under Owen Roe and with Antrim in 1644, but after the failure of the 1650 uprising, in which he was engaged, he disappeared and is supposed to have died miserably.

O'MORE, RORY or RUBY OGE (?-1578). An Irish patriot, second son and namesake of a captain of Leix. He entered young into the national conflict, and was pardoned in 1565-66. He was imprisoned for his share in the Kildare plots

of 1574. He escaped, and was pardoned again in 1576, but the hope of help from Spain made him rebel once more. After several escapes he was caught and killed by the Fitzpatricks and his head was set up on Dublin Castle.

OMPHALE, òm'fà-lè. The Lydian queen whom Hercules served. See **HERCULES**.

OM'PHALUS (Lat., from Gk. ὀμφαλός, navel, the centre point). The name of a stone in the Temple of Apollo at Delphi, which was supposed to mark the centre of the earth. According to the legend Zeus loosed two eagles, one at the east and one at the west, and in their flight they met at this point. In works of art the stone is conical, and covered with a network of fillets or ribbons, while often on either side are perched the eagles. In the time of Pausanias the Omphalus stood outside the temple. The origin of the Omphalus is not clear. Conical stones were elsewhere worshiped, but there is much in the Delphic legend which suggests that the Omphalus marked a grave, and was connected with an early chthonic cult.

OMSK, òmsk. The capital of the Territory of Akmolinsk and of the Governor-Generalship of the Steppes, Russian Asia, situated at the confluence of the Om with the Irtysh, on a barren steppe, 1624 miles by rail east of Moscow (Map: Asia, G 3). Its average annual temperature is somewhat over 33°. It is poorly built. It has two gymnasia, a seminary for teachers, a technical school, and the West Siberian section of the Russian Geographical Society. Its industries are unimportant. Its commerce has somewhat developed since the construction of the Trans-Siberian Railway, Omsk having become a distributing station for Western Siberia. Population, in 1897, 37,470.

OMUL, ò-mul'. A small salmon (*Salmo migratorius*), which abounds in Lake Baikal and other waters of Eastern Siberia, whence great quantities are sent salted to all of the western parts of the country.

ON, òn. An ancient Egyptian city. See **HELIOPOLIS**.

ONA, ò'nà. A group of tribes, apparently constituting a distinct linguistic stock, inhabiting the shores and islands of the Strait of Magellan and the northwestern portion of Tierra del Fuego. In spite of the cold and desolate nature of their country, they go almost naked and build only the slightest brushwood shelters, protecting their bodies by copious rubbing of grease. They are tall and strongly built, and are expert hunters and fishers, using the club, sling, bow, bolas, and lance. Their bark canoes withstand almost any storm and the baskets woven by their women are so well made that they will hold water. They have also trained dogs to hunt. Very little is yet known of their religion or sociology, which, however, appear to be as elaborate as among most roving tribes. They formerly numbered nearly 3000, but are being rapidly exterminated by the sheep-herders who have occupied the country.

ONAGER, òn'à-jër, or **GHORKHAR**. See **KIANG**.

ONATAS (Lat., from Gk. Ὀνάτας). A Greek artist, whose activity extended from about B.C. 490 to 460. He was a native of Ægina and son of Micon. Among his famous works were a four-horse chariot at Olympia made for Hiero of Syra-

cuse to commemorate a victory in the games, a colossal Hercules at the same place, dedicated by the Thasians, and a group of the Greek heroes casting lots to determine who should accept the challenge of Hector. At Delphi was a large group of fighting men dedicated by the Tarentines. Onatas is only known as a worker in bronze, but it is probable that the Æginetan sculptures (q.v.), which seem to have been executed during his lifetime, show his influence on the art of his native island.

ONATE, ò-nyü'tà, **JUAN DE** (c.1555-c.1615). A Spanish explorer, settler of New Mexico. He was born at Guadalajara, Mexico, of which city his father had been the founder, and married a granddaughter of Cortés. In 1595 he received permission from the Viceroy, Velasco, to colonize what is now New Mexico. After his preparations were complete, the start was delayed by Monterey, who had succeeded Velasco as Viceroy, and who wished to transfer the grant to Pedro Ponce de Leon. In the latter part of January, 1598, the force of 130 colonists with servants and Indians started from Zacatecas; it crossed the Rio Grande in April; and in August founded San Juan, the first capital of New Mexico. Onate led several expeditions into Arizona (1599, 1604, and possibly 1611), and seems not to have been Governor of the new settlements after 1608. The principal source for the history of the expedition is an epic poem by Gaspar de Villagrà (or Villagran), a captain, who accompanied Onate and made him the hero of the epopee.

ONAWA, òn'à-wà. A town and the county-seat of Monona County, Iowa, 59 miles north of Council Bluffs; on the Illinois Central and the Chicago and Northwestern railroads (Map: Iowa, A 3). It carries on considerable trade as the commercial centre of a productive farming and stock-raising country. There is a public library. Population, in 1890, 1358; in 1900, 1933.

ONCKEN, ònk'en, **AUGUST** (1844—). A German economist, of the historical school. He was born at Heidelberg, studied there, at Munich, and at Berlin, and after six years of retirement on his estates in Oldenburg, in 1872 became professor of political economy and statistics in the Imperial Agricultural Institute in Vienna, whence in 1877 he went to the Polytechnic Institute at Aïlla-Chapelle, and the following year to the University of Bern. Among his works are: *Adam Smith in der Kulturgeschichte* (1874); *Adam Smith und Immanuel Kant* (1877); *Die Maxime "Laissez faire et laissez passer"* (1877), a valuable critical edition of Quesnay (1888), which gave fresh stimulus to the study of the physiocrats; *Geschichte der politischen Oekonomie* (part i., 1901); and contributions to *Berner Beiträge zur Geschichte der Nationalökonomie*, of which he was editor.

ONCKEN, **WILHELM** (1838—). A German historian, brother of August Oncken. He was born in Heidelberg; was educated there, and at Göttingen and Berlin; taught at Heidelberg (1862-70); and in 1870 was appointed professor of history at Giessen. In 1877 he became editor of the comprehensive series entitled *Allgemeine Geschichte in Einzeldarstellungen*. He wrote: *Athen und Hellas* (1865-66); *Stadt, Schloss und Hochschule Heidelberg* (3d ed. 1885); and in the series mentioned: *Das Zeitalter Friedrichs des Grossen* (1881-83); *Das Zeitalter der Revolution*,

des Kaiserreichs und der Befreiungskriege (1885-87); and *Das Zeitalter des Kaisers Wilhelm I.* (1890-92).

ONCOCARPUS (Neo-Lat., from Gk. *ὄγκος*, *onkos*, hook, + *καρπός*, *karpos*, fruit). A genus of trees of the natural order Anacardiaceæ. *Oncocarpus vitiensis*, a remarkable Fiji tree about 60 feet high, has large oblong leaves, and a corky fruit, somewhat resembling the seed of a walnut. Its sap when brought in contact with the skin is very caustic, for which reason the wood is often called itch wood. The exhalations are said to cause itching with irritation for several days.

ONCORHYNCHUS (Neo-Lat., from Gk. *ὄγκος*, *onkos*, hook + *ῥύγχος*, *rhynchos*, snout). A genus of salmon including those of the Pacific coast, several species of which are of commercial importance. See SALMON.

O'NEALL, ō-nēl', JOHN BELTON (1793-1863). An American jurist. He was born in South Carolina, graduated at South Carolina College in 1812, and was admitted to the bar two years later. He served in the Legislature, and was Speaker in the House before being chosen associate judge in 1828. He was later judge in the Court of Appeals, and was also most energetic in promoting business enterprises which might benefit the State. Besides being a frequent contributor to the press on educational, temperance, and religious matters, he was the author of *A Digest of the Negro Law of South Carolina* (1848); *Annals of Newberry, S. C.* (1858); and *Biographical Sketches of the Bench and Bar of South Carolina* (1859).

ONEGA, ō-nyē'gā, LAKE. A lake in the northern part of Russia, Government of Olonetz (Map: Russia, E 2). It is, next to Ladoga (q.v.), the largest lake in Europe, and measures 150 miles in length by 50 miles in greatest width, its area being 3700 square miles. Its greatest depth is over 1400 feet. The north shore is indented with numerous deep and narrow fiords, and the lake contains a large number of islands, some of which are inhabited. Lake Onega receives the waters of a number of other lakes to the north and east of it, its own waters flowing into Lake Ladoga through the Svir. A canal runs along the south shore of the lake, from the Svir on the west to the Vytegra on the east, the latter river being further connected by canals with the Volga and the Dvina.

ONEGLIA, ō-nā'lyā. A town in the Province of Porto Maurizio, Italy, 40 miles east-northeast of Nice, on the Gulf of Genoa, at the mouth of the Impero, here crossed by two iron bridges (Map: Italy, C 4). The town has a prison resembling a church. It is a garrison town and a sea-bathing resort. It carries on a shipping trade in wine, oil, and fruits. Andrea Doria, the Genoese admiral, was born here. Population (commune), in 1881, 7286; in 1901, 8527.

ONE-HOSS SHAY, THE WONDERFUL. A familiar humorous poem by Oliver Wendell Holmes (1858), published under the title of *The Deacon's Masterpiece*. It tells of a vehicle constructed with such care that, after a long life, all its parts came to a sudden end at the same moment.

ONEIDA, ō-nī'dā. A central tribe of the Iroquois Confederacy (q.v.). The name by

which they are commonly known is a corruption of their proper name, *Oneyotka-ono*, commonly rendered 'people of the stone,' referring to the tribal palladium, the celebrated 'Oneida Stone,' a large granite boulder near the site of their ancient village on Oneida Lake. Their territory was about the lake of the same name, in central New York, and extending southward to the waters of the Susquehanna. They were considered a younger member of the confederacy, and never attained any special prominence in its affairs, seeming always to have acted contrary to the spirit of the league, being usually friendly to the French and Jesuits, of whom the majority of the Iroquois were the determined enemies; at a later period they, almost alone of their kindred, took sides with the Americans in the Revolutionary War. Their friendship for the Americans during this struggle was due chiefly to the influence of their Congregational missionary, Samuel Kirkland, and drew down upon them the vengeance of the hostile Iroquois under Brant, who burned their villages and forced them to take refuge within the American settlements until the close of the war, when the main body returned to their former homes, while a considerable number emigrated to Canada and settled upon Thames River, Ontario, where they still remain. Between 1820 and 1835, having sold most of their lands in the State of New York, the majority of the Oneida removed to a reservation at the head of Green Bay, Wis., where they now reside, being fairly prosperous and civilized, as are also those in New York and Canada. The whole tribe numbers at present considerably over 3000 (being probably more numerous than at any former period of its history), distributed as follows: Oneida reservation, Wisconsin, 1980; Oneida and other reservations, New York, 270; 'Oneidas of the Thames,' Ontario, 800; with Six Nations on Grand River, Ontario, not specified.

ONEIDA. A city in Madison County, N. Y., 27 miles east of Syracuse; on the New York Central and Hudson River, the New York, Ontario and Western, and the West Shore railroads (Map: New York, E 2). It has a fine high school building, a public library, a city hospital, and Allen and Higenbotham parks. It is but five miles distant from Oneida Lake, on the southern shore of which is Sylvan Beach, a popular watering place. The industrial interests are represented by iron works, and manufactories of caskets, flour, hosiery, handcars, carriages, wagons, furniture, steel and wood pulleys, and sash and blinds. The surrounding country is agriculturally productive. Under a charter of 1901, the government is administered by a mayor and common council, biennially elected. The water-works are owned and operated by the municipality. Population, in 1890, 6083; in 1900, 6364. The first settlers within the present limits of Oneida came in 1834, but a village was not established until 1839, and was not incorporated until 1848. The city was chartered in 1901. Oneida Castle, the ancient seat of the famous Oneida Indians, is not far distant, and two miles to the south is the Oneida Community (q.v.). Consult Durant, *History of Oneida County, N. Y.* (Philadelphia, 1878).

ONEIDA COMMUNITY. A communistic settlement at Oneida, Madison County, N. Y.,

founded in 1847 by John Humphrey Noyes (q.v.). It had a religious origin, Noyes having been led by his New Testament studies to believe in the possibility of Christians living a sinless life, and in other doctrines at variance with those of the established churches. In 1838 a small settlement of his disciples was formed in Putney, Vt., the home of his father's family, where it existed till its removal in 1847-48 to Oneida, N. Y. For the first ten years the Oneida Community was not financially successful, but after 1857 was prosperous, largely through the manufacture of the Oneida trap. There was no formally chosen leader, as it was believed that the most fit would naturally control, and Noyes remained the leading spirit. The distinguishing feature of the social life was the system of 'complex marriage.' Marriage was not permanent, but license did not prevail, as the marital relations were carefully regulated, and the Community assumed responsibility for the support and education of the children. A novel feature of the life was the plan of 'mutual criticism,' which is said to have successfully taken the place of ordinary means of government in the society. Outside opposition to this system, especially on the part of the churches, led to its abandonment in 1879, and the voluntary dissolution of the Community and re-organization into a joint-stock company took place January 1, 1881; but while communism of property and the distinctive social life were given up, a common dining-room, laundry, library, and assembly-hall and other coöperative features are still retained. At the time of the dissolution of the Community it had about 238 members, with 45 others at a branch at Wallingford, Conn., owned 650 acres of land, with numerous manufacturing establishments and other buildings, the total property being valued at \$600,000. It has since largely increased its property and business, having manufactories at Kenwood, Sherrill, and Niagara Falls, N. Y., and Niagara Falls, Ont. Consult: Noyes, *The Berean* (Putney, 1847); id., *History of American Socialisms* (Philadelphia, 1870); Nordhoff, *Communitistic Societies of the United States* (New York, 1875); Hinds, *American Communities* (Chicago, 1902). See COMMUNISM.

ONEIDA LAKE. A body of water in central New York, between the counties of Madison, Oneida, Onondaga, and Oswego, 11 miles north-east of Syracuse (Map: New York, E 2). It is 20 miles long, from 4 to 7 miles wide, and is connected with Lake Ontario by the Oneida and Oswego rivers. Oneida Lake was an important commercial highway before the era of railroads.

O'NEILL, ð-nēl', ELIZA, later Lady BECHER (1791-1872). An Irish tragedienne, daughter of an actor, who managed the Drogheda Theatre. After playing for some years in Ireland, she went to London, where, on October 6, 1814, she appeared as Juliet at Covent Garden. Her success was immediate, and for five years she was the most popular actress in Great Britain. Then she married William Wrixon Becher, one of the Irish members of Parliament, who afterwards succeeded to a baronetcy. After her marriage she never again appeared on the stage.

O'NEILL, HUGH. See TYRONE.

O'NEILL, OWEN ROE (Gael. *Eoghan Ruadh*, Red Owen) (?-1649). The commander of the Irish forces in the wars against the English in

the first half of the seventeenth century. He was the nephew of Hugh O'Neill, Lord of Tyrone, and on the flight of the northern chiefs in 1607 he accompanied his uncle to the Continent, where he was carefully educated at Louvain. Like most of the exiles of that period, he selected the profession of arms, and rose to distinction as commander of the Irish troops in the service of Spain. In the meantime, the wholesale confiscations in the north of Ireland, known in history as the 'Plantation of Ulster,' led to a general rising of the Irish in 1641. On the invitation of a delegation sent for that purpose, O'Neill crossed over to Ireland, assumed command of the forces levied by the General Assembly of the Irish nation, and for eight years held in check the whole power of England and the Scotch 'planters.' His most signal victory was won at Benburb on the Blackwater, in Tyrone, June 5, 1646, when with 5500 men he routed Monroe's army of 7000, killing, disabling, or taking nearly one-half the enemy, and capturing all the artillery, baggage, and 1500 horses, after which, rapidly facing around, he put to flight two other detachments of 2500 troops which were marching to effect a junction with Monroe. For two years more he continued to win one victory after another, in nearly every instance against superior force or equipment, until his death, November 6, 1649, after a brief illness. His removal deprived the Irish army of competent leadership, and the execution of King Charles I. and the overthrow of the Royalist Party in England left the way clear for the invasion by Cromwell in the same year.

O'NEILL, PEGGY. See EATON, MARGARET (O'NEILL).

O'NEILL, Sir PHELM (c.1604-53). An Irish rebel, the eldest son of Turlough O'Neill. As a youth he studied law at Lincoln's Inn, but lived a lawless life on his return to his native land, where he became an active participator in the insurrection of 1641. He was one of the five who planned to surprise Dublin Castle, and through a treacherous breach of hospitality he obtained possession of Charlemont Castle, while as the result of further successes he was made commander-in-chief of the northern Irish forces. He represented Ulster in the Confederate Council of 1642, but his failure to capture Drogheda after a prolonged siege in 1641-42 lessened the confidence of his army, which had once numbered 30,000, and he yielded the chief command to Owen Roe O'Neill (q.v.). Sir Phelim then expected to regain it, but was disappointed, and he went into hiding after the surrender of Charlemont in 1650, but was caught at last, tried, and executed for the atrocious massacres he had ordered. He refused to save himself by giving evidence to show that Charles I. had authorized him to raise troops in Ireland.

O'NEILL, Sir TURLOUGH LUINEACH (c.1530-95). An Irish chieftain, lord of Tyrone, in the County of Ulster, where he was born. He was a cousin of the notorious Shane O'Neill, whom he tried unsuccessfully to oust from the headship of the clan during the latter's compulsory absence in England in 1562. Turlough succeeded Shane at his death five years afterwards. Though Turlough promised fidelity to Queen Elizabeth, he excelled even his predecessor in the formation of traitorous leagues with the Scots. An unsuccessful attempt was made to capture him in 1568,

and his country was invaded by Essex, the English Governor of Ulster, in 1574. Turlough was called upon to surrender his lands, merely that he might receive them again under an English tenure. He took up arms against the English in 1579, and four years later invaded Tyrconnel, but was beaten back by O'Donnell, and he next entered into strife for the possession of lands with the Earl of Tyrone, over whom he gained a victory in 1588, but he resigned in his favor five years afterwards. While Turlough was making a final effort to regain his lost sovereignty, his castle was destroyed by Tyrone, and himself obliged to hide in a ruin near by, where he died.

ONEONTA, ō'nē-ōn'tā. A village in Otsego County, N. Y., 61 miles northeast of Binghamton; on the Susquehanna River, and on the Delaware and Hudson and the Ulster and Delaware railroads (Map: New York, E 3). It is the seat of the Oneonta State Normal School, and has a public library, a State armory, and the Aurelia Fox Memorial Hospital. The village carries on considerable trade, and its industrial establishments include construction and repair shops of the Delaware and Hudson Railroad, a silk mill, planing mill, knitting mill, foundries, and cigar factories. Settled about 1800, Oneonta was incorporated in 1848. Under a charter of 1885, the government is vested in a president, annually elected, and a council, chosen on a general ticket. Population, in 1890, 6272; in 1900, 7147.

ON'ESANDER (Lat., from Gk. Ὀνησάνδρος, *Onēsandros*). A Platonic philosopher of the first century A.D. He lived at Rome under Nero, and wrote a tract, *Στρατηγικὸς λόγος*, dedicated to Veranius, consul in 49. The work deals with the ethical duties of a general, is based on Xenophon, and was first edited in Greek in 1599. Later editions are by Korais (Paris, 1822) and Köchly (Leipzig, 1860).

ONE-TO-ONE CORRESPONDENCE. See CORRESPONDENCE.

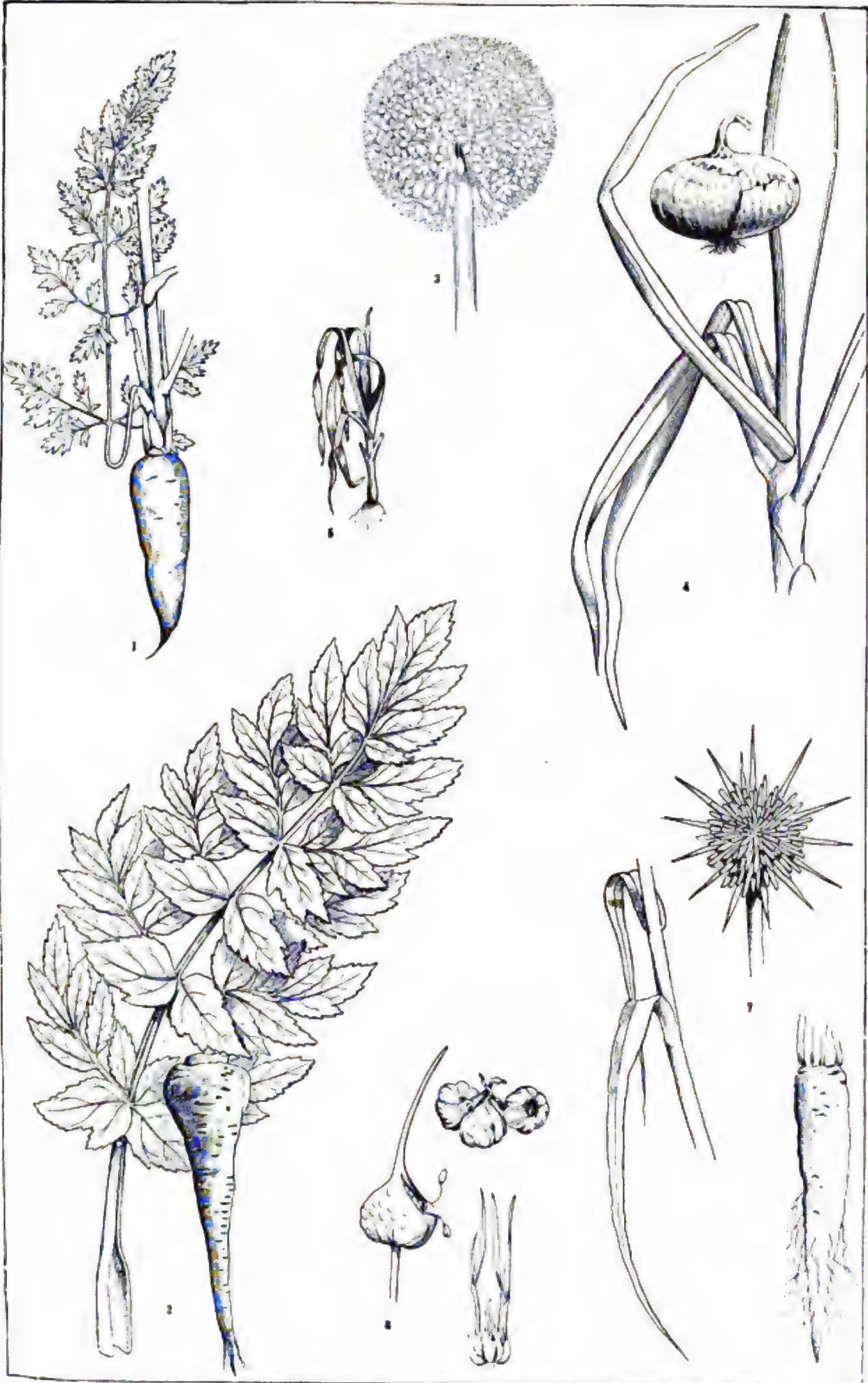
ONI'AS'S TEMPLE. A sanctuary built at Leontopolis in Egypt by the Jewish high priest Onias, probably not long after the desecration of the temple at Jerusalem by Antiochus IV., Epiphanes, in December, B.C. 168. According to Josephus, this Leontopolis was situated in the Heliopolitan nome (*Ant.*, xiii. 3, 2), 180 stadia northeast of Memphis (*Rel. Jud.*, vii. 10, 3), and is not to be confused with the well-known Leontopolis in the Delta. It consequently cannot have been far from the city of Heliopolis itself. In the *Itinerarium Antonini* a *Vicus Judaeorum* is mentioned that may have belonged to the Nome of Heliopolis, but is 464 stadia from Memphis. At this place, the modern Belbeis, there once was a temple of the goddess Bast, and in the neighborhood there is a Tell el-Yehudiyyeh. Another Tell el-Yehudiyyeh, however, is found near Heliopolis with a Jewish cemetery. This has been identified by Naville as the capital of 'the land of Onias,' and it is probably identical also with the *Castra Judaeorum* mentioned in a *Notitia Dignitatum Orientis*, c.25 A.D., while the so-called Camp of the Jews (*Ant.*, xiv. 8, 2) was in another direction, northwest of Memphis. A temple of Bast is perhaps more likely to have been allowed to fall into ruins there than nearer to Bubastis. There is no reason for doubting that an old pagan temple was given to Onias and

remodeled by him. The tower-like shape indicates this. If it had been a new structure, the pattern of the temple in Jerusalem would no doubt have been followed in regard to the exterior as well as the interior.

As to the identity of the Jewish high priest there is still some uncertainty. In his *Jewish War*, written a few years after the fall of Jerusalem, Josephus states that Onias, son of Simon, fled from Antiochus IV., Epiphanes, to Egypt, and built the temple of Leontopolis (i. 1, 1, vii. 10, 2-4). He would consequently be Onias III., son of Simon the Just. With this agree Theodore of Mopsuestia, in his commentary on Psalm lv., the references in the Palestinian Talmud (Yoma vi. 3), and the Babylonian Talmud (Menachoth 109 a). On the other hand, Josephus declares in his *Antiquities* (xii. 5, 1; xii. 9, 7; xiii. 3, 1-3; xiii. 10, 4; xx. 10) that the builder was a son of Onias III., who fled to Egypt in the time of Antiochus V., Eupator (B.C. 164-162), when Menelaus was deposed, and Alcimus (q.v.) took his place. As the *Antiquities* were written c.95 A.D., and therefore may be thought to represent more careful research, and it is told in II. Macc. iv. 33 sqq. how Onias III. was murdered by Andronicus in a sanctuary at Daphnæ, near Antioch, and bitterly lamented by Antiochus IV., many scholars have credited the later account rather than the earlier. But neither Josephus himself nor Theodore, who elsewhere follows II. Maccabees, mentions any such murder of Onias, and Baethgen, Willrich, and Wellhausen have strongly argued that the notice is unhistorical, being either a confusion with the murder of Menelaus or a transference to the Jewish high priest of the tragic fate of a son of Seleucus murdered by Andronicus at Daphnæ and naturally mourned by Antiochus. Josephus may, in his old age, have been misled by a poorer source or an altered tradition, a change of attitude toward the temple at Leontopolis being clearly discernible on the part of the Jewish teachers.

If it was Onias III. who in B.C. 170 fled to Egypt, it is natural to suppose that the desecration of the temple in Jerusalem and its dedication to Zeus Olympius in B.C. 168 led him to ask Ptolemy VII., Philometor, and Cleopatra I. for the temple of Bast at Leontopolis. For three years the legitimate high priest and ethnarch would then have officiated in a temple dedicated to the worship of Yahweh before the restoration of the Yahweh cult in Jerusalem in December, B.C. 165. Onias not only had with him numerous emigrants who formed military colonies, but left behind many sympathizers. This is evident from Isaiah xix. 18-25, probably written in B.C. 150, when Jonathan sat by the side of Alexander Balas, as he was married to Cleopatra. Here reference is made to five cities in Egypt occupied by Hebrews, one of them called Leontopolis (the city of the Lion), and to an altar and sacred stone (or 'tower,' if the word is read Mizpah) at the border of Egypt, where the Egyptians are expected to offer sacrifices to Yahweh. The feeling of the Greek translator toward Leontopolis is seen in his rendering the name 'The City of Righteousness.' It has been supposed that the *Sibylline Oracles* (v. 492 seq.) refer to this temple, but that is probably wrong. Early regulations preserved in the Mishna

ONIONS, OYSTER PLANT, ETC.



1. CARROT (*Daucus carota*).
2. PARSNIP (*Peucedanum sativum*).
3 and 4. ONION (*Allium Cepa*).

5. LEEK (*Allium Porrum*).
6. GARLIC (*Allium sativum*).
7. OYSTER PLANT (*Tragopogon porrifolius*).

(Menachoth xiii. 10) provide that a sacrifice promised to this temple should be offered there, and that priests of the temple should not lose their priestly dignity or share of the offerings if they came to Jerusalem. It is only after the destruction of the temple, and especially by rabbis of the second and third centuries, that the cult there was condemned (Menachoth, 109 b). After the fall of Jerusalem in A.D. 70 it seems to have enjoyed such favor that the Romans had reason to fear it, and after A.D. 72 Lupus closed it, and some time later, possibly A.D. 75, Paulinus destroyed it (*Bel. Jud.*, vii. 10, 2-4). Josephus states that it had then stood 343 years. This is no doubt an error for 243, which would place its consecration as a Yahweh sanctuary in B.C. 168. Consult: Cassel, *De Templo Oniæ Heliopolitano* (Bremen, 1730); Herzfeld, *Geschichte des Volkes Israel*, vol. ii., p. 557 seq. (Leipzig, 1863); Ewald, *Geschichte des Volkes Israel*, vol. iii., p. 405 seq. (Göttingen, 1852); Graetz, *Geschichte der Juden* (4th ed., Leipzig, 1888); Baethgen, in *Zeitschrift für alttestamentliche Wissenschaft*, vol. vii. (Giessen, 1886); Willrich, *Juden und Griechen vor der makkabäischen Erhebung* (Göttingen, 1895); id., *Judaica* (Göttingen, 1900); Bertholet, *Die Stellung der Israeliten und der Juden zu den Fremden* (Leipzig, 1896); Schürer, *Geschichte des jüdischen Volkes*, vol. iii. (3d ed., Leipzig, 1898); Derenbourg, *Essai sur l'histoire et la géographie de la Palestine* (Paris, 1867); Naville, *Seventh Memoir of Egypt Exploration Fund* (London, 1888); Wellhausen, *Israelitische und jüdische Geschichte* (3d ed., Berlin, 1899); Hamburger, in *Real-Encyclopädie des Judenthums* (Strelitz, 1896).

ONION (Fr. *oignon*, *ognin*, from Lat. *unio*, pearl, onion). Certain species of the genus *Allium* (q.v.), particularly *Allium cepa*, a biennial bulbous-rooted vegetable with a swelling stem, leafy at the base and with tapering fistular leaves. The bulb is composed of thickened leaf elements in concentric layers. The native country of the onion is not certainly known, but is probably either India or Egypt, in both of which countries it has been cultivated from the most remote antiquity. The part chiefly used is the bulb, but the young leaves are also employed and young seedlings drawn from onion beds are a very common ingredient in soups and sauces in the beginning of summer.

The onion requires a light, friable, well-drained soil, well stocked with organic matter and liberally fertilized. Reclaimed marsh soils are successfully and extensively used for growing the crop. Onions are propagated from: (1) sets, i.e. little bulbs which form on the tops of the stems of some varieties in place of seed, or by division of the parent bulb as in the case of the potato onion, or from small onions obtained from thickly sown seed; and (2) from seed. The first method is the one generally employed by farmers and market gardeners in growing early bunching onions. The sets are planted either in the fall or spring in rows a foot apart and three inches distant in the row. The main crop of onions is usually grown from seed sown in the open field in rows 12 to 14 inches distant and thinned to 3 inches in the row. Sometimes the seed is sown in the fall and transplanted to the field in the spring; but the method coming into vogue now in

the United States is to sow the seed under glass in the early spring and transfer to the field as soon as the weather will permit. Besides the certainty of an even stand by this method, the yields are much higher, the bulbs grade more uniformly, and the extra cost of transplanting is not much more than the cost of thinning and weeding when the seed is sown in place. Thorough cultivation is essential by whatever method grown. The bulbs are harvested when the most of the necks turn yellow, and are cured in rows if the weather is not too hot, or in open sheds or barns in rainy weather. They may be kept over winter by freezing and keeping in that state until spring or by storing in a dry apartment and keeping the temperature just above freezing. American varieties keep longer and are better adapted to most parts of the United States, but foreign varieties are better flavored and bring a higher price in the market. Bermuda onions, Spanish onions, and some other foreign varieties are quite extensively grown in California and the Southern States.

The potato onion, also called the Egyptian or ground onion, is a perennial variety which produces offset bulbs resembling the shallot but larger. They are milder than garlic, but are stronger than the common onion. The tree onion produces bulbs at the top of the stem, the umbels becoming viviparous. The Welsh onion (*Allium fistulosum*), also called cibol, is little cultivated in America. Its leaves are used like those of the shallot, by which name it is also known. Onions are similar to but milder than garlic (q.v.).

ONION-FISH. See GRENADIER.

ONION INSECTS. The principal insects which damage the onion crop are the onion-maggot (larva of *Phorbia ceparum*), the onion-thrips (*Thrips tritici*), and the onion-cutworm (larva of *Agrotis messoria*). The adult of the onion-maggot is a fly of the family Anthomyiidae. The eggs are laid early in the spring, next to the stems or leaves at the surface of the ground, and preferably in young onion beds. The larvæ work their way into the bulb and cause the rapid decay and death of the plant. Inasmuch as the bulb is the edible part of the vegetable, the slightest damage by these maggots is fatal, since the decay continues even after the maggots are killed. The maggots reach full growth about the end of May, and about the middle of June the second generation of flies occurs. This generation often attacks seedling onions, ruining entire beds. The insect passes the winter partly in the pupa state in the ground, and partly as adult in sheltered locations. On a small scale damage may be prevented by the use of sand soaked in kerosene, mixed with drier sand and placed at the base of the onion plants along the rows. This prevents egg-laying and kills such of the young maggots as attempt to work through it. On a large scale, the first plants which wilt must be lifted out and destroyed, and then kainit and nitrate of soda must be applied broadcast to the roots.

The onion-thrips sometimes attacks onions in great numbers, puncturing the succulent leaves and leaving a small yellow dot after each puncture. The leaf gradually loses its vitality and the top turns yellow. This thrips is not confined to the onion, but is also found upon cabbages and the flowers of the orange farther South,

and upon grass, wheat, oats, and rye. It thrives best in hot, dry weather, and the best remedy is a free use of standard kerosene emulsion diluted ten times.

Several species of cutworms attack onions, but *Agrotis messoria* has been specifically injurious in some of the large fields in the Northeastern States. The remedy here, as for other cutworms, consists in trapping the over-wintering larvæ early in the spring before vegetable gardens are set out, by distributing about the field bunches of grass or other early vegetation poisoned with Paris green or arsenic. Consult Smith, *Economic Entomology* (Philadelphia, 1896).

ON'KELOS. The supposed author of an Aramaic version of the Pentateuch. Onkelos is evidently, however, the Aramaic equivalent of Aquilas (or Aquila, q.v.), the Greek translator of the Pentateuch, and the term Targum Onkelos indicates merely that the translation is done in the style of Aquilas. The translation is written in Judean Aramaic, though edited in Babylonia probably not before c.400 A.D. (See BIBLE.) The method of Onkelos is in sharp contrast to that of the other Targums. It seeks to translate literally, keeping very close to the Hebrew text. One of its distinguishing features is the attempt to soften the anthropomorphic expressions of the Pentateuch—'The Word of the Lord,' 'The Presence of the Lord,' or 'Glory of the Lord' being used instead of the name of the divinity. In some places, moreover, particularly in the poetic portions (Gen. xlix.), Onkelos indulges in midrashic exegesis and weaves in some haggadistic turns. By Rabbinical prescription the Targum was to be read along with the Hebrew text—'twice Hebrew and once Targum.' For editions and translations, see TARGUM.

ON'OMAC'RITUS (Lat., from Gk. Ὀνομακρίτης, *Onomakritos*). A celebrated poet of the sixth century B.C., resident at Athens in the time of the Pisistratidæ. According to Tzetzes he was one of the four employed by Pisistratus to set in order the *Iliad* and the *Odyssey*, parts of which had become disarranged, owing to the failure of the rhapsodists to recite the lays in due order. He is said to have written theogonies himself, and to have attached the names of Orpheus and Musæus to compositions of his own. The extant Orphic hymns are, however, of much later origin. He was detected by Hipparchus in the forgery of oracles and exiled from Athens. After the expulsion of Hippias, however, he was on friendly terms with the tyrant, and in his interest urged Darius by pretended oracles to invade Greece. Consult Ritschl, *Onomakritos von Athen*, Opusc. 1, 238ff. (Leipzig, 1866).

ONOMANCY. See SUPERSTITION.

ON'OMAT'OPŒ'IA (Lat., from Gk. ὀνοματοποιία). A term used in philology to denote the formation of words in imitation of natural sounds, as *cuckoo*; *cock*; *clash*; *rap*; *whizz*; *clang*. The theory, termed by Max Müller the 'bow-wow' theory, of the onomatopoeic origin of all language, probably recognizes only one of the elements entering into the origin of human speech.

ONOMICHI, ō'nō-mē'chē. A seaport in the Prefecture of Hiroshima, Japan, situated on the southern coast of Hondo, 52 miles east of Hiroshima (Map: Japan, C 6). It is a prosperous

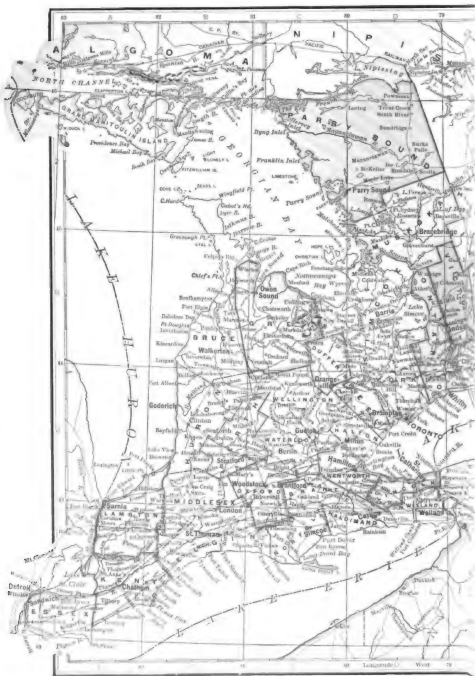
town with narrow streets and a number of interesting temples. Population, in 1898, 22,312.

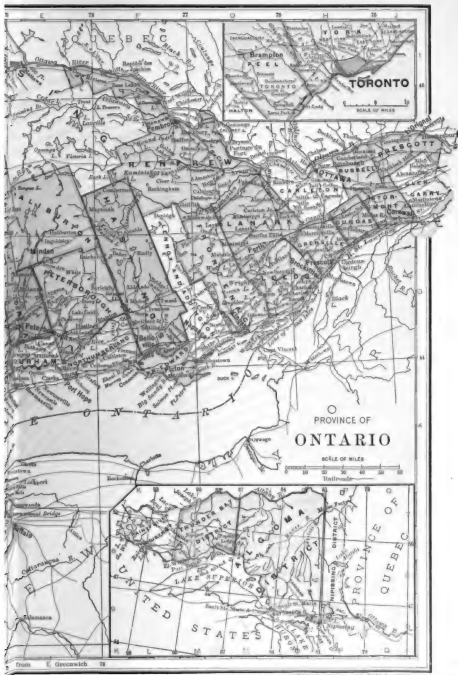
ONONDAGA, ōn'ōn-dā'gā ([people] of the hill). An important tribe of the Iroquois confederacy (q.v.), and the official guardians of the council fire of the league. Their chief residence was about the lake and creek of the same name, in central New York, with jurisdiction extending northward to Lake Ontario and southward to the Susquehanna. Their principal village, which was also the capital of the confederacy, was called Onondaga or Onondaga Castle, and was near the present town of that name, a few miles south of Onondaga Lake. In 1677 it contained 140 houses. The Onondaga were estimated by the Jesuits in 1660 at about 1500 and by Greenhalgh in 1677 at 1750. The interior position of the Onondaga rendered them less prominent than the Mohawk and the Seneca, the two frontier tribes of the confederacy, and they seem also to have been of less warlike disposition. Many of them came early under the influence of the French missionaries, and before 1751 it was said that one-half of the tribe had abandoned the league and removed to the Catholic Iroquois colonies in Canada. Those who remained with the confederacy shared its fortunes in the colonial wars and the Revolution. Nearly one-half followed Brant to Canada and were afterwards settled on the reservation on Grand River, Ontario, where they now reside. The rest, numbering now about 560, are still upon the Onondaga and other Iroquois reservations in New York, making an estimated total on both sides of perhaps 1000.

ONONDAGA PERIOD, or ONONDAGA SALT GROUP. The middle division of the Silurian era. It consists of a great series of shale beds, containing beds of salt, in Ohio and western New York, and also beds of water lime. The formation is found from the Hudson Valley, New York, westward into Ohio, Michigan, and Wisconsin, and southward into Pennsylvania. Its thickness varies from 100 feet in eastern New York to 1600 feet in Pennsylvania. See SILURIAN SYSTEM.

ONSL'OW, GEORGE (1784-1853). A French composer, born in Clermont-Ferrand, France, the grandson of the first Lord Onslow. In London he studied under Hüllmandel, Dussek, and Cramer, and opera composition under Reicha at Paris. His operas *L'Acalde de la Vega* (1824), *Le colporteur* (1827), and *Le Duc de Guise* met with some success, but he acquired more popularity by his delightful chamber music. He wrote sonatas, symphonies, concertos, and string quartets, which latter are still performed. In 1824 the French Académie elected him to succeed Cherubini.

ONTA'RIO (formerly Upper Canada, or Canada West). A province of the Dominion of Canada, lying between latitudes 42° and 52° N. and longitudes 74° and 95° W. The boundaries are very irregular, being determined mainly by natural limits. On the north the province touches James Bay and is separated from Keewatin by the English and Albany rivers, and from Quebec by the Ottawa. On the south it is separated from the United States by the Saint Lawrence River, the Great Lakes, and the Rainy River; on the east an arbitrary line divides it from Quebec, and its western extremity touches





Manitoba. The extreme length of the province from east to west is about 1000 miles, and the greatest breadth from north to south nearly 700 miles. The land area amounts to 210,050 square miles and the water area (exclusive of that bordering upon the south), 2350 square miles.

TOPOGRAPHY. The physical features of Ontario are not characterized by any striking variations. Age has reduced its surface to a hummocky plateau called the Laurentian Highland or the Height of Land, the highest portion of which constitutes the divide between the water systems of the Hudson Bay and the Great Lakes. Its altitude does not exceed 1200 feet. The southern portion comprises the lowlands of the Saint Lawrence, but is broken by a spur of the northern upland, running from Georgian Bay toward the eastern end of Lake Ontario. This spur is somewhat more elevated and broken than the surrounding lowland, and forms on the one hand the Thousand Islands of the Saint Lawrence, and on the other the high and solid bluffs of the north shores of Lakes Huron and Superior, which are in strong contrast with the low shores of Lake Ontario. Another slight elevation is occasioned by the Niagara escarpment, which extends across the peninsula in a northwesterly direction from Niagara Falls to the Blue Mountains and constitutes the long projection into Lake Huron and also forms the Manitoulin Islands to the northwest. From the economic point of view this lowland region, the Saint Lawrence River, and the Great Lakes are the all-important physical features of the province. The boundary rivers above mentioned are the most important; but there are also numerous lesser streams, whose courses are generally very tortuous and seldom navigable. Attractive lakes are scattered over the greater portion of the province, the largest being Lakes Simcoe and Nipissing, east of Georgian Bay, Lake Nipigon, north of Lake Superior, and the Lake of the Woods in the extreme west.

CLIMATE. The climate of southern Ontario, particularly the peninsular portion, is very materially modified by the proximity of the Great Lakes. Although the summers are hot and the winters cold, the extremes are not so excessive as in other inland Canadian regions or the most northern of the United States. Furthermore, the dryness of the atmosphere makes the extremes endurable without discomfort, and bracing and healthful. In the southern portion the mean temperature for January is 21°, with a minimum of about 10° below zero. The mean for July is 68°, and the ordinary maximum 80°, a temperature above 90° being rare. The fall is the most pleasant period of the year. In the great northwestern portion of the province the extremes are greater and the winter season is longer. The annual precipitation of the province is between 30 and 40 inches, being well distributed throughout the year. Winter storms of the blizzard type are unknown, and the winter snows, while not so deep as in the region farther to the northeast, are always sufficient to protect the farmer's crops and to enable the lumberman to secure his supply of logs.

SOIL. The soil of the lowland region (see *Topography* above) is generally of extreme fertility. Loams of the black, clay, and sandy varieties predominate. Much of the great Archæan region to the north is rocky and rugged, and the

soils have a less enviable reputation as regards fertility than those farther south. Their apparent barrenness, however, is probably due to climatic conditions.

FLORA. The plant life of the province is divided into two sections. In that portion of the peninsula which lies west of Toronto are found the oak, hickory, tulip-tree, and other varieties of trees and smaller plants which are common in the Ohio region south of the lakes. In the rest of the province the vegetation is sub-Arctic and the principal forest trees are the spruce, the pine, and the tamarack. Originally a dense forest covered almost the whole of the province, but less than one-half is now estimated to be in forest and woodland, the original forest having been entirely removed from the peninsular portion.

FAUNA. Northern Ontario is important as a fur-producing region. It has furnished a large portion of the world's supply of mink, skunk, otter, and other varieties of furs. It is a favorite hunting resort, its large game, especially moose and caribou, having been very abundant. Both fur and game animals are becoming scarce, and protective laws are but partially successful in checking the diminution. See CANADA.

GEOLOGY. The entire northern and central parts of the province belonged to the original Archæan continent, and consist of ancient crystalline rocks of the Laurentian and Huronian series. A tongue of the former, forming the upland spur mentioned under *Topography*, extends southeastward, crossing the Saint Lawrence at the Thousand Islands, and terminating in the Adirondacks of New York. The Huronian area is still indefinitely mapped, but it appears chiefly north of Lake Huron (where it is typical), and northwestward along the shore of Lake Superior. The most important mineral ores are found in the Huronian rocks. The southern lowlands, on either side of the Archæan spur, are overlaid with Lower Paleozoic strata of the Cambrian and Silurian series, with Devonian strata above and south of the Niagara escarpment, appearing in unbroken continuity with the States south of the Great Lakes.

MINING. Ontario is rich in mineral resources, but a combination of circumstances has greatly retarded their exploitation. Most of the minerals are found in the Archæan rocks beyond the settled portions of the territory, in the barren, inhospitable regions to the north of lakes Superior and Huron. Coal is not found in the province, and is imported only at great cost, while the exportation of the metallic ores into the United States is attended by the extra cost of tariff charges. Nevertheless the decade from 1890 to 1900 witnessed a remarkable growth of the mining industry. The Sudbury nickel deposit, north of Georgian Bay, is the only productive nickel deposit in this hemisphere. The output of nickel increased from 1,000,000 pounds in 1889 to 9,189,000 in 1901, and has exceeded that of New Caledonia. In 1898, 1899, and 1900, the United States took all the exports of nickel, the average annual value being \$1,000,000. The value of the output in 1901 was \$4,594,500. Copper is found in almost the whole of the shore region north of Lakes Huron and Superior. It was mined as early as 1846, but operations were discontinued in 1876. Its production began again with the development of the nickel mines, the copper being found in combination with nickel.

In 1898 the product reached 8,300,000 pounds, over half of which was exported into the United States. Iron is found in the same region as copper, and also in the region north of Kingston. An adverse tariff had prevented mining operations until recently, when the province placed a bounty upon its production. Since that time the industry has rapidly developed. The product for 1899 was estimated at \$850,000.

Gold has been found at points along the entire length of the Archaean rocks of the province. It is in the most paying quantities, however, in the region west of Lake Superior. The gold lies in quartz veins, and only recently has its exploitation been seriously undertaken. The annual value of the product increased during 1890 to 1900 from nothing to \$421,000. Silver is mined on the west shore of Lake Superior, but its production is small and uncertain. Prior to 1890 the principal mineral productions were secured from the older portion of the province, and consisted of petroleum and salt. Petroleum is found at the south point of Lake Huron in Lambton County. The average annual product from 1890 to 1900 exceeded 30,000,000 gallons. Farther north along the east shore of Lake Huron are the salt beds, whose annual yield from 1890 to 1900 averaged over \$200,000. During the last decade, the mineral wealth of peninsular Ontario has been increased by the development of natural gas fields near Niagara in the east and near Detroit in the west. The product of the latter field is consumed by the city of Detroit, and that of the former by the city of Buffalo. The estimated annual value of the product since 1893 has been \$350,000. Clay for brick and tile occurs in all parts of the province. Limestone and sandstone for building purposes abound in the Paleozoic region, and granite and marble are quarried in the Archaean region.

FISHERIES. Ontario shares with the United States in the fishing advantages of the Great Lakes. The value of the annual catch has been above \$2,500,000, about one-fourth the product being exported. Trout, whitefish, herring, and pickerel, in the order named, are the most important.

AGRICULTURE. This, the leading industry, is highly developed throughout the lowland region. The productivity is great, the acreage yield for most crops being greater than the average for the same crops in the United States. No portion of the Dominion is superior in adaptability to mixed farming. Oats and hay lead in acreage, approximately 2,400,000 acres in each case being the average for the six years ending with 1900. Wheat increased during that period from 950,000 acres to 1,400,000. Peas are a staple crop and averaged about 800,000 acres. The average for corn and for barley has been about 500,000, the conditions being especially favorable for barley. Rye, buckwheat, beans, mangel-wurzels, potatoes, and turnips are of considerable importance. Great attention is paid to apple-raising throughout the lowland region, especially in that portion lying west of Toronto. Here too are extensive vineyards. Peaches and other varieties of fruit are successfully grown.

Stock-breeding is extensively carried on, and the province excels in the purity and quality of the various breeds raised. Cattle-raising receives the greatest attention; the number, con-

stantly gaining, exceeded 2,400,000 in 1900. The number of sheep and swine is likewise increasing, each numbering about 1,700,000 in 1900. Horses show a decrease, the present number being about 600,000. Dairying is an important industry, the principal branch being cheese-making. In 1900 there were 1173 cheese factories, the value of whose products was \$13,023,025. This industry is rapidly growing in prominence.

MANUFACTURES. There are some important manufacturing industries in the province, though manufacturing is not generally well developed. Ship-building (wooden vessels) was formerly an important industry, owing to the great timber resources. These are now extensively drawn upon in the manufacture of doors, window frames, and furniture. Pork-packing and flour-milling are each of some importance. Few countries have at hand such an abundance of water power. The Ottawa River and almost every smaller stream in the province have important falls or rapids, not to speak of Niagara Falls and the rapids along the course of the Saint Lawrence. All these chief sources of power are being extensively utilized.

TRANSPORTATION AND COMMERCE. The Dominion, the provincial, and the various municipal governments have contributed liberally to the construction of railroads, and the mileage has rapidly increased until in 1900 it amounted to 6812 miles, or twice that of any other Canadian province, there being one mile of track to every 32.24 square miles of area. The greatest part of this is in peninsular Ontario, the Canadian Pacific being the only line which traverses the great northern portion of the province. At a number of points the railroads connect with those of the United States. The position of Ontario in relation to the Great Lakes and the Saint Lawrence River provides excellent water communication with the markets of the world. Formerly a number of falls and rapids greatly lessened the commercial advantages of these waterways; but the Provincial and Dominion governments have constructed a series of canals from Sault Sainte Marie in the north to Lachine Rapids in the east, so that it is now possible for vessels drawing 14 feet of water to pass from the head of Lake Superior through the whole course of the Saint Lawrence. The longest of these canals—the Welland, connecting Lake Erie with Lake Ontario—is 26¾ miles in length and cost over \$24,000,000. The severity of the winter season stops navigation during that period, and will always detract greatly from the otherwise superior advantages of the navigable waters.

The province is rapidly increasing in commercial importance. The imports for home consumption during the year 1900 amounted to \$70,200,000 as against \$43,600,000 for the year 1890. Coal is the leading import. The duty collected has grown correspondingly, and in 1900 was \$10,700,000. The exports for the same year amounted to \$56,100,000. The foreign trade of the province is principally with the United States and England. The merchant marine in 1900 consisted of 1064 steamers and 546 sailing vessels, with a combined tonnage of 141,112.

BANKS. In 1900 the chartered banks and bank branches of the province numbered 306. The post-office savings banks numbered 487, having 101,000 depositors, and \$23,637,000 on de-

posit. There was also one Government savings bank.

GOVERNMENT. The relation between the Provincial and the Dominion governments is somewhat similar to that between the States and the United States—matters of general interest being left to the Dominion Government. See CANADA.

The Provincial Government is administered by a Lieutenant-Governor, appointed by the Governor-General of the Dominion for five years. He is assisted by an executive council of eight members, which includes an attorney-general, commissioner of agriculture, secretary, registrar, treasurer, commissioner of Crown lands, commissioner of public works, and minister of education. The legislative assembly has only one House of 98 elective members. Voting is by ballot, and the right of suffrage is conferred on all male British subjects twenty-one years of age, possessed of certain property qualifications. The judicial power is vested in a superior court of judicature, consisting of the High Court of Justice (with King's Bench, Common Pleas, and Chancery courts), and the Court of Appeal. In the Dominion Parliament the Province of Ontario is represented by 24 Senators and 92 members of the House of Commons.

The division of the province for purposes of local government is similar to the system found in the United States. The organized portion is divided into counties, and these are subdivided into townships. The more densely populated groups are classified according to size into villages, towns, and cities. The governing body in each of these units of government consists of an elective council. There are also administrative officers.

FINANCE. General property taxes are levied only for local purposes, the Provincial Government having sufficient income from other sources to meet all expenses and keep free from indebtedness. The two main sources of the provincial revenues are the Dominion subsidy (see CANADA) and the revenue from the Crown lands—a commission being charged for the privilege to cut timber in the forests, and dues also being collected on the amount cut. Other important sources of revenue are the liquor licenses, the collateral inheritance tax, the sale of law stamps, and (recently) the revenue from the mines. The cost of the Provincial Government since confederation has averaged a little over \$3,000,000 annually. The province extends certain aids to the county municipalities, as, for instance, in the administration of justice. The law places a maximum limit upon the local tax rates, and a proposal to make a permanent debt must receive the sanction of the people. The support of public institutions constitutes the largest item of provincial expenditure, especially the charitable institutions, the Government meeting the expenses in whole or in part incurred in the care of the deaf, blind, or insane to the number of 4000.

POPULATION. Ontario, with 2,167,000 inhabitants (1901), is the most populous province of Canada, and contains about two-fifths of the total population of the Dominion. Formerly the inhabitants were centred almost wholly in the Ottawa and peninsular portions of the province, but the census of 1901 shows a decrease in almost all the counties of this region, which, however,

has been more than balanced by the increase in the mining districts north of lakes Huron and Superior. The total increase for the decade 1891-1901 was less than 2½ per cent. The birth rate is not low, but the province loses heavily through emigration. The large majority of the population is of English descent, though the Scotch predominate in the counties of Bruce, Grey, and Glengary. The German, Irish, and some other nationalities are represented in Toronto, and the negroes in the Niagara peninsula. The early development of Ontario profited from the migration of New England opponents of the War of 1812.

The census of 1901 returned the population of the largest cities as follows: Toronto, the capital, 208,040; Ottawa, 59,928; Hamilton, 52,634; London, 37,981; Kingston, 17,961; Brantford, 16,619; Windsor, 12,153; Guelph, 9959; Saint Catharines, 9946; Berlin, 9747; Belleville, 9117; Chatham, 9068.

INDIANS. The number of Indians is estimated at 20,700. The Government furnishes educational advantages for the Indian children, and the Indian is generally adopting agricultural and other occupations characteristic of civilized life.

RELIGION. There is no State Church, and all the churches are supported on the voluntary principle. The province is strongly Protestant, the ratio between the Protestants and Catholics being about 5 to 1. Of the Protestant denominations, the Methodists lead, followed by the Presbyterians, Episcopalians, and Baptists in the order named. The several bodies of Methodists have been united into one church, as have been also the several bodies of Presbyterians.

EDUCATION. Great attention is given to education, and the educational system is complete in scope, progressive in spirit, and efficient in administration. The taxpayers elect local boards of trustees, who have immediate control of the schools, but they are administered in accordance with the general regulations of the Minister of Education, and all follow a uniform course of study, use the same text books, and are taught by teachers who have passed the provincial examination. The schools are free, and attendance is compulsory. Under certain conditions both Catholics and Protestants may establish separate schools which will be supported from the public taxes and appropriations (such schools continuing under the control of the Minister of Education). The exercise of this privilege, however, has not become common, nearly nine-tenths of the school children attending the unsectarian schools. Since 1898 the province has expended an average exceeding \$9 per pupil of the total attendance. About two-thirds of this is raised by local taxes, the greater part of the remainder being the income from lands originally set apart as clergy reserves or for school purposes, and the smaller part being the annual legislative grant. There are additional aids to 'poor sections,' and the policy of pensioning superannuated teachers has long been in vogue. All the schools are in the hands of trained teachers, two-thirds of whom are females, the Government having provided for their training through the maintenance of 55 county model schools, two normal schools, and one normal college. The breadth of the public school system is shown in that it extends from the kindergartens (of which there are 119) to the university, and includes (besides

those mentioned above) high schools, night schools, and an agricultural college, the last being located at Guelph. Instruction in agriculture is becoming common in the rural schools. The school course provides the rudiments of a business education, and manual training is being introduced. Toronto University and College is at the head of the provincial school system, and has affiliated with it a number of denominational institutions, including Saint Michael's College (Catholic), Wycliffe College and Huron College (Episcopalian), Knox College (Presbyterian), and Victoria University (Methodist). There are a number of other private and sectarian colleges in the province, including the historic Upper Canada College, located at Toronto.

HISTORY. Champlain in 1615 was the first European to explore the region; by his alliance with the native Hurons he precipitated the war which led to their almost total annihilation by the Iroquois or Five Nations. In 1671 the French laid claim to the Lake Huron district; eight years later Niagara was settled by La Salle; and in 1749 Fort Rouillé, a French trading station, was established on the present site of Toronto. With the rest of Canada, the region was ceded to Great Britain in 1763 by the Treaty of Paris (q.v.), and formed part of the Province of Quebec. Its permanent settlement dates from the immigration of American Tories during the American Revolution and after its close in 1783. It became the Province of Upper Canada with a separate elective assembly in 1791; in the War of 1812 it was the scene of numerous Anglo-American conflicts, notably the battles of the Thames and Lundy's Lane; it was reunited with Quebec in 1841, in consequence of long continued political discontent and the rebellion fomented in 1837 by William Lyon Mackenzie (q.v.); in 1867 it received its present name, and again became an independent province in the newly organized Dominion of Canada. See CANADA.

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ONTARIO, LAKE. The most eastern and the smallest of the five great lakes of North America. It lies between latitudes 43° 10' and 44° 8' N., and longitudes 76° 30' and 80° W., and is enclosed by the Canadian Province of Ontario and New York State (Map: United States, K 2). With a water surface of 7240 miles, it is less than one-fourth as large as Lake Superior. It is 190 miles long, 55 wide in its widest part, and about 480 miles in circumference. Its distinctive hydrographic basin is 28,840 square miles in area. The mean elevation of its surface is 247 feet above tide water in the Atlantic, its maximum depth is 738 feet, its approximate mean depth is 300 feet, and the depth of its basin below the sea level is 491 feet, the bottom of the lake being

lower in relation to sea level than that of any other of the Great Lakes. The water discharge of the Saint Lawrence basin has been found to be slightly less than half its rainfall; Lake Ontario, lying at the foot of the chain of lakes, has naturally the largest discharge, 300,000 cubic feet per second, as compared with 265,000 for Lake Erie, 235,000 for lakes Huron and Michigan, and 86,000 for Lake Superior. The lake is sufficiently deep throughout for vessels of the largest tonnage. Its shores are generally very flat and have little attractive scenery, except in the bay of Quinte, a long, crooked arm, which extends about 50 miles into the land, on the northeast side of the lake. The lake freezes only a few miles from the shore, which is due in part to the frequent agitation of its waters by violent storms, and also to a persistent surface current established through its centre which moves to the east with return currents and eddies along the shores and about the islands. This surface current is due to the fact that the larger axis of the lake coincides with the direction of the prevailing westerly winds. There are many convenient harbors and thriving ports, chief among which are Kingston, Port Hope, Cobourg, Toronto, and Hamilton on the Canadian shore, and Oswego, Sacketts Harbor, and Charlotte in New York. Many lighthouses along the coasts facilitate navigation, and the lake is connected with Lake Erie by the Welland Canal, with the Erie Canal and the Hudson River by the Oswego Canal, and with the Ottawa River by the Rideau Canal.

ONTENIENTE, *on'tá-né-án'tá*. A town of Eastern Spain, in the Province of Valencia, 45 miles south of Valencia, on a branch of the railroad between Valencia and Madrid (Map: Spain, E 3). It was formerly fortified. Linen and woolen fabrics and paper are manufactured. Population, in 1900, 11,441.

ONTOGENY (from Gk. *ὄν*, *ón*, being + *-γένεια*, *-gencia*, production, from *γενεσθαι*, *gignesthai*, to become). The development of the individual animal, in contrast to *phylogeny*, or the development of the entire class. The development of the individual is accomplished in a few hours, days, or years, at the most, while that of the order or class or phylum may extend through several geological ages, and is represented by a series of forms so related that they appear to be blood relations, and descendants from a primitive type. (See PHYLOGENY.) The ontogeny of any animal is the successive stages it passes through in the course of its development after the fertilization of the egg until it reaches maturity. Such a series of stages roughly corresponds to and epitomizes the development or phylogeny of the class.

ONTOL'OGY (from Gk. *ὄν*, *ón*, being, pres. part. of *εἶναι*, *einai*, to be + *-λογία*, *-logia*, account, from *λέγειν*, *legein*, to say). A term applied to that department of metaphysics (q.v.) which deals with the ultimate nature of the universe conceived as being. With many philosophers ontology is made so inclusive as to be practically identical with metaphysics, but with others it is distinguished from other departments of that science, notably from teleology (q.v.).

ONUS PROBANDI. See BURDEN OF PROOF.

ON'YX (Lat. *onyx*, from Gk. *ὄνυξ*, nail, veined gem, onyx, thickening in the cornea of the

eye; connected with Lat. *vinguis*, OIr. *inga*, nail). A crypto-crystalline variety of quartz (q.v.), consisting of layers of chalcidony of different colors, usually white and black, or white and dark brown. The finest specimens of this mineral are brought from India, although it occurs in small quantities in many other localities, such as the Lake Superior region, and near the Bay of Fundy. It was highly esteemed by the ancients, who used it for ornamental purposes.

ONYX MARBLE. A beautiful ornamental stone composed chiefly of carbonate of lime colored by iron or manganese. This is the commercial variety of onyx, while true onyx is a banded variety of marble. Commercial onyx marble really includes two rock types, both of which are chemically deposited. The one is a hot-spring deposit or travertine, which is formed on the surface, the other is a cold-water deposit which is formed on the floor, roof, or walls of limestone caves in the same manner as stalagmites and stalactites. Owing to its method of formation, the cave onyx usually occurs in less extensive deposits than the travertine onyx marbles, which have been formed around springs, and both are far less extensive and less regular in their arrangement than the ordinary bedded limestones or marbles. The beautiful banding seen in onyx is due to the deposition of successive layers of carbonate of lime, while the colored cloudings and veinings are caused by metallic oxides, especially iron. The fact that onyx marble is colored along the veins or cracks is not necessarily due to an infiltration of the iron along these lines, but is caused by the iron carbonate in the stone being locally oxidized along the cracks. The cave onyx marbles are more coarsely crystalline and less translucent than the travertine onyx. Onyx marbles, although rarely occurring in large quantities, are widely distributed. The earliest worked deposits were probably those of Egypt, which were used by the ancients for the manufacture of ornamental articles and religious vessels. The Greeks and Romans also valued the material; the deposits near Urumiah and Yezd were extensively worked during the prosperous days of the Persian Empire. Many of the spring deposits occur in regions of recent volcanic activity and all of the known occurrences are of recent geological age. In the United States onyx marbles are said to occur in Arizona, California, and Colorado, but the American deposits have not been developed commercially to a large extent, most of the onyx used in the United States being obtained from Mexico, while small quantities are imported from Algeria and Egypt. The Mexican stone has for years been obtained chiefly from the vicinity of Pueblo and more recently from the vicinity of San Antonio. *Mexican onyx* is the name given to banded varieties of aragonite that are found extensively in Arizona, Missouri, and California, as well as in Tecali, Mexico. It is used for decorative purposes. The value of onyx varies considerably, the poorer grades selling for as little as 50 cents per cubic foot, while the higher grades bring \$50 or more.

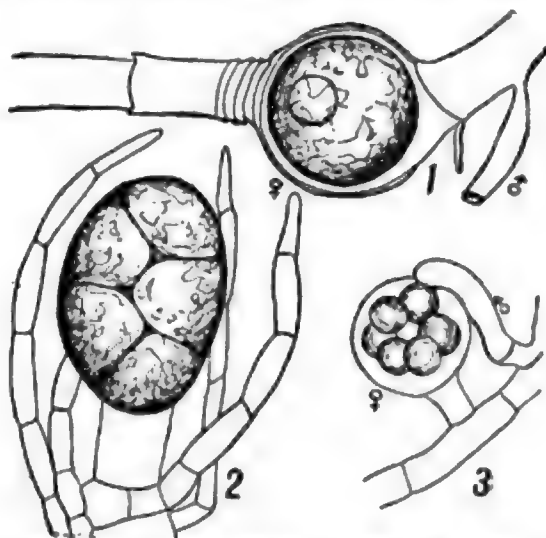
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Composition, and Uses, Both Ancient and Modern, Annual Report of the United States National Museum (Washington, 1894); Merrill, "Onyx," in *Mineral Industry*, vol. ii. (New York, 1894).

OO, or UHO. One of the names of the Hawaiian feather-cloak bird. The bird is so called from its cry. See MOHO, and Plate of CREEPERS.

ODEYPORE, ॐ'dī-pōr'. Another spelling for Udaipur (q.v.), the name of a native State and city in India.

OÖGONIUM (Neo-Lat., from Gk. *ὠογονεῖν*, *ōogonein*, to lay eggs, from *ὠόν*, *ōon*, egg + *γενή*, *gonē*, generation). An organ in the algae and fungi (thallophytes) which develops the eggs (oöspores), hence the female sex organ. It is generally a single cell, but may bear accessory structures. The oögonium of the algae was derived from a cell producing undifferentiated gametes (sex-cells). In the process of sexual evolution similar gametes became differentiated into eggs and



OÖGONIA IN. 1, OÖGONIUM; 2, PYCNOSPORANGIUM; 3, ACHLYA.

sperms; now the structure bearing the eggs is called the oögonium, and that developing the sperms ('antherozoids') the antheridium. The simplest and most primitive oögonia probably contained several eggs, although there are not now many illustrations of such conditions among the algae. That is to say, the evolutionary tendency in the development of oögonia is to reduce the number of eggs until all of the protoplasm is devoted to one. Such highly differentiated oögonia are well illustrated in *Vaucheria*, *Oedogonium*, and *Volvox*. *Chara* and *Coleochaete* present further complications in the form of filaments that invest the cell containing the egg with a protective covering. The oögonia of fungi are in general similar to those of algae, and indeed are believed in many cases to be directly derived from them. They are found chiefly in the group of the *Phycomycetes*, which is closely related to the algae, but homologous structures are found in the *Ascomycetes*, although they generally bear the name of ascogonium or archicarp. The best illustrations of oögonia in the fungi are furnished by the water molds (*Saprolegniales*), and such well-known genera as *Albugo* (*Cystopus*), *Pythium*, and *Peronospora*.

OO'JEIN'. A town of Malwa, Gwalior, Central India. See UJJAIN.

OOLACHAN, ॐ'lā-kān, or **EULACHAN.** See CANDLE-FISH.

OÖLITE, ō'ō-lit (from Gk. ὄον, *ōon*, egg + λίθος, *lithos*, stone). A term formerly used as synonymous with Jurassic, but now used to designate the middle and upper divisions of the Jurassic rocks, the lower division being called the Lias. In the United States the Oölite is of little importance, and in fact has only been identified along the Pacific coast, but in Europe it underlies a vast area, for during this period of geologic time there occurred one of the greatest encroachments of the sea over Europe and Asia which is known in geologic history. The rocks of the Oölite period are chiefly limestones. They are perhaps best known from their occurrence in the Jura Mountains of Switzerland, where the rocks have been bent into such beautiful folds as to attract the attention of the most casual observer. See JURASSIC SYSTEM.

OÖLOGY, ō-ō'lō-jī (from Gk. ὄον, *ōon*, egg + λογία, *-logia*, account, from λέγειν, *legein*, to say). The science of eggs; especially the study of the breeding habits, nests, and eggs of birds; a branch of ornithology. Birds' eggs (q.v.) are conveniently classified as 'marked' and 'unmarked,' according to the ground color. Birds which lay their eggs in holes in trees or in the ground almost always have white, unspotted eggs, and they are frequently of a peculiarly smooth, translucent texture. Birds which build in trees generally have blue or greenish eggs, either spotted or unspotted, while birds that build in bushes, near the ground, are likely to lay speckled eggs. The shore birds usually have the eggs heavily marked with dark brown on a yellowish background, while gulls and terns always lay heavily marked eggs. Ducks, geese, and herons lay unspotted eggs. Some birds lay only a single egg, and this is especially true of certain marine birds, such as auks, guillemots, and murrelets. Others lay two eggs, notably the humming-birds, while three, four, and five are the most common numbers. When the number is more than eighteen, there is reason to believe that more than one female has been concerned in the laying, as happens among ostriches and mound-birds. Gallinaceous birds and ducks, coots, and rails lay the largest number of eggs; the quail is said to lay eighteen, the coot fifteen, the wood duck fourteen, and the sora sixteen. There is no direct relation between the size of the bird and the size of the egg. The smallest eggs actually, and proportionately also, are those of humming-birds, which may be less than half an inch long by one-third of an inch wide. The largest eggs actually are those of the ostrich, but proportionately the eggs of the kiwi and mound-birds are much larger. Of North American birds, the largest eggs are probably those of the California condor, which are 4.5 × 2.5 inches. The swan lays an egg nearly as large, but does not breed within the United States. The great auk, though a much smaller bird than either of these, laid an egg 5 × 3 inches; but very few of them are now in existence. (See GAREFOWL.) The study of birds' nests is sometimes called *caliology*, as distinguished from oölogy proper. See NIDIFICATION.

Dr. Thomas M. Brewer (q.v.) may well be called the father of American oölogy, for his *North American Oölogy*, a quarto which appeared in 1857, was the first systematic work dealing with that subject published in this country.

Unfortunately only one part of this was ever printed, but it is notable for its colored plates of birds' eggs. Capt. Charles E. Bendire (q.v.) became famous as an oölogist in the West, and in 1883 was appointed a curator in the National Museum. In July, 1892, appeared the first volume of his *Life Histories of North American Birds*, and the second volume appeared in September, 1896. They are quarto volumes of many hundred pages and numerous colored plates. An earlier descriptive work was Ernest Ingersoll's *Natural History of the Nests and Eggs of North American Birds*, of which seven 'parts,' describing the nidification of about 100 species of oscine birds, with colored plates of their eggs, were issued at Salem, Mass., in 1879-80. Other books dealing exclusively with American oölogy have been: Gentry, *Nests and Eggs of North American Birds* (Philadelphia, 1885); and Davie, *Nests and Eggs of North American Birds* (2d ed., Columbus, 1889). Several fine works describe the eggs of European and East Indian birds, of which one of the oldest and finest in English is Hewitson's (3d ed., London, 1856). For others consult Newton, *Dictionary of Birds* (London and New York, 1893-96). See Egg, and the accompanying colored plates.

OOMS, ōms, KAREL (1845-1900). A Belgian historical painter, born at Desschel, Province of Antwerp. He studied at the Antwerp Academy and under Nicaise de Keyser, and supplemented his artistic training by extensive travels through Holland, England, Germany, and Italy. His most important works include: "Philip II. Paying the Last Honors to Don Juan d'Austria," in the Antwerp Museum; "Forbidden Reading," Brussels Museum; "Innocence Protected by Law," Palais de Justice, Antwerp; "Last Days of Rubens" (1892); and "Christ and His Disciples on the Sea of Galilee" (1895).

OORI, ō-ō'rē, or **URI**. A river in Africa. See LIMPOPO.

OORIAL, ō'rī-āl, or **URIAL**. The name in the Punjab of a wild sheep (*Ovis Vignei*), called 'sha' in Ladak. It is a large, powerful species, which is to be found on the high mountains from Eastern Persia to Northern Tibet. The horns of the rams are heavy, rounded, much wrinkled, rise close together, and sweep around, so that in old specimens they almost complete a circle. A ruff of hair on the throat is usual. These wide-ranging and variable sheep are very wary and agile, and give the sportsmen a hard chase. The young are often captured, however, and wild bands often mingle with native sheep on remote hill-pastures. Consult: Blanford, *Fauna of British India: Mammals* (London, 1889); and writers upon natural history and sport in Central Asia. See Plate of WILD GOATS.

OORT, ōrt, HENRICUS (1836-). A Dutch biblical scholar, born at Eemnes. He studied theology at Leyden, preached at Santpoort, and, after two years teaching in the Amsterdam Athenæum, became professor of Hebrew language and archæology at Leyden. Oort edited the *Theologisch Tijdschrift*, and wrote: *De dienst der Baälim in Israël* (1864; Eng. trans. by Colenso, 1865); *Het menschenoffer in Israël* (1865); *Twaalf wonder spreken van Jezus* (1870); *De Bijbel voor jonge lieden* (with Hooykaas, 1871; Eng. trans. by Wicksteed, 1873-79); *Evangelie en Talmud* (1881); *Atlas voor Bijbelsche en*

Kerkelijke geschiedenis (1884); and *Textus Hebraici Emendationes* (1900).

OÖSPHERE (from Gk. *ὄον*, *don*, egg + *σφαῖρα*, *sphaira*, ball). A general name given to the female sex-cell (gamete), and of course used only with heterogamous plants, in which the pairing gametes are unlike. It is the oosphere which upon fertilization becomes the oöspore (q.v.). The name is being abandoned for the simpler word 'egg.'

OÖSPORE (from Gk. *ὄον*, *don*, egg + *σπόρος*, *sporos*, seed). A general name given to the spore (in plants) which is the result of fertilization. Frequently the term is restricted to the sexual spores of heterogamous plants, that is, those whose pairing gametes are unlike (sperms and eggs). In this case the word 'zygospore' or 'zygote' is used for the sexual spore of isogamous plants, that is, those whose pairing gametes are alike. The oöspore is sometimes appropriately called the 'fertilized egg.' See FERTILIZATION; SPORE.

OOST, *ōst*, JAKOB VAN (1600-71) (called the Elder). A Dutch painter, born at Bruges. He studied under his brother, Frans van Oost, and then went to Italy, where he became an imitator of Annibale Carracci. In 1629 he returned to Bruges. His works are genre, historical, and portrait, and are to be found in many of the European galleries. His son JAKOB (1639-1713) was born at Bruges, and, after studying with his father, spent several years in Italy and went to Paris. He lived for more than forty years at Lille, where most of his works are to be seen.

OOSTERHOUT, *ō'stēr-hout*. A town in the Province of North Brabant, Holland, 25 miles southeast of Rotterdam (Map: Netherlands, C 3). The handsome town hall, the great Roman Catholic church in the market place, and the Convent of Saint Catharine in the vicinity are among the town's notable edifices. The manufacturing establishments include beet-sugar refineries, tan-yards, potteries, shoe factories, and iron foundries, and there is an active trade in wood, linen, and agricultural products. Population, in 1889, 10,425; in 1899, 11,545.

OOSTERZEE, *ō'stēr-zā*, JAN JACOB VAN. See VAN OOSTERZEE.

OOTACAMUND, or **UTAKAMAND**, *ut'ā-kā-münd'*. A fashionable hill-town resort, and the summer headquarters of the Madras administration, in the Nilgiri Hills, Madras, British India, 36 miles northwest of Coimbatore, and 350 miles southwest of Madras (Map: India, C 6). A good macadam road, 12 miles long, leads from Coonoor, the nearest railway station. The town occupies a hill-encircled plateau 7228 feet above sea level, the surrounding hills, commanding views of magnificent scenery, attaining a maximum altitude of 8622 feet above sea level in Doddabetta on the east. The Government House, the public library, the Lawrence Asylum, with technical branches for soldiers' children, the churches of Saint Stephen and Saint Thomas, Victoria Hall, Assembly Rooms, Bruks Memorial School, the botanical gardens, recreation grounds, and the lake, one and one-half miles long, surrounded by a fine drive, are some of the principal features. In the neighborhood are numerous tea, coffee, cinchona, and eucalyptus plantations. The

mean annual temperature is 55° F. Population, in 1891, 15,100.

OOTRUM (Dravidian *ōtrum*). A fibre derived from the stem of *Damia extensa*, an East Indian shrubby climbing plant of the natural order Asclepiadaceæ. The fibre is soft, white, silky, and strong, and is regarded as a promising substitute for flax. In some parts of the Deccan the plant is a troublesome weed.

OOZE. The fine homogeneous sediment, like mud, but softer and more sticky, forming a plastic floury substance, which constitutes a large portion of the bottom in the deeper parts of the ocean. As this ooze is principally made up of the shells of *Globigerina bulloides*, a surface foraminifer, it is generally called 'globigerina ooze.' As early as 1850 Pourtales stated that at depths of 257 fathoms "Globigerinæ are still living in immense numbers." He stated that at great depths in the Straits of Florida the bottom is covered by a chalk-like layer, which resolves itself into a mass of Foraminifera, and their fragments more or less comminuted. This formation extends, he says, almost uninterruptedly in the whole bed of the Gulf Stream, in the greater depths of the Gulf of Mexico, in the deep channels which intersect the Bahama Banks, and then up the Atlantic coast from about the 100-fathom curve outward, or from the inner limit of the Gulf Stream, which nearly coincides with it, and so over the greater part of the Atlantic basin. The discovery of this formation belongs to the year 1853, when it was found almost simultaneously by Lieutenants Craven and Maffit, then in the Coast Survey, and exploring the Gulf Stream. It became more extensively known somewhat later by the soundings made for the Atlantic telegraph. The Foraminifera most abundantly represented in this bottom are of the genus *Globigerina*. Then occurs in order of frequency *Rotalina cultrata*; then several Textulariæ, Marginulinæ, etc. It is now pretty generally admitted that these rhizopods live and die in these great depths. But that animals living near the surface also contribute a large proportion is proved by the numerous shells of mollusks, teeth of fishes, etc., contained in it. The *Challenger* expedition explorations established that the pelagic bottom deposits are not derived from the shores of the continent, but are formed in the deep water of the central regions of the great ocean basins, and consist of organic oozes and a reddish clay. They are chiefly made up of the calcareous and siliceous remains of organisms that have fallen to the bottom from the surface waters, along with clay and volcanic debris in a more or less advanced state of decomposition. There is little or no trace of mechanical action on their components, their accumulation is relatively slow, and among them there do not appear to be any accumulations of materials identical with the marine stratified rocks of the continental areas. It seems doubtful, says Murray, whether the deposits of the abysmal areas have in the past taken any part in the formation of the existing continental masses.

A 'pteropod ooze' is met with in depths of less than 2000 fathoms in the tropics, and is very largely made up of pteropod and heteropod shells, which also exist in considerable numbers in the deposits around oceanic and other islands.

In 'radiolarian' and 'diatom' oozes the deposits consist of siliceous skeletons and frustules of surface organisms, which have likewise fallen from the surface waters. A radiolarian ooze has hitherto been met with only in the deepest waters of the western and central Pacific, and diatom ooze appears to be confined to the Southern Ocean, a little north of the Antarctic Circle.

Thus it will be seen, as Agassiz has pointed out, that the character of a marine deposit is largely determined by its distance from land, and again by the nature of the organisms living in the surface waters. The dead shells of pteropods, foraminifers, radiolarians, and diatoms are heaped up on the bottom, some in one part of the ocean, some in another; and as no other materials reach these distant regions to cover them, they form characteristic deposits. Depth is, however, an important factor in reference to the composition of a deposit in any locality. There seems to be now no doubt that the whole of the carbonate-of-lime shells, such as those of mollusks and foraminifers, are entirely removed by solution in very deep water during their fall from the surface to the bottom, or immediately after reaching the bottom. It is found that, with increasing depth, the pteropod and heteropod shells are the first to disappear from deposits, then the more delicate surface foraminifers, and finally the larger and heavier ones. It is likewise observed that, the more numerous these shells are in the surface waters, the greater is the depth at which they will accumulate at the bottom. As a rule, a pteropod ooze or a globigerina ooze is found in deeper water in the tropics than in temperate regions.

It must be remembered that all the bottom deposits merge into one another, and at times it is difficult to say whether a deposit should be called a red clay, or a radiolarian ooze, or a globigerina ooze, or a blue mud. It was thought by Pourtales and others that the Globigerina lived in the oozes at the sea-bottom; but the *Challenger* observations have clearly established that many foraminifers have a pelagic mode of life (see PELAGIC ANIMALS), flourishing in the pure currents of the open ocean, nearly all the species being confined to tropical and subtropical waters. There are not more than twenty or twenty-two species of pelagic Foraminifera; yet, says Murray, so numerous are the individuals of the species that they usually make up over 90 per cent. of the carbonate of lime present in the calcareous oozes of the abyssal regions. The individuals belonging to even a dozen of these species far outnumber the individuals belonging to all the other known genera and species of Foraminifera. This is true not only with regard to their abundance in the deep-sea deposits of the present period, but also to their great development in Tertiary and other geological formations. Murray adds that the species of Foraminifera which live on the bottom in deep water "are habitually under very uniform conditions, and consequently their shells do not vary in size and thickness with change of latitude like those of the pelagic species, the animals of which are subject to great changes of temperature and salinity in the surface waters."

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Voyage of H. M. S. Challenger. Deep Sea Deposits (London, 1891).

O'PAH, or KINGFISH. A beautiful and palatable fish (*Lampris luna*) of the Mariposa family (Lampridæ) and related to the John Dory (q.v.). It abounds in most northern waters, but is rare on the American Atlantic coast. It grows to a length of four feet or more, is of oval form (see Colored Plate of GAME FISHES), with a high dorsal fin and a powerful tail. It is brilliantly colored; the upper part of the back and sides rich green, reflecting purple and gold in different lights, the lower parts yellowish-green; round yellowish-white spots above and below the lateral line; all the fins bright vermillion. The flesh is much esteemed. This fish has many names, as 'mariposa,' 'moon-fish,' and 'king of the herrings.' Consult Hamilton, "British Fishes," in *Naturalist's Library* (London, undated).

OPAL (Fr. *opale*, from Lat. *opalus*, from Gk. *ὀπάλλιος*, *opallios*, opal; connected with Skt. *upala*, stone, upper millstone). A hydrous mineral silicon dioxide used as a gem. It differs from quartz by containing water, the quantity of which varies from 2 to 13 per cent. and even more. It occurs usually in pale shades of yellow, red, green, and blue, although sometimes the color is quite dark, the coloration depending on different oxides and frequently showing a brilliant play in the light. Opal is never found crystallized and has a conchoidal fracture, being easily broken. Among the ancients this mineral was held precious and regarded as a lucky stone. In the East the opal is believed to make its wearer beloved of God and man so long as he trusts sincerely in its power. The finest opal is said to be among the Austrian crown jewels. It weighs seventeen ounces and is five inches long by two and a half inches in width. The principal varieties of the opal are: (1) The precious opal; (2) fire opal; (3) girasol; (4) common opal. The precious opal, called also noble opal, and sometimes oriental opal, is semi-transparent or translucent, usually of a bluish or yellowish-white color, yellow by transmitted light, and exhibits a beautiful play of colors, due to minute fissures which, being filled with air and moisture, reflect all prismatic colors. This variety is used principally as a gem-stone and is polished with a convex surface because its play of color is best shown in that way; but it is never cut into facets, because of its brittleness. The finest specimens are found near Kaschau, in Hungary, where they occur disseminated in the conglomerate; also in Saxony, in Honduras, in South America, Queensland, and New South Wales in Australia, and especially near Queretaro, in Mexico; also at various localities in Oregon and Washington in the United States. The fire opal, which is of a hyacinth red color, with yellow and green reflections, occurs at Simapan, in Mexico, and also in Honduras. The girasol, which is bluish-white in color with reddish reflections in a bright light, also occurs chiefly in Mexico and Central America. The common opal is semi-transparent and may be watery-white, yellow, green, red, or brown; it exhibits no play of colors. It is found in Hungary, in various localities in Germany, in Cornwall, Pa., Idaho Springs, Colo., in Calaveras County, Cal., and elsewhere. Wood opal is

petrified wood showing the original form and structure. Hyalite, or Müller's glass, is a colorless or whitish variety of opal, while menilite is an opaque grayish variety which is frequently found in concretionary form.

OPATA, ó-pá'tá ('Enemies,' so called by the Pima, with whom they were anciently at war). An important tribe of Piman stock (q.v.) occupying the mountainous region on the headwaters of the Yaqui River in Sonora and the adjacent portions of Chihuahua, Mexico. Like all the tribes of Piman affinity, their traditions indicate a northern origin. When first known to the Spaniards they were found occupying settled villages of adobe huts, and cultivating fields of corn and other vegetables. They are brave and faithful, for which reason they have been extensively employed by the Spanish and Mexican governments as soldiers and frontier guards. They readily accepted the teachings of the missionaries and are now all Christianized, although still governed under the ancient forms by their village chiefs. In 1820, owing to neglect and abuse from Mexican army officers, under whom they served, their warriors revolted. Under their chiefs, Doraine and Espiritu, they defeated several expeditions sent against them, making a final stand in an adobe church against a force of 2000 Mexican troops until their ammunition was exhausted, when they were obliged to surrender. The two leaders and seventeen others were shot, but the abuses of which they complained were corrected, and they have since remained quiet and loyal. They number now about 5000.

OPDYCKE, óp'dík, EMERSON (1830-84). An American soldier, born in Hubbard, Trumbull County, Ohio. In July, 1861, he enlisted as first lieutenant in the Forty-first Ohio Volunteers, and was soon afterwards promoted to be captain. In January, 1863, he became colonel of the 125th Ohio. At Chickamauga his regiment lost one-third of its number; at Missionary Ridge his command was one of the first to reach the Confederate works; and at Franklin (q.v.) a timely charge of his brigade by his orders restored the Federal line broken by Cleburne's charge, and prevented what might otherwise have been a great disaster. He was made brigadier-general of volunteers in 1865, and in 1866 was brevetted major-general of volunteers to date from the battle of Franklin. After his resignation, in 1866, he entered business in New York City.

OPECHANCA'NO. A chief of the Powhatan Indian confederacy of Virginia, succeeding the famous Powhatan, who died in 1618. He acted as mediator in preventing hostilities in consequence of the abduction of Pocahontas by the English in 1613, but on his succession to authority soon gave indication of settled dislike to the whites. Under cover of professions of friendship he united nearly all the tribes of tidewater Virginia into a conspiracy against the English, and on March 22, 1622, a simultaneous attack was made on all the scattered settlements, resulting in the massacre of 347 men, women, and children, or more than one-fourth of the whole white population of the colony. Jamestown alone escaped, through the timely warning of a friendly Indian. The war thus begun continued until both sides were exhausted, when a peace was made which endured for over twenty years. As the English settle-

ments advanced the Indians were steadily pressed back from their old-time fields and fishing grounds until in 1644 Opechancano, now grown old and nearly blind, determined to make a last stand for his people. In another concerted attack along the frontier 300 English settlers perished. By this time, however, the whites had greatly increased in number, while the Indians had correspondingly diminished. A war of extermination was ordered and kept up for two years, the Indians being hunted down like wild beasts, without rest or quarter. In 1646 it was brought to an end by the capture of Opechancano by an expedition led by Governor Berkeley in person. The chief was taken to Jamestown, where he was soon afterwards shot and killed by the sentry appointed to guard him.

OPELIKA, óp'è-lí'ká. A city and the county-seat of Lee County, Ala., 20 miles northwest of Columbus, Ga.; on the Western of Alabama and the Central of Georgia railroads (Map: Alabama, D 3). It is an important cotton market, owing to its location in a productive cotton section, for which it is also a distributing centre. There are cotton gins, cotton mills, flouring mills, fertilizer works, brick plants, etc., the products of the town's various establishments, according to the census of 1900, being valued at \$335,000. Opelika, settled about 1840, is governed, under a charter of 1896, by a mayor, elected biennially, and a council. Population, in 1890, 3703; in 1900, 4245.

OPELOUSAS, óp'è-lō'sas. A town and the parish seat of Saint Landry Parish, La., 125 miles west by north of New Orleans; on the Bayou Teche, and on the Southern Pacific Railroad (Map: Louisiana, C 3). It has the Academy and Convent of the Immaculate Conception, and a free reference library of 1000 volumes is connected with the high school. There are a cotton compress, cottonseed oil and rice mills, and other industrial establishments. Population, in 1890, 1572; in 1900, 2951.

OPEN-BILL. Either of two species of East Indian and African storks of the genus *Anastomus*, remarkable for the structure of the bill, the mandibles being in contact only at the base and tip, with a wide interval between their edges for some distance near the tip. They frequent the seacoast and rivers, and feed chiefly on mollusks.

OPEN CHURCH. See INSTITUTIONAL CHURCH.

OPEN DOOR. A term in international politics which came into general use in 1899, and has reference to the equality of commercial opportunity in China of all nations. The enunciation of the open-door policy had its origin in the acquisition by various European Powers of commercial ports in China and the insistence of the United States that such ports should be open to all the world on equal terms.

OPEN-FIELD (or COMMON-FIELD) **SYSTEM**. The term used to designate the scheme of agriculture which prevailed in England and other countries during the Mediæval period. At this time the rural population was grouped together in villages, either free or manorial, in which every man had his house with a small plot of ground about it, while around the village lay the plowed fields, the meadows, pastures, and for-

ests. The arable land was that to which the term under discussion is applied. It was divided as nearly as possible into three—or some multiple of three—equal fields, in each of which every man in the village had a certain share. The system had two distinctive features. In the first place, a man's holding in each field did not consist of one compact plot of ground, but was made up of several strips, each about an acre in size. Narrow strips of grass were the only boundary lines; hence the name open field. The second feature of the system was the rotation of crops. Every third year one of the fields was left to lie fallow. What crop it should bear the other two years was also regulated by custom. Survivals of the open-field system are present in English agricultural life to-day; in fact, during the nineteenth century more open fields were inclosed than had ever been inclosed in a like period before. See VILLAGE COMMUNITY; VILLEINAGE.

OPEN, SESAME, sēs'a-mē. In the story of Ali Baba in the *Arabian Nights*, the magic formula in response to which the door of the thieves' cave opens.

OPERA (It., composition, from Lat. *opera*, work; connected with *opus*, Skt. *apas*, work). A musical form of stage-play. The Athenian drama was great-parent to the opera. When that artistic reform, the Renaissance, swept Italy it stamped its influence on each one of the fine arts; it was a universal harking back to the period of the classics. The arts that had idled along through the Middle Ages were reanimated with the breath of classicism; but music alone was an exception to the rest. It was the youngest of the arts and differed by nature from the others in that it was not imitative. While its development was steady from about the tenth century on, this progress was almost entirely free from the influences of ancient models, and on lines dictated by evolution itself. One of the prevailing symptoms of the Italian Renaissance was complete dissatisfaction with art as it stood. It was easy enough to reconstruct the ideals of the other arts: there were tangible models to imitate; but none of these served the cause of music. Out of the hazy past came confusing echoes of the Greek drama, a combination of poetry, music, and the dance, and this was adopted as the ideal plan upon which to reconstruct music. Their choice seemed logical enough to the crew of reformers who went to Greece for most of its formulæ; but when it is considered that they knew little of the actual use to which music was put during those days of Athenian art, it must appear as a step in the dark. Remarkably enough, it was a step in the right direction; a step which, modernized and made practicable, afterwards led opera out of a discouraging tangle of half-hearted theories and ill-assorted experiments to a point of artistic culmination.

Previous to the real beginnings of opera there were plays to which in one manner and another music was linked. There were costumes, scenery, and action—all these displayed on a stage; and the trend was sometimes dramatically or sentimentally pastoral, frequently comic. Adam de la Halle (c.1235-87) composed a dramatic pastoral called *Le Jeu de Robin et de Marion* for the French Court at Naples, produced there about 1285, which has been mistaken for

the actual starting point of opera. In reality it was nothing more than a string of ballads, popular in that day, joined by a dialogue; and as Halle wrote only the latter, his fame as a composer is almost erased. There were many other efforts of this kind, none of which had a direct influence on the opera of the future. The plight of the serious composer striving then for a vehicle of dramatic utterance was pitiable. The folk-song or ballad could not be taken seriously by him as it stood: all his training had taught him to honor only the complex art of polyphonic writing, which is melody multiplied, in which the different voices interwove and crossed each other. He might—and did—take folk-song as material about which to weave his counterpoint. This bred new troubles, since such a procedure could not endure the test of dramatic action: several voices singing in counterpoint scarcely could be made to stand for the dramatic utterance of a single person. So he dared such experiments only in the unexacting domain of the concert room. Another claim for attention comes from the ballet of that period, especially in France. Besides the grandeur of the scale on which these entertainments were carried out, the plots were sufficiently important dramatically to cause some historians to believe this the beginning of opera. We, from our point of vantage, can see now the theoretical errors of all these attempts; but they were seen long ago by a band of enthusiasts.

Toward the end of the sixteenth century there assembled a number of Florentine noblemen determined to free dramatic music from its trammels. They have gone down in history as *La Camerata*, and the circle was composed of Bardi, Strozzi, Galilei—father of the famous astronomer—and Corsi. With these amateurs there consorted Ottavio Rinuccini, a poet, and the two musicians Jacopo Peri (c.1580-1630) and Giulio Caccini (c.1558-1618). In pursuing their Hellenic ideal of reconstructing music upon the principles of the Greek drama they ignored all the contrapuntal advance music had made during four centuries. The only task they set before themselves was to express in sounds the sentiments of the poet; and music as an independent art was discovered. What latitude this gave composers is easy to imagine; it also freed the voice so that it could work singly with an orchestral accompaniment. In a word, it was the first known attempt of merging the word and the sound into an individual whole. Theories grew into actuality when a performance of *Dafne* was celebrated at the Palace of Corsi in 1595. The libretto of this, the first opera, was by Rinuccini and the music by Peri; and it was written according to the formulæ of the *Camerata* in the *stile rappresentativo*—the 'expressive style.' *Dafne* was successfully performed several times, but always in private, and now the score is not discoverable. The public was initiated five years later when two settings of Rinuccini's *Euridice* were made—one by Peri and the other by Caccini. Both operas were produced in part during the marriage celebrations of Henry IV. and Maria de' Medici at the Pitti Palace, October 6, 1600. These two operas embody the tentative strivings of the Florentine *Camerata* in their efforts to revive the drama of the Greeks. Measuring the accomplished thing by the ideal model the former must appear ridiculous and very

wide of the mark. But here at least was a step in an untrodden path: Opera was now on a basis which admitted of development. Its career had begun.

THE INFLUENCE OF ITALIAN OPERA.

How ripe Italy was for the music reform begun at Florence is proved by the eagerness with which other composers took up and utilized the *Camerata's* ideas. Fortunately for the fate of opera, some great musicians interested themselves in it; musicians who were bolder even than the brave spirits that had launched it. First among these was Claudio Monteverde (1567-1643), by the nature of things a pioneer. Several innovations are laid at his door, the most important to the development of opera being the breath of life he put into the ligneous recitatives of Peri and Caccini. This meant the bursting of another bond which had restrained dramatic freedom, and dramatic melody replaced the stilted recitatives. He was aided in these reforms by his contemporary Marco da Gagliano. When Monteverde's first opera, *Orfeo*, appeared in 1607 and his second one, *Arianna*, a year later, synchronous with Da Gagliano's *Dafne*, it was evident that Peri and his comrade had been left far in the rear. The individuality of the later composers asserted itself and in a short space of time opera had made a great bound for freedom. Of the three following decades few records remain to prove any great advance along the line of reform, a surprisingly large number of scores having been destroyed. But opera made a great advance in 1637 when the Teatro di San Cassiano—the first public opera house—was opened in Venice. Now that the masses had a voice in the matter, it soon became evident that the people must be pleased and the Florentine ideals forgotten. The nobleness of the libretti deteriorated, mythology gave way to history, and Melodrama was king. The masses were pleased, and the business of opera flourished until there were eleven opera houses in Venice alone. The leading musical spirit of this Venetian opera period was Monteverde's pupil, Pietro Francesco Caletti-Bruni (c.1600-1676), who adopted the name of his noble patron, Cavalli. He was an excellent musician and did much to give Venice opera local color by introducing the spirit of jest in his works; he is even credited with the invention of the operatic aria, distinct from the *musica parlante* used by his predecessor. (See ARIA.) But the introduction of the aria was a disastrous move for the good of opera; it boded degeneration of serious opera and paved the way for the *opera buffa*. The same fate was threatening Neapolitan opera despite the composer-genius Francesco Provenzale (c.1610-?), when a new force stayed the decline of opera. The contemporary composers who had not bothered their heads about the stage had gone quietly about their business developing the other forms of music in which they were unhampered by scenic bounds. It stands to reason that their art was a purer one; so when one of these—Marc' Antonio Cesti (c.1620-69), pupil of the celebrated Carissimi—came to Venice at the middle of the seventeenth century he brought with him a remarkable technique and a lot of musical ideas. That the latter were for the most part badly suited to the demands of opera is true, but he made his mark on the map of operatic history by ousting the comic element

from serious opera. Hereafter *opera seria* and *opera buffa* traveled different roads. The latter tumbled mightily from grace at first, but gradually its cause was championed by Nicolò Logroscino (c.1700-63), Pergolesi (1710-36), and Piccini (1728-1800), who reestablished it on an artistic basis. Under the above-mentioned Cesti serious opera fared very badly. His intentions doubtless were good—he even is said to have invented the *da capo*, or repetition, of aria—but his training under Carissimi was all antagonistic to the principles of opera. He tried to reconcile opera and oratorio and what resulted was neither. The product was some unfortunate thing that had fallen between the two stools; opera became undramatic and unscenic—in a word, it became unoperatic.

Even so great a musician as Alessandro Scarlatti (1659-1725) could not rescue opera from its plight. His one striving was to develop the musical end of the form, and in his eagerness he neglected the dramatic entirely—just as so many other composers had done and were doing. This wretched period, which has been called the 'oratorio epoch' of opera, lasted until the stern Gluck reform set in. Italy had been too small to hold the effects of the Florentine movement, and Dresden produced a German version of *Dafne* about 1627. The composer was Heinrich Schütz, who had been trained in Venice under Gabrieli, whose work was an imitation of the Italian. Nuremberg cropped up with something which purported to be more Teutonic later. This was a lyric drama called *Sceleswig*, by Staden (1607-55), which proved, after all, to have little of the national in it. It was evident that Germany could not get on without Italy in matters musical, so it was no surprise to find a wholesale importation of Italian composers, operas, and opera troupes into Germany about the middle of the seventeenth century. Nevertheless by 1678 Hamburg had a German opera house. The opening performances were mere farces of serious work and the scheme was too ridiculous to last. A betterment came in 1697 when Reinhard Keiser (1674-1739) produced his *Ismene*; from then until 1734 he was actively connected with the opera. He worked diligently to divorce opera from Italian influences and wrote German music; but unfortunately he planned his work in the forms of the Neapolitan 'oratorio-opera,' which had no artistic excuse for existence at all. So far opera 'made in Germany' was not a success, and with Keiser's death Italy again flooded the country with its musical product. The Italians also forced their way into France. Their early performances there may be passed over, being of no great importance in themselves; but they awakened in the Frenchman's mind the possibility of a national opera. This culminated with the accession of Louis XIV. to the throne, for he bestowed on Pierre Perrin (1620-75) the right to found an academy of music. A company was incorporated, and on August 10, 1671, the Académie Royale de Musique, which still exists, began its career with *Pomone*, a mediocre pastoral, the music by Cambert (1628-77). So here was the Italian influence dominant in France and resulting in the founding of an institution in imitation of the Florentine *Camerata*. Although Perrin and Cambert founded the Académie Royale de Musique, their activity at its head was short-lived. The father of French opera is Lully

(1633-87). Giovanni Battista Lully, a Florentine by birth, was taken to France and began his Parisian career as a scullion. His violin-playing, however, drew attention to him, and under noble patronage he began the study of music. As a musician he acquired dignity, knowledge, and power; he intrigued against Perrin and Cambert, and in short order was the head of the Académie. Here he ruled with a high hand, but his extraordinary and numerous talents made him a valuable person; he composed a large number of ballets, divertissements, and operas—in all of them pandering to the local taste and keeping the dramatic element well forward. Naturally his operas betray Italian influence, but this is neatly modified or cleverly disguised; above all they are adapted to the stage. His principal successor—and this after a lapse of time—was Jean Philippe Rameau (1683-1764), who was a better musician, but had not so keen an eye for the dramatic end of opera, and under his reign Italian opera once again secured a hold in France. It must be recorded to the glory of French pride that the Italians did not succeed—as in Germany—in overwhelming national opera; but the taste of the musical public was divided, and afterwards—as we shall see—culminated in the Gluck-Piccini contest for operatic honors.

In England opera had tentative beginnings as in every other country; here it was the masque (q.v.) that gave early excuses for the employment of music with stage productions. But this form was no nearer opera than the gorgeous French ballet had been and it founded no school. It remained for Henry Purcell (1658-95) to lay the corner-stone of English opera. He was probably the greatest of England's musicians—certainly the last of the great ones—and was a pupil of Pelham Humphries, who in turn had studied under Lully. Much of his work consists in musical settings for plays, but there is at least one real opera, *Dido and Eneas*. The early death of Purcell was particularly unfortunate for England, inasmuch as there was no one to succeed him; and as art cannot remain stationary, it declined. This was the usual opportunity for Italy, whose musical scouts were constantly surveying the operatic field for fresh conquests. The most important of the invaders, however, was the German George Frederick Handel (1685-1759), who had become thoroughly Italianized. He wrote and produced opera after opera until he became bankrupt, and then he turned out oratorios with equal facility. That he had dramatic ability—other than a musical one—is extremely doubtful, and his operas belong unquestionably to that dread 'oratorio-opera' style inaugurated by Carissimi through Cesti. Handel did not have the English field to himself; his rivals were Buononcini (1660-1750) and Ariosti (1660-c.1740). The stringing of ballads—as Dr. Pepusch (1667-1752) did in the case of John Gay's *The Beggar's Opera*—does not deserve serious consideration in itself, but in England it gave rise to the school of ballad opera from which nearly all later attempts at English opera stem. How widespread the influence of Italian opera was has been shown; also that it was the kernel of national opera in England, France, and Germany. Even a cursory glance into the matter will prove that in the haste to cover all available territory and in the eagerness

to please the several masses the Florentine ideals were buried under the numberless mounds of failure which opera had left in its trail of popularity. A reform was imminent.

GLUCK, THE REFORMER, AND MOZART, THE MELODIST.

Christoph Willibald Gluck (1714-87) was a dissenter from the very start. His musical training had been principally in the Italian school, but he realized many of its operatic insipidities and had determined even with his first work to cut loose from some of the foolish conventions into which opera had drifted. At first he aimed to give importance to the dramatic in the libretto by means of music—something which had been overlooked by the composers of ornamental opera for decades. This experiment was tried with *Artaserse*, which, oddly enough, came on the boards the same year that Handel's final opera appeared. It would be silly to contend that Gluck had 'found himself' straightway in his first opera; no composer has done that yet. In fact, he seems simply to have defied convention with no rules of his own save just this one of defiance. Now no system can grow on such a basis, and after writing several operas and traveling about, he began to lose interest in his work. He had met convention at every turn, and this constant attitude of fight on his own part wore him out. Eventually he conferred with an Italian poet, Calzabigi, and the two decided that the trouble of the entire operatic situation was that the prima donna had grown too vain and important—she dictated to the composer—and that the libretto of the day was lacking in dramatic element. This happened when Gluck was already forty-six years old, and certainly the weaknesses which he and the poet unearthed must have been known to both of them long before. But what followed was important. Calzabigi wrote a libretto on entirely new lines, and Gluck set it sincerely to music. This was *Orfeo ed Euridice*, brought out in 1762, the first attempt not only to forsake the 'oratorio' school of opera, but also to formulate a new plan by which opera might claim attention as an art form. Of course the public complained; but after a while the intelligent ones among them realized the earnestness of both poet and musician and were won over. The next opera from these pens, *Alceste*, was a further improvement on the previous one, as was *Paride ed Elena*. Gluck now attracted the attention of the French poet Du Rollet, connected with the French Embassy at Vienna, and the two set to work to make an opera out of Racine's *Iphigénie en Aulide*. Then Gluck longed for a Paris success, and through the influence of Marie Antoinette succeeded in securing an invitation to that city. His patron also succeeded in precipitating the innocent composer into a political quarrel by antagonizing Mme. Du Barry. However, Gluck's *Iphigénie* achieved a hearing and afterwards a success in Paris. In the wake of this came one of the bitterest fights in all operatic history. At the bottom of it politics raged, but on the surface it seemed a controversy over æsthetic ideals. It culminated by forming two violently antagonistic parties which pitted Gluck on the one hand against Piccini on the other. Many prominent persons took active share in the conflict, which was almost an international affair, since the outcome would control the fate of Italian opera. The two composers were duel-

ing with operas. Gluck composed *Armide*, and against that Piccini wrote *Roland*. So matters might have gone on indefinitely had it not been decided that both of them should set the same subject to music. This was *Iphigénie en Tauride*, and Gluck triumphed because of the superiority of his work. So dramatic verity and operatic sincerity won the day. The principles upon which Gluck had insisted and for which he had waged successful war were really only those formulated by the Florentine *Camerata* almost two centuries earlier. It is a tribute to the Florentine noblemen; though probably they builded better than they knew.

At this period the influence of Mozart (1756-91), the genius of melody, began to make itself felt. Except that he had a keen appreciation for the dramatic, he was the antithesis of Gluck. He had no regard for the precepts of his planning predecessor; those formulæ over which Gluck had slaved meant nothing to him, and he succeeded by virtue of sheer genius. He composed with the greatest ease and rapidity, and wrote masterpieces with less care than other composers devote to writing trash. Yet his *Don Giovanni* is one of the greatest of the older operas. He individualized his characters musically, was alive to dramatic situations, and inclosed the whole in a network of pure melody—perhaps the most exquisite ever produced. It was more Italian than the sunny, melodious product of that country, but it was controlled by a genius which shone through at every bar. When he wrote in the vein amusing—as in *Le nozze di Figaro*—it made the efforts of the Italians, who created this genre, sound flimsy and trivial. When he grew serious—as in the grewsome scenes of *Don Giovanni*—he foreshadowed the Wagner music drama. Yet with all these attributes Mozart himself did not change the current of the operatic stream nor did he found a school of successors. Nowhere in the history of opera is there a parallel to his case.

THE ITALIANS AND THE FRENCH.

While supplying the world with operas and composers, Italy grew careless of her product. Too great a prosperity usually breeds decadence, and the business of music is no exception; besides, the Italians were exporting their music and importing none. The fertility of every nation has an end. Soon poverty threatened musical Italy, though she produced some remarkable men. Domenico Cimarosa (1749-1801) was unfortunate in that he was followed by Rossini (1792-1868), whose operas soon displaced those of his less gifted predecessor. Rossini had the fertile gift of melody, but lacked the ambition to develop his gifts. He wrote melody and let the action look out for itself. This was a distinct step backward to the ante-Gluck period, and it is remarkable to note how rapidly the vices of the old Italian school sprang into life again and thrived. The flourish became the thing; the singer's agility was a virtue; the ear was tickled and the eye insulted. In lighter opera this did not matter so much, and Rossini left the world at least one masterpiece and a model in this form: *Il barbiere di Siviglia*. His successor, Giovanni Pacini (1796-1867), tried to stem the flippant tendency which crept into opera; but in this work he was overshadowed by both Gaetano Donizetti (1797-1848) and Vincenzo

Bellini (1802-35), who slaved for the dramatic in opera. They achieved it, all the while flattering the public with the flourish to which Rossini had accustomed it. Save for a very few operas, such as *Don Pasquale*, *Lucia di Lammermoor*, and *Norma*, their names have disappeared from the roster of opera houses to-day. They lead the way to Verdi, however. He, on account of the masterly works of his last period, will be treated later. In France the Gluck theories of opera had been driven home so sensationally that they were not dislodged in a hurry. After Gluck's death the work was carried on by his pupils, Antonio Salieri (1750-1825), and Sacchini (1734-86), who kept alive his master's ideas without accomplishing anything remarkable himself. Then come the stately Cherubini (1760-1842), and Gasparo Spontini (1774-1851), who has been called the last classicist of the lyric stage. Soon afterwards, Auber (1782-1871), who had previously worked for the Opéra-Comique, sprang into the arena of grand opera with *La muette de Portici*, also known as *Masaniello*, and sent Gluck classic traditions flying. This shock was still upon the people when Rossini's *Guillaume Tell* appeared—the most pretentious work attempted by this composer—and then the Romantic Period of 1830 possessed the Parisians heart and soul, bringing with it a lordly figure in the history of opera—Giacomo Meyerbeer (1791-1864).

Meyerbeer had a most remarkable genius for adaptation, combined with a shrewd technical mastery and a keen business insight. All these fitted the period, and he was careful to see that they did. By writing what pleased he controlled the operatic situation of France absolutely. His librettist was Scribe, a man of sprawling talent, and the two knew to a beat how quickly the Parisian's pulse throbbed. The success of *Robert le Diable* was simply stupendous, and Meyerbeer held French opera in the palm of his hand. His hold on the public did not relax with his later works, and even the music-lover of to-day acknowledges the tremendous moments in *Les Huguenots* and *Le Prophète*; but his last work, *L'Africaine*, betrays the sameness of his methods, though there is a decided advance on the technical side of the orchestra. Meyerbeer was a master of sensational effect; his operas are not lacking in it, and they are full of bombast; to this end he employed a large and fully equipped orchestra. If to-day there is much in his works which is obsolete, there still remains enough to convince the just one that here was a man of great talent who molded himself so accurately to fit the time that one is frequently misled into believing that he was a product of the early thirties in Paris. In contrast to this honor-crammed career is the one of Hector Berlioz (1803-69), that strange, willful genius who yielded not a jot to popular likes. His operas are fantastic creations that have never appealed to managers of opera houses; in fact, his huge double work, *Les Troyens*, had to wait until 1893 for its première. He also composed a sprightly musical comedy, *Béatrice et Bénédicte*. It is most unlikely that his operas ever will become repertory pieces; when they were written they were considered too much in advance of their time, and now Richard Wagner's music dramas have made most of the advanced works seem old-fashioned.

Jacques Fromental Halévy (1799-1862) bridges the gap between Meyerbeer and Charles François

Gounod (1818-93), whose *Faust* is probably the most popular of French operas. His later work, of equal pretensions, *Roméo et Juliette*, is marred by its sentimentality. A word about the French Opéra Comique: It was naturally the child of Italian opera buffa, and in time gained importance as an art form. Its earlier composers—Philidor (1726-95), Monsigny (1729-1817), Grétry (1741-1813), wrote light, pleasing music. Méhul (1763-1817), who was a pupil of Gluck, introduced some ideas bordering on the serious, as did Boieldieu (1775-1834). Then came Auber and Hérold (1791-1833), who raised the standard considerably. It grew entirely serious when the unique operettas of Offenbach attracted the jocose element to the Opéra-Bouffe. The Opéra-Comique had branched out before, but Offenbach drew the dividing line plainly. Since then some of the works written for the Opéra-Comique differ from those at the Grand Opéra only in that the dialogue in the former is spoken, not sung. Among its serious contributors were Gounod with *Mireille*, Ambroise Thomas with *Mignon*, and Bizet with the masterpiece of them all, *Carmen*. This work is a classic, and where it is performed with sung dialogue rears its head high above some of the more pretentious works of the Grand Opera school. Among more recent contributors to the repertory of the Opéra-Comique are Delibes, Massé, De Joncières, Massenet, Godard, Saint-Saëns, Lalo, Bruneau, D'Indy, and Charpentier. Some of the latter have even done away with the old-time formula of spoken recitative, and now there is little theoretical difference between works produced at the Comique and the Opéra.

THE GERMANS AND WAGNER.

Mozart's early death left Germany without any great opera composers until Ludwig van Beethoven (1770-1827) wrote *Fidelio*. Beethoven was about the last man who might be expected to attack the task of opera-writing—all his works had been in the line of absolute music; but finally he selected a surprisingly bad libretto and went to work. *Fidelio* is one of the most curious compositions in the entire literature of opera; it is so full of contradictions. From passages that are nothing short of superb and wonderful it ranges to episodes when the listener feels that the composer is decidedly out of sympathy with his subject and the art form. As a whole—despite the overwhelming 'Abscheulicher' air and the superb duo in the second act—it is disappointing and even admitting all greatness possible it is at best scarcely an opera. The next important figure is Louis Spohr (1784-1859), whose operas marked the beginning of German Romanticism, followed closely by Weber (1786-1826), whose works show this movement in full bloom. His principal opera, *Der Freischütz*, is still in the repertoire and apt to remain so for a long time to come, since the music displays a buoyancy and richness of sentiment that are remarkable. He is by far the most German of all opera composers—Wagner not expected—and seems to have embodied in his music many of the national characteristics. In the wake of Weber came a string of opera composers who have been designated depreciatingly as the writers of 'kapellmeister' music. The list is too long and unimportant to repeat; but there were a few others who rose distinctly

above this level and really produced some good work. First among these is Heinrich Marschner (1795-1861), some of whose operas are still produced to-day in Germany; the same is the case with Albert Lortzing (1803-51). Peter Cornelius (1824-74) left at least—thanks to the kindness of Liszt—one opera, the *Barbier von Bagdad*, which has survived its critics. Incidental mention may be made of musical works with spoken dialogue—*Singspiele* they were called—among which Otto Nicolai's (1810-49) *Die lustigen Weiber von Windsor* is a charming example. But the operatic list might be prolonged indefinitely, it includes the names of Schubert, Mendelssohn, Liszt, and Schumann, and at the end it would be found that none of them affected the history of opera to be sufficiently worthy of mention. Besides, interest of this period centres in the greatest figure of the whole history of opera, Richard Wagner (1813-83).

Wagner's musical development is one of the most remarkable on record. Passing over two youthful works—*Die Feen* and *Das Liebesverbot*—which are of historical interest only, his career as opera composer began with *Rienzi*, a work designed for the Paris Grand Opéra, and one which out-Meyers Meyerbeer. Successful as this was, Wagner must have realized that the old form was a bar to any progress, and he turned his back on it for all times. With his next opera, *The Flying Dutchman*, he works along the lines laid down by Weber; but his own individuality was so marked that the result is not at all Weberish. After this he takes a tremendous leap forward and lands with *Tannhäuser*, again a tentative move; then with another effort he achieves *Lohengrin*. No other case in music history comes to mind where three moves cover so great an advancement as those from *Rienzi* to *Lohengrin*. Now followed the period of his political exile, which gave him liberal opportunities to ponder the problem of music-drama. During these broodings he saw that opera was going the wrong way. The set forms of aria, recitative, of chorus, and orchestral accompaniments and interludes, must be abolished. He thought and wrote out the problem, arriving at the idea that the one possible salvation of this art form lay in abandoning all the excrescences of the later Italian, the Neapolitan school, and going back to the original principles of the Florentine *Camérata*. Upon these he experimented until he had formulated his basis for a music-drama with its logical development of the leitmotive (q.v.)—or leading motive—and its welding into a great synthesis, song, action, and orchestra. Not only did he theorize, but he composed his tetralogy, *Der Ring des Nibelungen*, of which *Das Rheingold* was the first part. One vital point must be made here: that in every case Wagner was his own librettist. This was the first active rebellion against the puerile stuff furnished by poets for musical setting. *Rheingold* was followed by the second part, *Die Walküre*, and that by *Siegfried*. Poverty and troubles of exile compelled an interruption, during which time *Tristan und Isolde* and *Die Meistersinger von Nürnberg* were composed in hopes of having them produced—a thing which did not seem at all likely to happen to the *Ring*. Eventually he secured the patronage of King Louis II. of Bavaria and finished *Siegfried*, together with the final part, *Götterdämmerung*. Then followed the planning and contriving to

have an opera house built in which he could produce this great tetralogy, and after a long fight Bayreuth was selected and the theatre constructed. He closed his life's work by writing *Parsifal*, soon after the first performance of which he died. No other composer ever schemed such sweeping reforms; none other ever held out so obstinately for dramatic verity. He came nearer than any one in merging the word and its meaning into the sound musical, and his technical mastery allowed him to do just that which he started out to do; though in the last analysis Wagner the musician triumphs over the theorist Wagner. It is perhaps not just to speak of Wagner's work as an operatic reform; he did more than this, since he demolished opera as he found it—a mere string of idle tunes strung on silly words—and constructed it anew, with a few shadowy precedents to guide him. His versatility is shown by the range of poetic subjects he handled—each one with an enviable amount of sincerity; his *Ring* more nearly approaches the magnitude of the Greek drama than anything in modern times. And in *Tristan* he has on the simplest action achieved a musical drama that stands as a granitic block. His influence was and is tremendous: probably no composer of opera since has been able to escape it: either he has imitated or he has rejected Wagner—in both cases the influence is traceable.

MODERN TENDENCIES.

Giuseppe Verdi (1813-1901) must be considered first of all. He began his career when Italy was still absorbing the melodic treacle that flowed from the pens of Donizetti and Bellini, and he closed it two decades after Richard Wagner had died. He was a most prolific writer and a progressive one. His early works were of the approved style of the period; then came a spell during which he wrote what still remain his most popular works—*Rigoletto*, *Il Trovatore*, and *La Traviata*—and then he matured into such a work as *Aida*, a vast improvement on all its predecessors. By this time he had acquired a certain amount of dramatic freedom which was most valuable, added to the skill with which he wrote for the voice. After the revolutionary period in opera—the period when Wagner was alive and during much of which Verdi lived in silence—the aged Italian came forward anew with *Otello*, considered by some critics his greatest work and certainly among the great operas. From Wagner he had learned the importance of being musically sincere to one's text at all hazards; and either by chance or fate he was blessed with one of the best operatic texts written, compiled from Shakespeare by Boito. *Otello* is an astounding work in many ways. It is lyric—Verdi apotheosized the voice—and forcefully dramatic; as a whole it is satisfying, in parts tremendous. Still later in life he brought forth *Falstaff*, a work so viable with youthful vigor that every page of it denies the number of years then piled on Verdi's head. With this he concluded his career.

Very near Verdi—his friend, and librettist in the later works—stands Arrigo Boito (1842—). His one produced opera, *Mefistofele*, was at its time full of a promise which the composer has not yet made good, although he has promised *Nero*, which in 1903 was reported to be almost completed. A follower of Verdi was Amilcare Ponchi-

elli (1834-86), whose fame lives in *La Gioconda*. Then follows a list of younger composers—the school of brutal verity—Puccini, a man of much talent and great technique; Franchetti, Spinelli, Giordano, and others—to say nothing of Mascagni and Leoncavallo, whose *Cavalleria Rusticana* and *Pagliacci*, respectively, have made them known the world over. But they all seem to be groping. Not only Wagner, but also Verdi, with his last works, left them in a maze of theories with no settled sign post to direct them. Germany is still subject to the Wagner influences. The later men have done nothing startling—as Verdi did—but principally have followed Wagner, as Humperdinck, Richard Strauss, Bungert, D'Albert, Goldmark, Schillings, Siegfried Wagner, Weingartner, Kienzl, and others. Very recently Richard Strauss has composed a *Sinnegedicht* *Feuernot*, which has met with success, but it is scarcely possible that the form is favorable to great development. His early music-drama, *Guntram*, reveals post-Wagnerian ideals. Practically the history of German opera closes with Wagner. The name of Johann Strauss (1825-99), a member of the celebrated family of dance composers, must not be omitted. His joyous, sparkling light operas are a distinct genre—*Die Fledermaus* is a masterpiece in little. It has found a large following—Von Suppé, Genée, and others.

The Wagner influence also pervaded France, where it brewed a tempest. The public decried it—so did some of the native composers; but others and wiser ones bowed their musical heads, accepted and for a time followed the master. Of late France has developed operatic realism and has produced a school of very clever musicians who have more technique than ideas. An exception is the Belgian—musically, France and Belgium are one—César Franck (1822-90), who was a spiritual thinker; but his opera *Hulda* is almost unknown. Reyer (1823—) has made tedious attempts to preserve the classic in opera, while Saint-Saëns (1835—) and Massenet (1842—) have floundered from the school of Meyerbeer to the more sensational style of the younger men. Of the latter, mention must be made of Charpentier, D'Indy, Hue, Pierné, Leroux, and Bruneau. Faure, and later and more important, Debussy, have written serious and intricate incidental music to accompany spoken drama. This is mere experimenting, since poetry and music must be united by closer bonds if they are to be joined at all. Altogether the operatic situation in France is not promising. Most of the modern works are threatened with an early decline, and on the horizon there is no figure promising enough to originate a new operatic faith. The Bohemian Smetana (1824-84) and his pupil Dvořák (1841—) have added works of local color to opera, but nothing absolutely revolutionary. The Polish pianist-composer Paderewski composed *Manru* (1901), and two other Poles, Xavier Scharwenka and Moritz, or Moszkowski, respectively, wrote *Mataswintha* and *Boabdil*. Russia has worked long and earnestly to produce a school of national opera composers. Let a few names suffice: Glinka (1804-57), Dargomyzhsky (1813-69), Séroff (1819-71), Rubinstein (1829-94), César Cui (1835—), Tchaikowsky (1840-93), Borodin (1834-87), and Rimsky-Korsakoff (1844—). Few of their works are heard outside of Russia.

England makes sporadic attempts to breed

native composers, and every now and again succeeds in producing some operatic novelty which dies immediately or soon after its appearance in a world of which Wagner is still lord. After the Handel invasion England contented itself with imitative Italian opera and English ballad opera. Arne (1710-78), Bishop (1786-1855), John Barnett (1802-90), Balfe (1808-70), Wallace, (1814-65), Benedict (1804-85), Macfarren (1813-87), Goring Thomas (1851-92), and Arthur Sullivan (1842-1902), bring the list to the prominent ones of the younger school: Stanford, Cowen, Mackenzie, MacCunn, De Lara, Bunning, and Ethel Smyth. Some of their works have been fostered by local pride and have gained notoriety—there is scarcely a masterpiece among them. The cleverest one of the modern English composers, Sullivan, gave the best of himself to comic opera, in which line he achieved international reputation. England is far behind Italy, Germany, and France in the quality of its native operas produced, and its future seems unpromising enough to discourage any musical optimist. In the United States the field of serious opera has been plowed, but the harvest time is not yet. Of so-called comic operas—with a few honorable exceptions—which in the United States have degenerated into musical farces—there is no end to their number and no limit to the poorness of their quality. It seems safe to assert that the world's history of opera closed for the present with the last work of Verdi. Since then operas have been either experiments or imitations of the good that has gone before.

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OPERA LIST.		
Opera.	Composer.	First Produced.
Abencérages, Les.....	Cherubini	1813
Abimelek.....	Meyerbeer	1813
Abreise, Die.....	D'Albert	1898
Abu Hassan.....	Weber	1811
Achille à Scyros.....	Cherubini	1804
Acide e Galatea.....	Haydn	1770
Actis and Galatea.....	Handel	1732
Actéon.....	Auber	1836
Adelaide di Borgogna.....	Rossini	1818
Adèle et Dorsan.....	Dalayrac	1725
Adelson e Salvini.....	Bellini	1824
Adm-to.....	Handel	1727
Adonis.....	Keiser	1697
Adriano in Siria.....	{ Caldara	1731
	{ Pergolesi	1734
	{ G. Scarlatti	1752
	{ Sacchini	1770
	{ Cherubini	1782

Opera.	Composer.	First Produced.
Adrien.....	Méhul	1799
Africaine, L'.....	Meyerbeer	1865
Agnes von Hohenstaufen.....	Spontini	1829
Aida.....	Verdi	1871
Alceste.....	Lully	1674
Alceste.....	Gluck	1766
Alchimist, Der.....	Spohr	1830
Aleidor.....	Spontini	1825
Aleina.....	Handel	1735
Alessandro.....	Handel	1726
Alessandro nell' Indie....	{ Vinci	1729
	{ Leo	1741
	{ Gluck	1745
	{ Jommelli	1757
	{ Sacchini	1768
Alessandro Severo.....	{ Paisiello	1776
	{ Cherubini	1784
Alessandro Stradella.....	Handel	1738
Alfonso und Estrella.....	Flotow	1844
Alfred.....	Schubert	1854
Ali Baba.....	Arne	1740
Ali Pascha von Janina.....	Cherubini	1833
Alruna.....	Lortzing	1824
Alruna.....	Spohr	1808
Amadis de Gaule.....	Lully	1684
Amant Jaloux, L'.....	Grétry	1778
Amazones, Les.....	Méhul	1811
Ambassadrice, L'.....	Auber	1836
Ame en Peine, L'.....	Flotow	1846
Amico Fritz, L'.....	Mascagni	1891
Amphitryon.....	Grétry	1780
Anacréon.....	Cherubini	1803
Andromaque.....	Grétry	1780
Andromeda und Perseus.....	J. W. Franck	1879
Angélique et Médore.....	Am. Thomas	1843
Angelo.....	C. Cul.	1876
Anna Bolenna.....	Donizetti	1831
Antigone.....	{ Mendelssohn	1841
	{ J. A. Hasse	1723
Apollo et Hyacinthus.....	Mozart	1767
Arabi nelle Gallie, Gli.....	Pacini	1827
Ariadne.....	Porpora	1733
Ariodant.....	Méhul	1799
Ariodante.....	Handel	1735
Armide.....	Gluck	1777
Armide et Renaud.....	{ Lully	1686
	{ Cherubini	1782
	{ Zingarelli	1786
Armin.....	Rossini	1817
Armin.....	H. Hofmann	1777
Arminius.....	{ Scarlatti	1714
Arminius.....	{ Handel	1737
	{ Hasse	1730
	{ Leo	1740
Artaserse.....	{ Gluck	1741
	{ Scarlatti	1763
	{ Piccini	1772
Artaxerxes.....	Arne	1762
Artemisia.....	Cimarosa	1801
Artisan, L'.....	Halévy	1827
Ascanio.....	Saint-Saëns	1890
Ascanio in Alba.....	Mozart	1711
Aspasie.....	Grétry	1789
Astarte.....	Buononcini	1720
Astianasse.....	{ Leo	1725
	{ Buononcini	1727
	{ Jommelli	1741
Attila.....	Verdi	1846
Avaro, L'.....	J. Haydn	1802
Avviso al marittimi.....	{ Cimarosa	1780
Azémia.....	{ Isouard	1795
	{ Dalayrac	1787
Bagatelle.....	Offenbach	1874
Ballo in Maschera, Un.....	Verdi	1859
Barbarea, Les.....	Saint-Saëns	1901
Barbe-Bleue.....	Offenbach	1866
Barbier de Trouville, Le.....	Leococq	1871
Barbier von Bagdad, Der.....	P. Cornelius	1858
Barcarolle, La.....	Auber	1845
Bärenhäuter, Der.....	S. Wagner	1899
Basilius.....	Keiser	1693
Bastien und Bastienne.....	Mozart	1768
Ba-ta-clan.....	Offenbach	1855
Bayadères, Les.....	Catal	1810
Bayard à Mézières.....	{ Boieldieu, Catal,	1814
	{ Isouard and Cherubini	
Bavards, Les.....	Offenbach	1863
Beatrice di Tenda.....	Bellini	1833
Béatrice et Bénédict.....	Berlioz	1862
Béguements d'amour.....	Grisar	1864
Beggars' Opera, The.....	Pepusch	1728
Beiden Pädagogen, Die.....	Mendelssohn	1821
Belden Schützen, Die.....	Lortzing	1837
Bellisario.....	Donizetti	1836

Opera.	Composer.	First Produced.
Belle Arsène, La.....	Monsigny	1773
Belle Hélène, La.....	Offenbach	1864
Bellérophon.....	Lully	1679
Belshazzar.....	Handel	1745
Benvenuto Cellini.....	Berlioz	1838
	F. Lachner.	1849
	Porpora	1710
	Handel	1737
Berenice.....	Piccinni	1764
	Zingarelli	1811
Bergère Châtelaine, La.....	Auber	1820
Bergers, Les.....	Offenbach	1865
Bergglist, Der.....	Spohr	1835
Bergtagna, Den.....	Hallström	1874
Bettelstudent, Der.....	Müllöcker	1881
Bianca.....	Balfe	1860
Billet de Marguerite, Le.....	Gevaert	1854
Blanche de Provence.....	Boieldieu	1821
Boccaccio.....	Suppé	1879
Bohème, La.....	Leoncavallo	1897
	Puccini	1896
Bohemian Girl, The.....	Balfe	1843
Boris Godunoff.....	Mussorgski	1872
Boule de neige, La.....	Offenbach	1871
Braniboři v Cechách.....	Smetana	1865
Brasseur de Preston, Le.....	Adam	1838
Bravo, il.....	Mercadante	1839
Bride of Song, The.....	Benedict	1864
Bride of Venice, The.....	Benedict	1844
Briganti, I.....	Mercadante	1836
Buona Figliuola, La.....	Piccini	1760
Cadmus et Hermione.....	Lully	1673
Cald, Le.....	Am. Thomas.	1849
Cagliostro.....	Adam	1844
Calife de Bagdad, Le.....	Boieldieu	1800
Camargo.....	Lecocq	1878
Camille.....	Dalayrac	1791
Canillus.....	Gluck	1754
Canterbury Pilgrims, The.....	C. V. Stanford.	1884
Captive, La.....	F. David	1866
Capuleti ed i Montecchi, I.....	Verdi	1830
Caractacus.....	Arne	1806
Carillonneur de Bruges, Le.....	Grisar	1852
Carline.....	Am. Thomas.	1840
Carmen.....	Bizet	1875
Cartouche.....	H. Hofmann.	1869
Castor et Pollux.....	Rameau	1737
Catarina Cornaro.....	Donizetti	1844
	F. Lachner.	1841
Catharine Howard.....	Litolff	1847
Catherine Grey.....	Balfe	1837
	Vinci	1727
	Leo	1732
	Graun	1744
	Jommelli	1749
	Piccini	1770
	Paisiello	1788
Cavalleria Rusticana.....	Mascagni	1890
Caverne, La.....	Méhul	1795
	Lesueur	1793
	Isouard	1810
Cendrillon.....	Massenet	1899
Cenerentola, La.....	Rossini	1817
Cent Vierges, Les.....	Lecocq	1872
Cephalus et Procris.....	Grétry	1773
Cert a Kaca.....	Dvořák	1899
Chalet, Le.....	Adam	1834
Chaperons blancs, Les.....	Auber	1836
Charles VI.....	Halévy	1843
Chatte Merveilleuse, La.....	Grisar	1862
Chevalier d'Harmental, Le.....	Messager	1896
Chevalier Nahel, Le.....	Litolff	1863
Chilperic.....	Offenbach	1868
	Piccini	1763
	P. Cornelius.	1860
	Massenet	1885
Cid, Le.....	Gounod	1877
Cinq-Mars.....	Auber	1861
Circassienne, La.....	Cimarosa	1779
Circe.....	Keiser	1734
	Rossini	1812
Ciro in Babilonia.....	Raimondi	1820
Clari.....	Halévy	1828
Clemenza di Tito, La.....	Gluck	1751
	Mozart	1791
Cleopatra e Cesare.....	K. H. Graun.	1742
Cloches de Corneville, Les.....	R. Planquette.	1877
Colomba.....	A. C. Mackenzie.	1883
Colombe, La.....	Gounod	1866
Comédie à la ville, La.....	Gevaert	1848
Comte Carmagnola, Le.....	Am. Thomas.	1841
Comte d'Ory, Le.....	Rossini	1828

Opera.	Composer.	First Produced.
Contessa de' Numi, La.....	Vinci	1729
	Paisiello	1773
	Caldara	1723
Contes d'Hoffmann, Les.....	Offenbach	1881
Cora.....	Méhul	1791
	Cavalli	1669
Coriolano.....	Caldara	1717
	Ariosti	1723
Corona, La.....	Gluck	1765
Così fan tutte.....	Mozart	1790
Cour de Célémène, La.....	Am. Thomas.	1855
Cour du roi Pétaud, La.....	Delibes	1869
Cox and Box.....	Sullivan	1867
Créole, La.....	Offenbach	1875
Crispino e la Comare.....	L. and F. Ricci.	1850
Crusaders, The.....	J. Benedict	1846
Czar und Zimmermann.....	Lortzing	1837
Dafne (first real opera).....	Peri	1597
Dalibor.....	Smetana	1868
Dame blanche, La.....	Boieldieu	1825
Dame invisible, La.....	Berton	1787
Dame Kobold.....	J. Raff.	1870
Damnation de Faust, La.....	Berlioz	1846
Dämon, Der.....	Rubinstein	1875
Danilowa.....	Adam	1830
Danza, La.....	Gluck	1755
Dardanus.....	Rameau	1739
	Sacchini	1784
Déjanire.....	Saint-Saëns	1898
	Caldara	1731
	Gluck	1742
	Jonclères	1876
	Dvořák	1882
Demetrio e Polibio.....	Rossini	1812
	Caldara	1733
Demofonte.....	Leo	1741
	Gluck	1742
	Hasse	1748
Démophon.....	Cherubini	1788
Déserteur, Le.....	Monsigny	1769
Deux avarés, Les.....	Grétry	1770
Deux aveugles, Les.....	Offenbach	1855
Deux familles, Les.....	Labarre	1831
Deux reines de France, Les.....	Gounod	1872
Deux nuits, Les.....	Boieldieu	1829
Devils' Opera, The.....	G. A. Macfarren.	1838
Dieu et la Bayadère, Le.....	Auber	1830
Diana.....	Keiser	1712
Didon.....	Piccini	1783
Dido and Aeneas.....	Purcell	1675
Didone Abbandonata.....	Scarlatti	1724
	Piccini	1767
	Mercadante	1823
Dimitri.....	Jonclères	1876
Dimitri Donskol.....	A. Rubinstein.	1852
Dimitrije.....	Dvořák	1882
Diva, La.....	Offenbach	1869
Djamilék.....	Bizet	1872
Djelma.....	Lefebvre	1894
Docteur Miracle, Le.....	Lecocq and Bizet.	1867
Domino noir, Le.....	Auber	1837
Don Bucefalo.....	A. Cagnoni.	1847
Don Carlos.....	Verdi	1867
Don César de Bazan.....	Massenet	1872
Don Giovanni (Don Juan).....	Mozart	1787
	Gluck	1761
Donna Diana.....	H. Hofmann.	1886
Don Pasquale.....	Donizetti	1843
	Purcell	1694
	Schaek	1792
Don Quixote.....	Macfarren	1846
	Moniuszko	1847
Don Sébastien.....	Donizetti	1843
Dot, La.....	Dalayrac	1785
Double échelle, Le.....	Am. Thomas.	1837
Dragon of Wantley, The.....	J. F. Lampe.	1737
Drapier, Le.....	Halévy	1840
Drei Pintos, Die.....	Weber	1888
Due Foscari, I.....	Verdi	1845
Duenna.....	Linley	1776
Echo et Narcisse.....	Gluck	1779
Eden, L'.....	F. David.	1848
Edoardo e Cristina.....	Rossini	1819
Edgar.....	Puccini	1889
Egyptienne, L'.....	Lecocq	1890
Elisa.....	Cherubini	1794
Elisabeth.....	Donizetti	1853
Elisa e Claudio.....	Mercadante	1821
Ellsir d'amore, L'.....	Donizetti	1832
Enfant prodigue, L'.....	Auber	1850
Entführung aus dem Seerail, Die.....	Mozart	1782

Opera.	Composer.	First Produced.
Lucia di Lammermoor.....	Donizetti	1835
Lucio Silla.....	Mozart	1772
Lucrezia Borgia.....	Donizetti	1834
Ludovic.....	Hérold and Halévy.....	1833
Luisa Miller.....	Verdi	1849
Lustige Krieg, Der.....	J. Strauss.....	1881
Lustigen Weiber von Windsor, Die.....	Nicolai	1849
Macbeth.....	Verdi	1847
Madame Favart.....	Offenbach	1879
Maestro di musica, Il.....	Pergolesi	1731
Mage, Le.....	Massenet	1891
Magicienne, La.....	Halévy	1858
Maid Marian.....	{ Bishop	1822
	{ De Koven.....	1901
Maid of Artois, The.....	Balfe	1836
Maid of the Mill.....	S. Arnold	1765
Maison à vendre.....	Dalayrac	1800
Maitre de chapelle, Le.....	Paër	1821
Makkabäer, Die.....	Rubinstein	1875
Manon.....	Massenet	1884
Manon Lescaut.....	Auber	1856
Manru.....	Paderewski	1901
Maometto secondo.....	Rossini	1820
Maréchal ferrant, Le.....	Philidor	1761
Margherita d'Anjou.....	Meyerbeer	1820
Mariage impossible, Le.....	Grisar	1833
Maria Stuarda.....	{ Mercadante	1821
	{ Donizetti	1834
Marie.....	Hérold	1826
Marino Faliero.....	Donizetti	1835
Maritana.....	W. V. Wallace.....	1845
Marjolaine, La.....	Lecocq	1877
Martha.....	Flotow	1847
Masaniello.....	Auber	1828
Martyrs, Les.....	Donizetti	1840
Mascotte, La.....	Audran	1880
Masnadicri, I.....	Verdi	1847
Matilda di Ciabrano.....	Rossini	1821
Matrimonio segreto, Il.....	Cimarosa	1792
Mazeppa.....	Tschalkowsky	1882
Medea in Corinto.....	S. Mayr.....	1813
Médecin malgré lui, Le.....	Gounod	1858
Médée.....	Cherubini	1797
Medici, I.....	Leoncavallo	1893
Meistofele.....	Boito	1868
Meistersinger von Nürnberg, Die.....	Wagner	1868
Merlin.....	Goldmark	1856
Merope.....	Jommelli	1742
Messaline.....	De Lara	1899
Methusalem, Prinz.....	J. Strauss.....	1877
Mignon.....	Am. Thomas.....	1866
Mikado, The.....	Sullivan	1885
Mireille.....	Gounod	1864
Mitridate rè di Ponto.....	Mozart	1770
Mlada.....	Rimsky-Korsakoff	1892
Molenara, La.....	Paisiello	1788
Monsieur Lohengrin.....	Audran	1896
Moïse in Egitto.....	Rossini	1818
Moses.....	Rubinstein	1887
Mountain Sylph, The.....	J. Barnett.....	1834
Mousquetaires de la reine, Les.....	Halévy	1846
Musikanten, Die.....	Flotow	1887
Muzio Scevola.....	{ Handel, Ariosti, }	1721
	{ and Buononcini. }	
Nacht in Venedig, Eine.....	J. Strauss.....	1883
Nachtlager in Granda, Das.....	K. Kreutzer.....	1834
Nadeshda.....	A. G. Thomas.....	1885
Nalida.....	Flotow	1873
Nals.....	Rameau	1749
Navarraise, La.....	Massenet	1894
Nero.....	{ Handel	1705
	{ A. Rubinstein.....	1879
Niccolo de' Lapl.....	Pacini	1873
Nitteti.....	{ Sarti	1765
	{ Paisiello	1781
	{ Jommelli	1753
Noces de Jeannette, Les.....	Massé	1853
Noces d'Olivette, Les.....	Audran	1879
Nonne sanglante, La.....	Gounod	1854
Nordlicht, Das.....	Millöcker	1897
Norma.....	Bellini	1831
Nouveau seigneur du village, Le.....	Boieldieu	1813
Nozze di Enea con Lavinia, La.....	{ Monteverde	1641
	{ A. Scarlatti.....	1720
	{ Vinci	1724
Nuit de Cléopâtre, Une.....	Massé	1885
Nurmahal.....	Spontini	1822
Nyaga.....	Hallström	1885
Oberon.....	Weber	1826

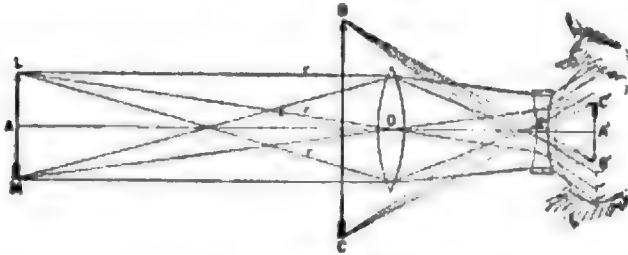
Opera.	Composer.	First Produced.
Oberto conte di San Bonifacio.....	Verdi	1839
Oca del Cairo, L'.....	Mozart	1783
Oedipe à Colone.....	Sacchini	1787
	{ Cimarosa	1784
	{ Leo	1737
Olimpiade, L'.....	{ Pergolesi	1735
	{ Piccini	1761
	{ Sacchini	1767
Orlando.....	Handel	1733
Orfeo.....	Monteverde	1607
Orfeo ed Euridice.....	Gluck	1762
Orphée aux enfers.....	Offenbach	1858
Otello.....	{ Rossini	1816
	{ Verdi	1887
Pagliacci, I.....	Leoncavallo	1892
Paladins, Les.....	Rameau	1760
Panier fleuri, Le.....	Am. Thomas.....	1839
Panurgi dans l'île des lanternes.....	Grétry	1785
Pardon de Ploërmel, Le.....	Meyerbeer	1859
Parisina.....	Donizetti	1883
Parsifal.....	Wagner	1882
Part du diable, La.....	Auber	1843
Pastor fido, Il.....	Handel	1712
Patience.....	Sullivan	1881
	{ R. Kreutzer.....	1791
Paul und Virginie.....	{ Lesueur	1794
	{ Massé	1876
Pêcheurs de perles, Les.....	Bizet	1863
Pêcheurs, Les.....	Gossec	1766
Pélage.....	Spontini	1814
Perle du Brésil, La.....	F. David.....	1851
Perruquier de la régence, Le.....	Am. Thomas.....	1838
Persée.....	Lully	1682
Peter Schmoll und seine Nachbarn.....	Weber	1803
Petit chaperon rouge, Le.....	Boieldieu	1818
Petit duc, Le.....	Lecocq	1878
Phaéton.....	Lully	1683
Philemon et Baucis.....	Gounod	1860
Philtre, Le.....	Auber	1831
Phrosine et Mélidore.....	Méhul	1794
Phryné.....	Saint-Saëns	1893
Pietro von Albano.....	Spohr	1827
Pinafore, H.M.S.....	Sullivan	1878
Pique, Dame.....	Suppé	1864
Pirata, Il.....	Bellini	1827
Pirates of Penzance, The.....	Sullivan	1879
Polluto.....	Donizetti	1848
Polyeucte.....	Gounod	1878
Pomo d'oro, Il.....	Cesti	1666
Pomone.....	Cambert	1671
Poro.....	Handel	1731
Postillon de Lonjumeau, Le.....	A. Adam.....	1836
Pré aux clercs, Le.....	Hérold	1832
Prelosa.....	Weber	1821
Premier jour de bonheur, Le.....	Auber	1868
Princesse jaune, La.....	Saint-Saëns	1872
Prophète, Le.....	Meyerbeer	1849
	{ Lully	1680
Proserpine.....	{ Saint-Saëns	1887
	{ Paisiello	1803
	{ Lully	1678
Psyché.....	{ Am. Thomas.....	1857
P'tites Michu, Les.....	Messager	1897
Puritani, I.....	Bellini	1835
Puritan's Daughter, The.....	Balfe	1861
Quentin Durward.....	Gevaert	1858
Quinto Fabio.....	Cherubini	1780
Radamisto.....	Handel	1720
Rapimento di Cefalo, Il.....	Caccini	1597
Rappresentazione dell'anima e del corpo, La.....	Cavallieri	1600
Ratcliff, Guglielmo.....	Mascagni	1895
Reine de Chypre, La.....	Halévy	1841
Reine de Saba, La.....	Gounod	1862
Renaud.....	Sacchini	1783
Renaud d'Ast.....	Dalayrac	1787
Rê pastore, Il.....	{ Mozart	1775
	{ Sarti	1753
Rêve d'amour.....	Auber	1869
Rheingold, Das.....	Wagner	1869
Riccardo.....	Handel	1727
Rienzi, der Letzte der Tribunen.....	Wagner	1842
Richard Cœur de Lion.....	Grétry	1784
Rigoletto.....	Verdi	1851
Rinaldo.....	Handel	1711

Opera.	Composer.	First Produced.
Ring des Nibelungen, Der: the tetralogy comprising Das Rheingold, Die Walküre, Siegfried, and Götterdämmerung (qq.v.).....	Wagner	1876
Rita	Donizetti	1860
Ritorno d'Ulisse, Il.....	Monteverde	1641
Rob Roy.....	Flotow	1837
Robert Bruce.....	Rossini	1846
Robert le Diable.....	Meyerbeer	1831
Robin Hood.....	{ Macfarren	1860
	{ De Koven.....	1890
Rodrigo.....	Handel	1707
Roi de Lahore, Le.....	Massenet	1877
Roi d'Ys, Le.....	Lalo	1888
Roi d'Yvetot, Le.....	Adam	1842
Roi l'a dit, Le.....	Delibes	1873
Roland.....	{ Lully	1685
	{ Puccini	1778
	{ Bellini	1859
Roméo et Juliette.....	{ Gounod	1867
Rosamunde.....	Schubert	1823
Rosaura, La.....	Scarlatti	1690
Rose of Sharon, The.....	Mackenzie	1884
Rosières, Les.....	Hérold	1817
Rübezahl.....	Flotow	1854
Rubin, Der.....	Eugène d'Albert.....	1893
Ruggiero, Il.....	J. A. Hasse.....	1771
Runenstein, Am.....	Flotow	1868
Ruslan e Ludmilla.....	Glinka	1842
Russalka.....	Dargomyzhsky	1867
Ruy Blas.....	Marchetti	1869
Sadko.....	Rimsky-Korsakoff	1876
Saffo.....	Pacini	1840
Salammbô.....	Reyer	1890
Samson et Dalila.....	Saint-Saëns	1877
	{ Gounod	1851
Sappho.....	{ Massenet	1897
Sarah.....	Grisar	1836
Sarazin.....	C. Cui.....	1899
Sardanapale.....	Joncières	1867
Savonarola.....	C. V. Stanford.....	1884
Schauspieldirektor, Der.....	Mozart	1796
Scipione.....	Handel	1726
Selma Sedlak.....	Dvořák	1878
Semiramide.....	Rossini	1823
Sémiramis.....	Catel	1802
Serment, Le.....	Auber	1832
	{ Cavalli	1654
Serse.....	{ Handel	1738
Sesostrate.....	J. A. Hasse.....	1726
Shamus O'Brien.....	C. V. Stanford.....	1896
Shérif, Le.....	Halévy	1839
Siège de Corinthe, Le.....	Rossini	1826
Siegfried.....	Wagner	1876
Sigesmondo.....	Rossini	1815
Simone Boccanegra.....	Verdi	1856
Sirène, La.....	Auber	1844
Snegorotchka.....	Rimsky-Korsakoff	1882
Sogno di Scipione, Il.....	Mozart	1772
Sonnambula, La.....	Bellini	1831
Songe d'une nuit d'été, Le.....	Am. Thomas.....	1850
Sorcier, Le.....	Philidor	1764
Sosarme.....	Handel	1732
Spiegelritter, Der.....	Schubert	1815
Spitzentuch der Königin, Das.....	J. Strauss.....	1880
Sposo deluso, Lo.....	Mozart	1784
Stradella, Alessandro.....	Flotow	1837
Sylvana.....	Weber	1810
Tancredi.....	Rossini	1813
Tannhäuser.....	Wagner	1845
Tarare.....	Salleri	1747
Tcharodjeika.....	Tschalkowsky	1887
	{ Gluck	1750
Telemacco.....	{ Scarlatti	1718
Télémaque dans l'île de Calypso.....	Lesueur	1796
Temistocle.....	{ Caldara	1736
	{ J. C. Bach.....	1760
Tempête, La.....	Am. Thomas.....	1889
Templer und die Jüdin, Die.....	Marschner	1829
Templiers, Les.....	Litolff	1886
Thais.....	Massenet	1894
Theodora.....	Handel	1749
Thésée.....	Lully	1675
Timbre d'argent, Le.....	Saint-Saëns	1877
Toleмео.....	Handel	1728
Torquato Tasso.....	Donizetti	1833
Torvaldo e Dorliška.....	Rossini	1815
Tosca.....	Puccini	1900

Opera.	Composer.	First Produced.
Todte Gast, Der.....	Millöcker	1865
Traviata, La.....	Verdi	1853
Trial by Jury.....	Sullivan	1875
Tribut de Zamora, Le.....	Gounod	1881
Troyens, Les.....	Berlioz	1897
Tristan und Isolde.....	Wagner	1865
Trompeter von Säckingen, Der.....	Nessler	1884
Troubadour, The.....	Mackenzie	1886
Trovatore, Il.....	Verdi	1853
Troyens à Carthage, Les.....	Berlioz	1863
Tcharodelka.....	Tschalkowsky	1887
Tcheravitchki.....	Tschalkowsky	1886
Undine.....	{ Hoffmann	1816
	{ Lvoff	1846
	{ Lortzing	1845
Unter Räubern.....	Rubinstein	1883
Uthal.....	Méhul	1806
Vakula.....	Tschalkowsky	1876
Vampyr, Der.....	Marschner	1828
Vendôme en Espagne.....	Hérold and Auber.....	1823
Véronique.....	Messager	1898
Vert-vert.....	Offenbach	1869
Vestale, La.....	Spontini	1807
Veuve Grapin, La.....	Flotow	1859
Vie parisienne, La.....	Offenbach	1866
Villi, Le.....	Puccini	1884
Vivandière, La.....	Godard	1895
Vizeadmiral, Der.....	Millöcker	1886
Vollère, La.....	Leeocq	1888
Voyevoda.....	Tschalkowsky	1869
Waldmeister.....	J. Strauss.....	1895
Waldmädchen, Das.....	Weber	1800
Walküre, Die.....	Wagner	1870
Wanda.....	Dvořák	1876
Werther.....	Massenet	1892
Wildschütz, Der.....	Lortzing	1842
William Ratcliff.....	C. Cui	1869
Zaide.....	Mozart	c.1780
Zähmung der Widerspenstigen, Die.....	Goetz	1874
	{ Lefebvre	1887
	{ Bellini	1829
Zaire.....	{ Mercadante	1831
Zampa.....	Hérold	1831
Zanetta.....	Auber	1840
Zanetto.....	Mascagni	1896
Zhizn za cezaria.....	Glinka	1836
Zauberflöte, Die.....	Mozart	1791
Zauberharfe, Die.....	Schubert	1820
Zaza.....	Leoncavallo	1900
Zelmira.....	Rossini	1821
Zémire et Azor.....	Grétry	1771
Zenobia.....	{ Puccini	1756
	{ J. A. Hasse.....	1763
Zerline.....	Auber	1851
Zoraimé et Zulnar.....	Boieldieu	1798
Zoroastre.....	Rameau	1749
Zwillingsbrüder, Die.....	Schubert	1820

OPERA GLASS. A small double telescope, used for looking at objects that require to be seen clearly and distinctly rather than greatly magnified. The opera glass is short and light, and though it has usually small magnifying power (varying in most instances from two to three times), the large amount of light admitted by the object glass on account of its large angle of aperture enables it to present a well-illuminated picture which can be seen without undue strain to the eye. The opera glass allows the use of both eyes, which gives to the spectator the advantage of seeing objects stand out stereoscopically as in ordinary vision. It consists of two lenses, or sets of lenses, as each lens is generally achromatic and made up of two lenses of different glass fitted together. The object lens which is the larger is convex, and the eye lens is concave. They are mounted so that when the tubes are drawn out the distance between the two lenses shall be nearly equal to the difference of their focal lengths. The figure shows the

action of the opera glass. O is the object lens and E is the eye lens, the line AA' representing the axis of the instrument. The object lens alone would form a real and inverted image C'B' of the distant object LM at or near its principal focus, were it not for the concave eye lens which changes the direction of the rays and causes them to diverge instead of converge at the focus.



Accordingly, the rays appear to diverge from an erect and magnified image located at BC. The formation of the image may be understood by tracing the course of rays, r, r, r , diverging from some point of the original object such as L. These rays diverge until they meet the convex lens O, which makes them convergent, and would bring them to a focus at B', but the concave lens E causes them to diverge and take the direction of the rays r', r', r' , entering the eye as if they came from the point B.

OPÉRETTE (It., little opera). An opera of a light character, generally comic or humorous. Between the various numbers spoken dialogue is introduced. Although originally operettas were written in one act, they now contain generally two. As a rule these productions are ephemeral. But the operettas of Johann Strauss, Offenbach, and Arthur Sullivan have survived their composers. See **OPERA**.

OPHELIA, ò-fé'lyá. In Shakespeare's *Hamlet*, the daughter of Polonius, in love with Hamlet, who in his madness puts her aside, and by mistake kills her father. Her mind gives way, and she becomes a pathetic figure in her madness. Her wandering fancies, her gayety and tears, and her old songs form a touching picture, true to nature. She meets an accidental death by drowning while gathering flowers.

OPHICLEIDE (from Gk. *ὄφης*, *ophis*, serpent + *κλέις*, *kleis*, key). A musical wind instrument of brass or copper, which ceased to be used in the orchestra about the middle of the nineteenth century. It consisted of a conical tube, terminating in a bell like that of a horn, with a mouthpiece similar to that of the serpent (q.v.), and with ten holes which were stopped by keys. The only ophicleide which was in general use was the bass, and that has now been superseded by the bass tuba in E flat. The compass of the ophicleide was about three octaves. The models varied in length from four to two feet.

OPHID'IA (Neo-Lat. nom. pl., from Gk. *ὀφίδιον*, *ophidion*, diminutive of *ὄφης*, *ophis*, serpent). An order of reptiles of the subclass Sauria, the serpents, which are distinguished from lizards by the fact that the right and left halves of the lower jaws are connected by an elastic band. See **SNAKE**.

OPHIOCEPH'ALUS. See **SNAKE-HEADED FISH**.

OPHILETA. A genus of fossil gastropods very characteristic of the lower Ordovician strata of North America. The shells are from one-half to two inches in diameter, with impressed spires and flat or slightly concave lower surfaces. The upper surfaces of the whorls are sharply keeled, the keel of the outermost whorl being higher than those of the inner whorl. The shells resemble those of the genus *Euomphalus*, to which they are allied. About 15 species range from Potsdam to Trenton limestones, and of these *Ophileta complanata*, of the New York and Canadian Beekmantown limestones, is the best known.

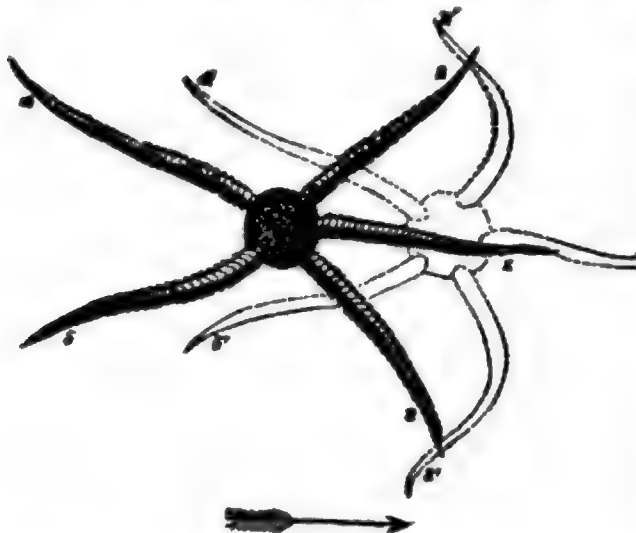
O'PHIOL'ATRY. The worship of serpents. See **NATURE-WORSHIP**.

OPHIR, ò'fēr (Heb. *Ophûr*, Ophir). The region to which the ships of Hiram and Solomon went from Eziongeber, and whence they brought gold, precious stones, etc. (I. Kings ix. 26-28; x. 11; II. Chron. viii. 18; ix. 10). The region was chiefly remarkable for its gold. (Cf. Isa. xlii. 12; Job xxii. 24, et al.) The location of Ophir is a much-vexed question. In Genesis x. 20 Ophir is mentioned in a list of the sons of Joktan. The names in this list are those of countries, and the Joktanites belong to Southern Arabia. The inclusion of Ophir shows, at least, where tradition placed the country, and there is much that speaks in favor of this traditional view, since Southern Arabia was known to the ancients as a gold-producing country. Hence, Glaser places Ophir on the east coast of Arabia, on the Persian Gulf. Other locations, however, have advocates, notably Zimbabwe, in Mashonaland (q.v.), South Africa. The Ethiopian coast of the Red Sea, Ceylon, and the Malay Peninsula have also been proposed. Consult the article "Ophir" by Price in the *Hastings Bible Dictionary*, vol. iii. (New York, 1900), and by Cheyne in *Encyclopædia Biblica*, vol. iii. (London, 1902).

OPHITES, ò'fīts (Lat. *Ophites*, from Gk. *ὀφίτης*, *Ophite*, from *ὄφης*, relating to a serpent, from *ὄφης*, *ophis*, serpent). A Gnostic sect. With the other Gnostics they shared the general belief of dualism, the conflict of matter and spirit, the emanations, the demiurgos, and other notions common to the many subdivisions of this school, but were distinguished from the rest by their peculiar doctrine and worship connected with their *ophis* or serpent. Hence they were also called *Naassenes* (from Heb. *nāchāsh*, serpent). Like most Gnostics, they regarded the demiurgos, or the Jehovah of the Old Testament, with great abhorrence, and, considering the emancipation of man from the power and control of the demiurgos as a most important end, they considered the serpent who tempted Eve, and introduced into the world 'knowledge' and revolt against Jehovah, to have been the great benefactor of the human race. Hence their worship of the serpent. Information regarding them is very meagre, and comes chiefly from antagonistic sources. They were in existence as late as the sixth century. Consult the monographs relating to them by Gruber (Würzburg, 1864) and Hönig (Berlin, 1889). See **GNOSTICISM**.

O'PHIUROI'DEA (Neo-Lat. nom. pl., from Gk. *ὄφης*, *ophis*, serpent + *οὐρά*, *oura*, tail). The class of brittle stars, or sand stars, of which *Ophiura* is the typical genus. Ophiuroids (or ophiurans) are star-shaped, freely moving echino-

derms (q.v.), with a flat, roundish or polygonal disk, from which suddenly arise five arms, which are slender, cylindrical, and contain no spacious continuation of the cœlomic cavity of the disk, or hepatic cœca, while there is no vent. There are no ambulacral grooves in the arms, and the



AN OPHIURAN.

Natural movements of a brittle star when proceeding along a solid horizontal surface. The arms are numbered.

suckers are but little used in locomotion, which is mainly effected by the arms themselves, the 'feet,' or ambulacra, being thrust out laterally and acting as tactile organs. The mouth and also the madreporite are on the under side of the disk. On the ventral surface, also, are five slits which connect with a corresponding number of respiratory sacs (bursæ) into which the ovaries or spermaries open. The eggs passing out through these slits are fertilized in the water,



STRUCTURE OF THE OPHIURAN ARM.

1. Diagrammatic cross-section of an arm; a, a dorsal plate; b, side plate; c, ventral plate; d, d, tube-feet, connected and penetrated by the ambulacral vessel; e, vertebral ossicle. 2. A vertebral ossicle, seen from the inward side, and surrounded by the external arm-plates. 3. Vertebral ossicle, viewed from the side.

the sexes being distinct. The ophiuroids, as a rule, pass through a well-marked metamorphosis, the free-swimming young being called a pluteus. Certain forms undergo self-division, and in others development is direct. The class is divided into two orders, *Ophiurida* and *Euryalida*, the latter having the arms greatly subdivided into long curly tendrils, as in *Astrophyton*, the basket-fish. Fossil ophiuroids begin to appear in the Silurian period, while genuine modern forms arose in the middle Trias. See BRITTLE STAR.

Both orders of the Ophiuroidea—the Ophiurida having simple arms and the Euryalida with branched arms—are represented from the Silurian onward, and the fossil forms show few important differences from their modern descendants. They are usually rare, but a few localities in the Devonian and in the Triassic and Jurassic shales and limestones have furnished well-preserved specimens in abundance. Such localities are

Bundenbach (Devonian) and Solenhofen (Jurassic) in Germany, and Crawfordsville (Carboniferous) in Indiana. The more important genera are: Silurian—*Eucadia*, *Protaster*, *Teniaster*; Devonian—*Protaster*, *Ophiura*; Carboniferous—*Onychaster*; Mesozoic—*Aspidura*, *Geocoma*, and *Ophioglypha*, with other modern genera. See ECHINODERMATA; BRITTLE STAR.

OPHTHALMIA (Lat., from Gk. *ὀφθαλμία*, disease of the eyes, from *ὀφθαλμός*, *ophthalmos*, eye; connected with *ὄρω*, *orôpa*, I have seen, *ὄσσε*, *osse*, the two eyes, Lat. *oculus*, OChurch Slav. *oko*, Skt. *akṣan*, OHG. *ouga*, Ger. *Auge*, Goth. *augô*, AS. *æage*, Eng. *eye*). A term originally used to denote inflammation of the eye generally, and still employed in that sense at times, but now usually restricted to designate inflammatory affections of the conjunctiva or mucous coat of the eye. (See CONJUNCTIVITIS.) Sympathetic ophthalmia is, however, a term applied to describe an inflammation in one eye due to a similar inflammation of the other. This usually follows perforation by foreign bodies or ulcer of the cornea, or operations in the ciliary region. The sympathizing eye is usually affected about five to eight weeks after the injury of the exciting eye. After one or more periods of irritability of the sympathizing eye, marked by dread of light, pain in the eye, lachrymation, and dimness of vision, the sympathetic inflammation comes on. Removal of the exciting eye before this takes place will prevent its occurrence. The course of the sympathetic inflammation is slow and it usually results in blindness in months or one or two years. The cause of sympathetic ophthalmia is not positively known, but it is probably due to extension of infection through the sheath of one optic nerve by way of the optic chiasm to that of the nerve of the other eye. (See EYE.) Treatment consists in the removal of the exciting eye before the sympathetic inflammation develops; after this period it is of no avail. If the injured eye, however, possesses good vision, it is often advisable not to excise it as long as there are no signs of trouble in the other. The inflammation itself is treated as in cases due to other causes. See IRITIS.

OPHTHALMIC GANGLION. One of the ganglia connected with the branches of the fifth cranial nerve, and thought to be a part of the great sympathetic nerve. It is about the size of a pin's head, and situated at the back part of the orbit, between the optic nerve and the external rectus muscle. It lies in a quantity of loose fat which makes its dissection somewhat difficult. It has three branches of communication (motor, sensory, and sympathetic), which enter its posterior border. The long branch (sensory) is derived from the nasal branch of the ophthalmic nerve (first division of the fifth nerve). The second branch or root (motor) is derived from a branch of the third nerve supplying the inferior oblique muscle of the eyeball. The third branch, or root, is a slender filament from the cavernous plexus of the sympathetic. According to Tiedemann this ganglion receives a filament of communication from Meckel's ganglion (q.v.). Its branches of distribution are the short ciliary nerves. These are 10 or 12 delicate filaments arising from the fore part of the ganglion in two bundles. They run forward with the ciliary arteries, pierce the sclerotic coat at the back

part of the globe, pass forward in delicate grooves on its inner surface, and are distributed to the ciliary muscle and the iris. It is therefore seen that the ophthalmic ganglion is one of the most important nerve centres in the whole body, although no larger than a pin's head. The ciliary muscle is the muscle of accommodation of the eye, causing variation in the form of the aqueous humor and the crystalline lens so as to accommodate the focal length of the eye to the distance of objects. Its supply of nerve force to the muscular fibres of the iris is also intimately connected with the focal length of the eye-apparatus.

The other three of the four ganglia above referred to are Meckel's (already described), the otic, and the submaxillary.

The otic (Arnold's) ganglion is a small, flattened oval body reddish-gray in color, situated immediately below the *foramen ovale* (through which the inferior maxillary nerve escapes from the cranial cavity). It is connected with the inferior maxillary, facial, and glossopharyngeal nerves, and with the sympathetic system, sending branches principally to the various parts of the tympanic cavity (middle ear), to which it serves much the same purpose that the ophthalmic ganglion does to the eye.

The submaxillary ganglion is a small fusiform body, situated above the submaxillary gland. It receives branches from the lingual, facial, and sympathetic nerves, and is distributed by five or six filaments to the mucous membrane of the mouth and the submaxillary gland, and indirectly, it is thought, to the sublingual gland.

OPHTHALMOLOGY. See EYE; EYE, DISEASES OF.

OPHTHALMOSCOPE from Gk. *ὀφθαλμός*, *ophthalmos*, eye + *σκοπεῖν*, *skopein*, to view). An instrument invented by Helmholtz in 1851 for the purpose of examining the deep-seated structures of the eye, and for detecting disease in them. It is a concave circular mirror, of about 10 inches focus, having a hole in the centre, and mounted on a handle and accompanied by a set of convex and concave lenses. In the most approved forms the mirror is cut in approximately the form of a parallelogram and is so arranged as to be tilted toward either side. The lenses are placed near the circumference of a disk, by pressure upon the reeded edge of which they are brought successively before the opening in the mirror. Light is reflected into the interior of the eye by the mirror, and a portion returns, through the opening in the mirror and through the lens placed opposite it, to the eye of the observer.

OPHTHALMOSCOPIC EXAMINATION. (1) *Of the Media.*—In a darkened room, an Argand burner is placed several inches from either side of the patient, a few inches behind, and on a level with the eyes. Facing the patient, the observer looks through the perforation in the mirror, which is held about 15 inches from the patient's eye and reflects light into it. An orange-red reflex from the fundus is seen in the normal eye. Dark spots show opacities of the media or cornea; ametropia (see SIGHT, DEFECTS OF) is shown by ability to see the vessels in the fundus. (2) *Indirect Method.*—This gives an inverted image of the fundus. For both this and the direct method the pupil should be dilated by some mydriatic. The

light is placed as before, and the ophthalmoscope is held at the same distance but with a positive lens of sufficient strength before the opening. The light is directed by the mirror into the eye through a strong convex lens held at its focal distance of about two inches in front of the patient's eye. By varying the distance of the mirror and lens an inverted image of the fundus is obtained. The fundus appears as an orange-red surface, darker in brunettes than in blondes, finely dotted by pigment cells. It is crossed by blood-vessels which radiate from the optic disk, the arteries bright, the veins darker red and more tortuous. The optic disk is usually circular, pinkish, often bordered by a white ring of sclera, and an external dark ring formed by the choroid coat. The blood-vessels emerge from a depression at the centre of the disk. The appearance of the normal fundus varies greatly. (3) *Direct Method.*—This gives an erect image, magnified about 14 times, a smaller field at one time, allows estimation of errors of refraction by noting the lens which is necessary to give a clear view, and is less difficult. The light is placed on the side of the eye examined; the ophthalmoscope is held about one inch in front of the patient's eye. Different portions of the fundus are brought into view by movement of the eye of the patient. In this method correction by lenses must be made for errors of refraction of both patient and observer. Much practice is required for the skillful use of the ophthalmoscope, but it is now as essential in the diagnosis of diseases of the eye as the stethoscope is in that of thoracic affections. Those of other parts of the body may also be detected or confirmed by its use. For example, inflammation of the optic disk occurs in 90 per cent. of brain tumors.

O'PIE, AMELIA (ALDERSON) (1769-1853). An English novelist and poet. She was the second wife of John Opie (q.v.), the painter, whom she married in 1798. After her husband's death she lived at her father's house in Norwich. She was an attractive woman and occupied a high position in London society. On Sundays during her stay there, her house was thronged with visitors, including Sheridan, Sydney Smith, Byron, Scott, Wordsworth, and Humboldt. In 1825 she joined the Society of Friends and devoted herself to charitable work. Among her publications are: *Father and Daughter* (1801); *Miscellaneous Poems* (1802); *Adeline Moubray* (1804); *Detraction Displayed* (1828); and *Lays for the Dead* (1833).

OPIE, JOHN (1761-1807). An English artist. He was born at Saint Agnes, Cornwall, and had but elementary village schooling. His early attempts at art won the notice of Dr. Wolcott ('Peter Pindar'), whose patronage secured for him important local custom. After he had already accomplished much in portraiture, he was in 1780 taken by Dr. Wolcott to London, where he was presented at Court, received numerous commissions from the fashionable world, and was known as the 'Cornish Wonder.' This favor was soon withdrawn, and the artist, well prepared for such an event, was left to supply his many defects in art and general culture. Skill abundantly employed as a portrait-painter, he thoroughly acquainted himself with the Latin, French, and English literatures, and in 1786 sent seven canvases to the Academy. For a number of

years thereafter he exhibited frequently at the Academy, and illustrated such works as the *Boydell Shakespeare* and *Macklin's Poets*. In 1788 he was elected Academician, in 1805 was appointed professor of painting at the Academy, and in 1807 delivered before that institution four lectures which are a recognized part of permanent art-criticism. Severe application to work hastened his death. His works include: "James I. of Scotland Assassinated by Graham;" "The Assassination of David Rizzio;" "Arthur Supplicating Hubert;" "Jephtha's Vow;" and "The Presentation in the Temple." He contributed a *Life of Reynolds* to Dr. Wolcott's edition of *Pilkington's Dictionary of Painters* (1798).

OPINION (Lat. *opinio*, from *opinari*, to suppose; connected with *optare*, to hope, *apisci*, Skt. *āp*, to obtain) (of a court). A statement of the principles of law and legal reasons, which govern the court in reaching its decision in an action. It is usually handed down in writing, but may be delivered orally by a judge from the bench, in open court. When there are several opinions from several judges sitting together as a court, the opinion of the majority is the only one which has legal effect; and it is known as the 'opinion of the court' or the 'prevailing opinion.' The majority opinion usually contains, besides the reasons of the court, the application of the principles of law therein enunciated to the particular case, and a direction as to its disposition, and therefore includes the decision. For this reason, an opinion and a decision are sometimes confused, and an opinion is often defined as a written statement of the decision.

Where a judge in the course of an opinion expresses his views as to the law on some point which may be incidental to, but is not necessarily involved in, the issues before him, such part of the opinion is said to be *obiter dictum* (Lat., outside remark), or 'extra-judicial,' and has no absolute binding effect as a statement of the law, although it may be referred to in an argument on a mooted point of law, as the individual opinion of a learned judge. However, that part of the opinion which is necessary to the conclusion of the court is deemed a statement of the law, which inferior courts are bound to respect and follow. An opinion is a part of the record of a case, and is the authority for the entry of judgment.

The statutes of some States provide that certain public officers, such as the Governor, or a mayor of a city, may ask the courts for opinions on questions of law involving the public interests. For example, a Governor might ask for a judicial interpretation of an obscure statute creating a new public office. An opinion delivered under such circumstances may be considered as law. See DECREE; JUDGMENT.

OPINION EVIDENCE. See EVIDENCE;

- EXPERT.

O'PISTHOC'OMI (Neo-Lat. nom. pl., from Gk. *ὀπισθοκομος*, *opisthokomos*, wearing the hair long behind, from *ὀπισθεν*, *opisthen*, behind + *κόμη*, *komē*, hair). A group of birds now regarded as a suborder of the Gallinæ, including only a single species, the remarkable hoatzin (q.v.). The order differs from other birds chiefly in the remarkable character of the sternum and shoulder-girdle. The clavicles are ankylosed with the coracoids and with the manubrium of the

sternum. The latter has a pair of notches on each side of its posterior margin and the keel is cut away in front.

OPIS'THOGLYPH'A (Neo-Lat. nom. pl., from Gk. *ὀπισθεν*, *opisthen*, behind + *γλυφή*, *glyphē*, carving). A group of snakes of the family Colubridæ, characterized by the fact that one or more of the posterior maxillary teeth are grooved in front, and in most cases serve the purpose of poison-fangs, conveying venom from labial poison-glands. (Compare PROTEOGLYPHA.) They comprise about 300 species, occurring in all the warmer parts of the world excepting New Zealand, and containing terrestrial, arboreal, and aquatic forms. All are more or less poisonous, but so far as man is concerned are comparatively harmless, since the poison is not very strong, does not exist in large quantities, and the fangs stand so far back that the snakes cannot easily inflict wounds with them. The tree-snakes (*Dipsas*, *Septognathus*, etc.) of tropical South America and the cat-snake (q.v.) are conspicuous examples.

OPITZ, *ŏ'pits*, MARTIN (1597-1639). A German poet and literary reformer, born at Bunzlau, Silesia, December 23, 1597. He studied at Frankfort-on-the-Oder and at Heidelberg; visited, with his friend Hamilton, a Dane, the Netherlands and Jutland (1620); returned to Silesia (1621); occupied various subordinate confidential posts at small German courts; was knighted by the Emperor Ferdinand II. (1628), and died of the plague in Danzig, August 20, 1639. For a century after his death he passed for the Father of German Poetry, less for his mediocre verses than for his critical *Aristarchus*, *seu de Contemptu Linguae Teutonicæ* (or "Scorn of the German Tongue") (1618), and his *Buch von der deutschen Poeterei* (1624, reëd. 1876). Opitz borrowed his poetical theories mostly from Scaliger, Heinsius, and Ronsard. In 1627 he made the verses of the oldest German opera, *Dafne*, after Rinuccini, music by Heinrich Schütz. He laid great stress on Greek and Latin learning, urging that classic forms ought to be adopted in German poetry. Opitz laid down the law that rhythm must be pure, and there must be alternating masculine and feminine rhymes. The Alexandrine, a measure of French origin, which had come to be the standard French verse in the sixteenth century, he held up as the ideal for German poets. The influence of Opitz did much to secure the acceptance of the literary German of Luther in the Catholic States and so to make a common German literature possible. Opitz's works were incompletely gathered in three volumes (Breslau, 1690; Amsterdam, 1646; Frankfort, 1724). There are *Lives* by Strehlke (Leipzig, 1856); Hoffmann von Fallersleben (ib., 1858); Weinhold (Berlin, 1862); and Palm (Breslau, 1862). Consult also: Borinski, *Die Kunstlehre der Renaissance in Opitzens Buch von der deutschen Poeterei* (Munich, 1883); Witkowski, *Aristarchus und das Buch der Poeterei* (Leipzig, 1888); Scherer, *Kleine Schriften*, vol. i. (Berlin, 1893); Burdach, in *Forschungen zur deutschen Philologie* (ib., 1894); and Perry, *From Opitz to Lessing* (Boston, 1884).

OPIUM (Lat., from Gk. *ὀπιον*, poppy-juice, from *ὀπός*, *opos*, juice, sap). The dried juice of the unripe capsules of a species of poppy (q.v.), *Papaver somniferum*, sometimes called the com-

mon poppy, and sometimes the white poppy, although the latter name is really appropriate only to one of its varieties. The plant is probably a native of some of the warmer parts of Asia, although it is now common in cultivated and waste grounds throughout all the south and middle of Europe, and is occasionally found in Great Britain and the United States. It is an annual, varying in height from one to six feet erect, branched, of a glaucous green color, with ovate-oblong sessile leaves, the stem and leaves generally smooth, the branches terminated by large flowers on long stalks, the capsules globose or roundish-ovate and smooth. There are two principal varieties cultivated for the opium which they yield, which have been regarded by some botanists as distinct species; the one (*Papaver somniferum*) having generally red or violet-colored flowers, numerous flower-stalks rising together, globose capsules opening by a circle of pores under the persistent stigma, and black seeds; the other (*Papaver officinale*) having white flowers, solitary flower-stalks, the capsules somewhat ovate, the circle of pores almost wanting, the seeds white. The former variety is generally cultivated in the mountainous parts of the north of India, the latter in the plain of Bengal. The cultivation of the poppy for the sake of opium is carried on in many parts of India, although the chief opium district is a large tract on the Ganges. The poppy is also extensively cultivated for opium in the Asiatic provinces of Turkey, in Egypt, and in Persia. It is a garden flower in the United States and Great Britain, but is not of commercial importance. The poppy requires for its profitable cultivation a rich soil, and in India is generally sown in the neighborhood of villages where manure can be easily obtained. The soil ought to be fine and loose when the seed is sown. The subsequent cultivation consists chiefly in thinning and weeding. Irrigation is practiced. Mild moist weather, with night dews, is deemed most favorable during the time of the collection of the opium. Very dry weather diminishes the juice, and much rain is injurious.

Opium, as a commercial article, is of great importance, exceeding that of any other drug in use. The seed is sown in India in the beginning of November; it flowers in the end of January, or early in February, and three or four weeks later the capsules or poppy-heads are about the size of hens' eggs, and are ready for operating upon. When this is the case, the collectors take a little iron instrument, called the *nushtur*, and wound each full-grown poppy-head in the field. This is always done in the afternoon and early on the following morning the milky juice which has exuded is collected by scraping it off with a kind of scoop called a *sittooha*, and transferred to an earthen vessel called a *kurrace*. It is then transferred to a shallow open brass dish, which is left for a time tilted on its side, so that any watery fluid may drain out; this watery fluid is very detrimental to the opium unless removed. It now requires daily attention and has to be turned frequently, so that the air may dry it equally, until it acquires a tolerable consistency, which requires three or four weeks; it is then packed in small earthen jars and taken to the factories. The opium is then thrown into vast vats, which hold the accumulations of whole districts, and the mass being kneaded is again

taken out and made into balls or cakes for the market.

The manufacture of opium is carried on to the greatest extent in India, but large quantities are also made in Turkey, and this latter is considered the best in quality. It is also made in Persia and Egypt; occasionally it has been produced in Germany, France, and England. Next to China the largest consumption of Indian opium is by the Burmese and the natives of Malacca, who use annually an amount of the value of nearly \$5,000,000.

In the United States and Europe opium is used chiefly for medicinal purposes, and large quantities of it undergo a still further stage of manufacture, in order to separate from it the active principles morphine, codeine, etc.

PHYSICAL AND CHEMICAL PROPERTIES. Good opium is a hard compact solid of reddish-brown color, which leaves an uninterrupted stain when drawn across paper, and breaks with a deeply notched fracture. It has a strong characteristic odor and a rather bitter, acrid taste. The pharmacopœia of the United States requires that it shall contain at least 9 per cent. of morphine, its most important alkaloid. A good Turkey opium contains 12 to 16 per cent. and should average about 14. Fifteen other alkaloids are found in opium, the most important being codeine, narceine, narcotine, and papaverine. It also contains meconic and other acids, gum, resinous and extractive matters, besides a volatile odorous principle. Although opium was cultivated for use before the Christian Era, morphine was not discovered until 1816.

Some of the most important and characteristic constituents are meconic acid, morphine, and narcotine. The only isolated constituents of opium now extensively used in medicine are *codeine*, which is less powerful and less narcotizing than morphine and which is very widely used as a nerve quietant, and also to control excessive cough, and is used with good effect in diabetes mellitus; *morphine*, and two derivatives of morphine, *apomorphine* and *heroin* (q.v.). The salts of these alkaloids and derivatives are preferred on account of their greater solubility.

PHYSIOLOGICAL ACTION. (1) In *small doses*, as from a quarter of a grain to a grain, opium acts as an agreeable stimulant producing a sense of well-being, stimulation of imagination by blunting of reason, judgment, and memory, this effect being followed by a desire to sleep, from which the person awakes refreshed or with some headache, depression, dryness of the mouth and throat, and slight constipation. When it is given in a *full medicinal dose* (as from two to four grains), the stage of excitement is soon followed by contraction of the pupils, well-marked depression or torpor, both of the bodily and mental organs, and an almost irresistible sleepiness; these effects being usually succeeded by constipation, nausea, furred tongue, headache, and listlessness. Among Eastern nations, in whom the emotional element is strong, the imagination is highly stimulated, and the ingestion of opium is followed by loss of all disagreeable sensations with the onset of a delightful mental state, with gorgeous visions and a sense of happiness. Among the more stolid races the hypnotic effect is usually experienced at once, though some nervous persons experience terrible mental agony after even a small dose. When it is administered

in a dangerous or *poisonous dose*, the symptoms begin with giddiness and stupor, generally without any previous stimulation. The stupor rapidly increasing, the person becomes motionless, and insensible to external impressions; he breathes noisily and very slowly, with slow full pulse, the eyes shut, and the pupils contracted and not reacting to light; and the whole expression of the countenance is that of deep and perfect repose. As the poisoning advances the features become ghastly, the pulse feeble and imperceptible, the muscles exceedingly relaxed, respiration stertorous and constantly slower, and, unless assistance is speedily procured, death ensues from paralysis of the respiratory centre. If the person recovers, the insensibility is succeeded by prolonged sleep, which commonly ends in twenty-four or thirty-six hours, and is followed by nausea, vomiting, giddiness, and loathing of food. The treatment of acute morphine poisoning consists in removing the drug as far as possible, chiefly by washing out the stomach; in the administration of potassium permanganate; and in keeping the patient awake at any cost. This is accomplished by large doses of coffee, enforced exercise, and flagellation. If breathing is very slow artificial respiration may keep the person alive until the drug is eliminated. In case of failure of respiration or the heart suitable stimulants are employed. The effects of morphine are practically the same as those of opium, but it is less likely to derange digestion, is less constipating, less diaphoretic, and less tetanizing. When given hypodermically the stimulant effect is more marked and immediate.

(2) The *habitual use of opium*, whether the drug be eaten or smoked, is undoubtedly in most cases injurious to the constitution, although probably not to the extent that some Eastern travelers assert. In numerous cases very large quantities of this drug may be regularly taken with impunity.

OPIUM-SMOKING is a habit that is chiefly confined to China and the islands of the Indian Archipelago. An extract, called *chandoo*, is made into pills about the size of a pea. One of these pills is put into the small cup at one end of the opium pipe; the pill being lighted, the smoke is inhaled and then exhaled through the nostrils. Although the immoderate practice of opium-smoking is most destructive to those who live in poverty and distress, it does not appear that the Chinese in easy circumstances, and who have the comforts of life about them, are materially affected, in respect to longevity, by addiction to this habit. The Chinese practice the habit frequently, but in moderation, while those of Western races who become addicted to it carry it to an excess and soon show its degrading effects.

The 'morphine fiend,' as the victim of the morphine habit or chronic morphine poisoning is called, is pale, with parchment-like skin. He suffers from chronic digestive disturbance, pain in the region of the stomach, constipation, insomnia, irritability, mental and moral weakness, itching of the skin, and other disorders. With many the temptation to lie is not confined to statements in regard to their habit. The habit may be broken by immediate withdrawal of the drug or the dose may be gradually reduced. Diarrhœa is apt to occur when either plan is

followed. Careful feeding and absolute control of the supply of the drug are essential.

There can be no doubt that the essential and primary operation of opium is on the nervous system, the other effects being for the most part secondary.

Opium is undoubtedly the most valuable remedy of the whole materia medica. We exhibit it not only to mitigate pain, to allay spasm, to promote sleep, to arrest vomiting and convulsions, to relieve nervous restlessness, to produce perspiration, and to check discharges from the bronchial tubes and intestinal canal; but we also find it capable of relieving some diseases in which none of the above indications can be always distinctly perceived. It is a valuable cardiac tonic and its action is almost miraculous in some cases of heart disease in which digitalis and other drugs have failed. It is a constituent of nearly all cough mixtures.

Its use is contraindicated in coma, in chronic uræmia, and in chronic diseases unless necessitated by pain which nothing else will relieve, as there is great danger of forming the habit. It is borne badly by children and by some adults. It must be used with great caution in some affections, and in painful abdominal conditions in which its effect may hide the presence of peritonitis or other grave affections. It may be administered by mouth, by rectum, or hypodermically. The best known preparations of opium in the United States Pharmacopœia (in addition to the alkaloid morphine and codeine) are laudanum, paregoric, and the mixture of opium and ipecac known as Dover's powder. For hypodermic use a solution in water of 16 grains of morphine to the ounce is frequently employed. It is known as 'Magendie's solution,' and is not official. See ANTIDOTE; CODEINE; HEROIN; MORPHINE; LAUDANUM. Consult Potter, *Hand-book of Materia Medica, Pharmacy, and Therapeutics* (Philadelphia, 1901).

OPIUM WAR, THE. A war between China and Great Britain which broke out in 1840, resulting from the attempt of the former to stop the opium trade with India. Though declared illegal in 1796, the importation of opium about 1840 amounted yearly to £1,500,000. Charles Elliott, the moderate British representative, was superseded by Sir Henry Pottinger, who carried on the war with such vigor that when it ended with the Treaty of Nanking (1842) China opened the treaty ports to foreign trade and ceded Hong Kong to Great Britain with an enormous indemnity. See CHINESE EMPIRE.

OPODELDOC (of obscure etymology, the first part apparently from Gk. *ὀπός*, *opos*, juice). A popular synonym for *soap liniment*. The term was apparently applied by Paracelsus to various forms of liniments or local applications. Soap liniment is composed of common soap, camphor, oil of rosemary, alcohol, and water, and is employed as a stimulating application for sprains, bruises, etc. See LINIMENTS.

OPÓN, *ô-pôn'*. A town of Cebú, Philippines, situated on the small island of Mactán, opposite the town of Cebú (Map: Philippine Islands, H 9). Here Magellan was killed by the natives in 1521. Population, 11,506.

OPOPONAX (Lat., from Gk. *ὀπὸν ἄραξ*, juice of the plant panax, from *ὀπός*, *opos*, juice + *ἄραξ*, *panax*, sort of plant, from *πᾶς*, *pas*, all +

Akos, *akos*, cure). A gum resin obtained by puncturing the roots of a species of parsnip which grows in Persia (*Pastinaca opoponax*). The chief interest in this material is the great importance which the ancient physicians attached to it as an antispasmodic medicine. It is not much used, except for the preparation of a well-known perfume. It is practically obsolete in medicine.

OPOB'TO, *Port.* pron. u-pōr'to (Portug. *Porto*, *O Porto*, The Port). The second city of Portugal in population and importance. It is situated on the north bank of the Douro about three miles from its mouth, in the Province of Entre-Minho-e-Douro, District of Oporto, and 172 miles north by east of Lisbon (Map: Portugal, A 2). It is one of the most beautifully situated towns of the whole peninsula, being built on an amphitheatre of hills between two rocky headlands extending to the river banks, while the little village of Villa Nova de Gaia nestles in a similar position on the opposite side of the river. Like Lisbon, the city rises in a steep incline from the river side, the houses and gardens being terraced above one another with a very picturesque effect. The newer portions spread out over the upper slopes and are surrounded by wooded heights dotted with villas. Many of the streets in the older portion of the city are steep, narrow, and tortuous, but on the heights there are several wide avenues commanding fine views of the river and city below and of the ocean beyond. From the heights east of the city two magnificent iron bridges span the river. The first, that of Luiz I., crosses the river in a single arch of 560 feet span, and carries a roadway 200 feet above the water. It is rivaled in size and beauty by few other bridges of the kind in Europe. The second bridge, that of Maria Pia, is almost as large as the Luiz I., and carries a railroad. The centre of the business section of the city is the low-lying portion around the Praça de Dom Pedro, faced by the city hall on the north, and having in its centre a bronze equestrian statue of Pedro IV., Emperor of Brazil (as such Pedro I.). From this square the streets lead upward to the hills on either side, which are crowned on the west by the high and slender clock-tower of the Clerigos Church, and on the east by the cathedral. West of the Clerigos Church is the Jardim da Cordoaria, which, like the other garden-plazas of the city, has a luxuriant wealth of mingled southern and northern flora. Still farther west is another park containing the Crystal Palace, a large building erected for the industrial exposition of 1865, and now occupied by a theatre and ballrooms. Among other buildings worthy of note are, besides several churches, the exchange, a handsome building with a central court, and the English factory house, an imposing structure built in 1785, and used chiefly for club-rooms. Oporto is distinctly a modern city, and the commercial and industrial interests predominate. The chief educational institutions are the polytechnic academy and the schools of commerce and navigation, besides a school of medicine, and one of philosophy, and several colleges. There is a municipal library of 120,000 volumes.

About one-third of the population of Oporto are engaged in manufacturing industries, which are represented by distilleries, sugar refineries, tan-

neries, and manufactures of woolen, cotton, and silk fabrics, hats, preserved foods and beverages, soap, pottery, corks, tobacco, and jewelry. There are also a number of factories in Villa Nova de Gaia, on the south bank of the river, and here are large depositories for the well-known port wine. The only harbor facilities of Oporto formerly consisted of the quays along the banks of the river, which is here 600 feet wide. The water of the river is deep enough for large vessels, but the mouth is almost closed by a sandy spit prolonged into a bar. To avoid this bar a new harbor was completed in 1892 at Leixões, on the ocean front, 2½ miles north of the river-mouth, and connected with the city by a street railroad. This harbor is formed by two jetties or breakwaters, each about three-fourths of a mile long, and projecting into the ocean so as to form an artificial port with a narrow entrance. The total shipping of both harbors in 1900 amounted to 2765 vessels, aggregating 1,821,780 tons, and the total trade was valued at nearly \$25,000,000, of which about \$17,000,000 represented imports. The chief exports are wine, oil, and olives, raisins, oranges, lemons, onions, cork, salt, cattle, and building materials. The city is the seat of a United States consular agent. The population in 1890 was 139,856; and in 1900, 172,421.

In ancient times the site of Oporto was occupied by the harbor-town *Portus Cale*, afterwards *Porto Cale*, from which has been derived the name of the Kingdom, Portugal. It was an important city during the supremacy of the Arabs, was destroyed in 820 by Almansor of Cordova, but was restored and peopled by a colony of Gascons and French in 999. During the Middle Ages it was famous for the strength of its fortifications, its walls being 30 feet in height, and flanked with towers. In 1808 it was taken by the French; but in the following year it was retaken by an Anglo-Portuguese force under Wellington. In 1832-33 Dom Pedro, the ex-Emperor of Brazil, was unsuccessfully besieged in this city by the forces of Dom Miguel. Consult Sellers, *Oporto, Old and New* (London, 1899).

OPOS'SUM (from the American Indian name). The opossum (*Didelphys Virginiana*) is certainly the most distinctive and characteristic of American mammals, for not alone is it found only in America, but it is with a single exception (see MARSUPIALIA) the only marsupial mammal



DENTITION OF AN OPOSSUM.

found in the United States, and the family, to which the name opossum is now universally extended, does not occur except in America. This family, the Didelphidæ, is characterized, in distinction from the other marsupials, by numerous (18) small, subequal incisors, the canines larger, the molars with sharp cusps, and the hind feet with the four outer toes subequal, distinct, and having a well-developed, opposable hallux. The tail usually is long, naked, and prehensile. The

marsupial pouch is complete in the common opossum, but in most of the family it is rudimentary or wanting. The family includes only one genus besides *Didelphys*, and that is *Chironectes*, which contains the single species *variegatus*, the 'yapock' (q.v.) of South America.

The common or 'Virginia' opossum is widely distributed in the United States. It ranges as far north as southern New York State and southern Michigan; southward it extends through Mexico into Central and perhaps South America. The opossum is about as large as a big cat; it has rather short but equal legs, and a somewhat pig-like snout. The hair is coarse, of a yellowish tint, the tips of the hairs on the back and sides brownish or blackish, and intermingled with these are larger white hairs. The tail is scaly like that of a rat, but is hairy at the base. The brain is small, but the senses of smell and sight are well developed. The opossum is ordinarily a solitary animal, and except during the breeding time individuals are seldom found together. It is not exclusively arboreal, though fitted especially for such a life. It makes its retreat for the day chiefly in hollow trees, for it is nocturnal in its habits. The young, six to twelve in number, are brought forth in a nest of dried grass and leaves in some hollow in a stump or tree. The embryonic life lasts only about twenty-six days, when the young are born in a helpless condition and are transferred by the mother to the teats, where they are concealed and protected by the pouch. (See MARSUPIAL.) They are at this time about the size of young mice, but grow rapidly and at the end of six weeks are large enough to leave the pouch and run about, but for the first few weeks thereafter they return to the pouch for shelter and protection. The food of the opossum is chiefly insects, but almost any available animal food will be used, especially reptiles, and birds' eggs and young. As an article of food the animal is in particular demand among the negroes of the South. Under the stress of capture, the opossum has the remarkable habit of simulating death, lying with closed eyes and limp muscles, until a favorable opportunity to make its escape. When so simulating, no amount of handling, kicking, or ordinary abuse will cause the animal to show signs of life, but if tossed into water it realizes its peril and resumes activity with great promptness.

The number of species of *Didelphys* and their geographical limitations are still in doubt, on account of great individual diversity, but there are probably about twenty good species, nearly all smaller than the common opossum, and many no larger than rats. The crab-eating opossum (*Didelphys cancrivora*) is an interesting Brazilian species, which feeds chiefly upon crustacea and is consequently found most commonly in swamps. One of the species from Surinam (*Didelphys dorsigera*) carries the young, after they leave the teats, on the back of the mother, with their tails twined around hers, and this method of caring for the young is common to various other species in which the pouch is rudimentary or wanting. Several of the Peruvian opossums are remarkable from their habit of living mainly upon fruit. Among the smallest species may be mentioned the mouse-opossum (*Didelphys murina*), a little larger than a mouse, bright red in color, and ranging from Mexico through Brazil; and the three-striped

opossum (*Didelphys Americana*) of Brazil, which is very small and shrew-like, without a prehensile tail, of a reddish-gray color, with three distinct black stripes down the back. The name opossum is used in Australia for several mammals of widely different families, and not entitled to the name. See Colored Plate of MARSUPIALS; and Plate of MINOR CARNIVORES.

OPOSSUM-MOUSE. One of the diminutive, mouse-like flying phalangers (q.v.) of New South Wales, of the genus *Aerobates*, whose appearance and habits, not only, but even their dentition approach a murine type. They are the smallest of marsupials.

OPOSSUM-RAT. A name given to a little marsupial (genus *Cenolestes*) representing the otherwise extinct Patagonian family Epanorthidae, rediscovered at the end of the nineteenth century in Colombia and Ecuador. It is of particular interest because otherwise the only marsupials in the New World were those of the family Didelphidae, which is polyprotodont, while *Cenolestes* belongs to the diprotodont division of marsupials. Consult Thomas, *Proceedings of the Zoological Society of London* for 1895. See MARSUPIAL.

OPOSSUM-SHRIMP (so called because the female carries the eggs in pouches between the thoracic legs). A small, shrimp-like marine crustacean of the order Schizopoda and genus *Mysis*. See CRUSTACEA.

OPPELN. The capital of a district and a river port in the Province of Silesia, Prussia, on the Oder, 51 miles by rail southeast of Breslau (Map: Prussia, H 3). The Church of Saint Adalbert is believed to have been founded by Adalbert, Bishop of Prague, in 995. The so-called new castle of the Dukes of Silesia, dating from the fourteenth century, is situated on an island in the Oder and is used as a Government building. The educational institutions of the town include a gymnasium, a seminary for teachers and a school of agriculture. Oppeln manufactures cement, cigars, machinery, barrels, etc., and trades in grain and cattle. From 1288 to 1532 Oppeln was the residence of the dukes of Oppeln. It came into the possession of Prussia in 1742. Population, in 1890, 20,300; in 1900, 30,115, chiefly Polish-speaking Roman Catholics. Eduard Schnitzer (Emin Pasha, q.v.) was born at Oppeln.

OPPER, FREDERICK BURR (1857—). An American illustrator. He was born at Madison, Lake County, Ohio, January 2, 1857, and after a brief experience in newspaper work, in 1872, he came to New York City, where he entered the employ of a mercantile house, devoting his leisure to drawing. He produced some clever sketches, which he sold to comic papers, and after attending one term of the evening class in drawing at the Cooper Union Institute, he devoted himself to drawing as a profession. He studied for a time with Frank Beard, the designer, whom he assisted in his work. From 1877 to 1880 he was engaged on Frank Leslie's publications, then became illustrator for *Puck* until May, 1899, since which time he has been employed by the *New York Journal*. Oppen has illustrated the writings of Bill Nye and Mark Twain, Hobart's *Dinkelspiel*, and Peter Dunne's *Mr. Dooley*, and has himself published *Folks in Funnyville* and a col-

lection of drawings entitled *Puck's Oppert Book*. While lacking the highest artistic and technical qualities, Oppert's illustrations are forcibly executed and are characterized by fine humor. His political cartoons have been of notable influence in several Presidential campaigns.

OPPERT, ô'par', JULES (1825—). A French Orientalist, born at Hamburg. He studied law at Heidelberg, Oriental languages at Bonn and Berlin, and obtained the degree of doctor of philosophy at Kiel in 1846, with a thesis *De Jure Judæorum Criminale*. In 1848 he was elected professor of German in the Lyceum of Laval, and in 1850 to the same position at Rheims. His interest in Oriental studies still continued, however, and in 1851 he was appointed a member of the expedition sent by the French Government to Mesopotamia. On his return in 1854 he laid his system of deciphering the Assyrian inscriptions before the Institute. In 1857 he was made professor of Sanskrit at the Imperial Library in Paris, in 1869 teacher of Assyriology in the College of France, and in 1874 he was elected professor. Among his works are: *Les inscriptions des Achéménides* (1852); *Expédition scientifique en Mésopotamie* (2 vols. and atlas, 1859-64); *Grammaire sanscrite* (1859); *Les fastes de Sargon* (1864); *Histoire des rois de Chaldée et de l'Assyrie* (1866); *Éléments de la grammaire assyrienne* (2d ed. 1868); *Documents juridiques de l'Assyrie et de la Chaldée* (with J. Menant, 1877); *Le peuple et la langue des Mèdes* (1879); as well as translations of inscriptions, and many monographs and contributions to periodicals. He has been one of the editors of the *Revue d'Assyriologie*. A full list of his articles may be found in Haupt and Delitzsch, *Beiträge zur Assyriologie*, vol. ii. (Leipzig, 1891).

OPPIAN (Lat. *Oppianus*, from Gk. Ὀππιανός). (1) A Greek didactic poet, who flourished in the reign of Marcus Aurelius. He was born in Corycus in Cilicia of a wealthy and distinguished family. When the Emperor Verus visited Corycus, Oppian's father failed to join in the general manifestations of adulation, and therefore was banished to the island of Melita in the Adriatic. Oppian accompanied him in his exile, and after the death of Verus (A.D. 169) won such favor with Marcus Aurelius by means of his poem in five books on fishing, *Haliëutica* (Ἀλιευτικά), dedicated to the Emperor and his son Commodus, that the Emperor not only granted him his father's release from exile, but, according to the tradition, paid him a piece of gold for every verse. The poem is written in a smooth but ornate and artificial style, and at times descends to bombast. The high esteem in which it was held in antiquity is to us incomprehensible. Oppian died in his thirtieth year; his native town honored his memory with a statue.

(2) To this same Oppian the ancient writer of his *Life* falsely attributes two other didactic poems, one on hunting in four books, *Cynegetica* (Κυνηγετικά), the other, now lost, on bird-catching, *Ixeutica* (Ἰφευτικά). But it is clear from internal evidence that the *Cynegetica* was not written by the earlier poet, for it is dedicated to the Emperor Caracalla and apparently was composed in A.D. 212; furthermore, the author speaks of his home as Apamea in Syria; and finally the metrical structure is inferior to the careful elegance of the *Haliëutica*. The *Ixeutica* is pos-

sibly preserved in a paraphrase by a certain Dionysius. The best edition of the *Haliëutica*, *Cynegetica*, and the paraphrase, is by Lehrs in his *Poetæ Bucolici et Didactici* (Paris, 1846). There is an English translation of the *Haliëutica* by Draper and Jones (Oxford, 1722), and of the *Cynegetica* by Mawer (London, 1786). See also Ausfeld, *De Oppiano et scriptis sub eius nomine traditis* (Gotha, 1876).

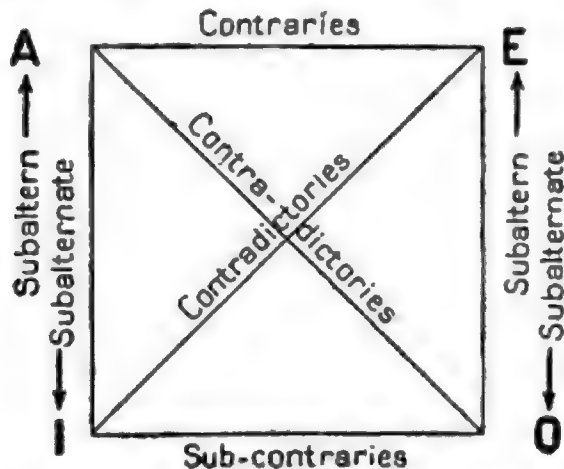
OPTIUS, CAIUS. A Latin writer. He was an intimate friend of Julius Caesar, and in conjunction with Balbus managed all affairs at Rome during the dictator's absence in Spain. He wrote biographies, not now extant, of Caesar, Cassius, and Scipio Africanus, the elder, and was regarded by some as the author of the continuation of Caesar's *Commentaries*, the *De Bello Alexandrino*, *De Bello Africano*, and *De Bello Hispaniensi*. This theory, however, is untenable as to the last two, and improbable as to the first. Consult Nipperdey, *De Supplementis Commentariorum Cæsaris* (Berlin, 1846).

OPPOLZER, ôp'pôl-tsêr, JOHANN VON (1808-71). An eminent Austrian physician. He was born at Gratz, Bohemia, and studied medicine in Prague, where he practiced for some time and in 1841 became professor in the medical clinic. For two years he was professor of special pathology and therapy in Leipzig, and in 1850 was called to the university at Vienna, where his name contributed much to the fame of the medical faculty. He was widely known as a clinicist and for his opposition to 'nihilism' in therapeutics. His *Klinische Vorträge* (1866-72) were edited by Stoffella.

OPPOLZER, THEODOR VON (1841-86). An Austrian astronomer, son of the preceding. He was born in Prague. In 1866 he was appointed docent and in 1870 professor in the University of Vienna. In 1884 he began his important studies on the pendulum. His earlier research had been on the orbits of planets and comets. His publications include: *Lehrbuch zur Bahnbestimmung der Kometen und Planeten* (1870-80), the best and most complete work of this kind; *Ueber die Bestimmung einer Kometenbahn* (1868-71); *Syzygientafeln für den Mond* (1881); *Kanon der Finsternisse* (1887), with tales of eclipses of the sun between B.C. 1207 and A.D. 2163; and *Entwurf einer Mondtheorie* (1886).

OPPOSITION. In logic, the relation between propositions which have the same subject and the same predicate, but which differ in quality or in quantity, or in both. (See JUDGMENT.) Thus "All cows ruminant" and "Some cows ruminant" stand in opposition or are opposites, because they have the same terms ('cows' and 'ruminant') but differ in quantity. If opposites differ only in quantity, the universal proposition is called the subaltern and the particular the subalternate. When the opposites differ only in quality and are both universal, they are said to be contraries; if they are both particular and differ only in quantity, they are said to be subcontraries. If the opposites differ in both quantity and quality, they are said to be contradictory. These relations are generally represented graphically in the so-called 'square of opposition,' in which the symbols A, E, I, O, stand for the four mutually opposing propositions. See LOGIC.

From this square probably arises the expression 'squarely contradictory.' An 'immediate inference by opposition' is made when from the known or granted truth or falsity of any proposition, the truth or falsity of its opposites is inferred. Thus, if A be true, E and O are false and I is true. If E be true, A and I are false



and O is true. If I be true, E is false, and either—not both—A or O is true; which is true cannot be inferred from the premise. If O be true, A is false, and either—not both—E or I is true; which is true cannot be inferred from the premise. On the other hand, if A be false, O is true, and either—not both—I or E is true; which is true cannot be inferred from the premise. If E be false, I is true, and either—not both—A or O is true; which is true cannot be inferred from the premise. If I be false, E and O are true, and A is false. If O be false, A and I are true and E is false.

OPTIC, OLIVER. The pen-name of William Taylor Adams (q.v.).

OPTICAL ILLUSION. See ILLUSION.

OPTICALLY ACTIVE SUBSTANCES.

See LIGHT, section *Rotation of the Plane of Polarization*.

OPTIC AXIS. See LIGHT.

OPTIC NERVE, See EYE.

OPTIC NEURITIS. Inflammation of the optic nerve may be (1) papillitis, in which the optic disk is affected, or (2) retrobulbar neuritis; in which the disk is but slightly involved and the changes are in the nerve fibres behind the eye. In papillitis both eyes are usually involved, most frequently as the result of brain tumor, meningitis, abscess of the brain, or hydrocephalus. Syphilis is a common cause, and less frequently acute febrile affections, general diseases and inflammations in the region of the eye. The only subjective symptom is impairment of vision. The ophthalmoscope (q.v.) shows a condition known as choked disk, in which the optic disk is swollen, its edges indistinct and fringed, the veins dilated and tortuous, or less projection of the disk and involvement of more of the surrounding retina. The inflammation runs a chronic course and may terminate in recovery or be followed by atrophy of the nerve with consequent loss of sight to a varying degree. Retrobulbar neuritis may be acute or chronic. The former is rare, and results from rheumatism, syphilis, exposure, acute infectious diseases, and poisons. There is neuralgia, pain in the eye and near it, rapid loss

of sight, while even ophthalmoscopic examination shows little or nothing. Sight usually returns within a few months, but often with a central scotoma; sometimes there is partial or total blindness. The chronic form is usually the result of excessive use of tobacco and alcohol, separately or combined. Both eyes have gradually diminished vision. (See AMBLYOPIA.) If the patient gives up the use of the drug causing the neuritis complete recovery may occur; on the other hand, there may be partial loss of sight.

OPTICS. See LIGHT.

OPTIMATES (Lat., aristocrats) **AND POPULARES** (Lat., democrats). In the politics of later republican Rome, the conservative or aristocratic, and the democratic or progressive, parties respectively. The *populares* comprised the great body of the people, including not only the proletariat, but many men of wealth, who, however, were generally without personal influence. The *optimates* were the aristocracy and their followers. The two parties perpetuated the old contests between the patricians and plebeians. In the second century B.C. the *populares* gained great power under Tiberius Gracchus and his brother Gaius, whose drastic measures were, however, nullified at their deaths. From this time until the Empire, politics entered less into the controversies of the *optimates* and *populares* than did the personal ambitions of the leaders. Marius, the leader of the *populares*, was overthrown by Sulla in the name of the *optimates*, and, later on, Cæsar led the party of the *populares* in opposition to the aristocracy at whose head was Pompeius. See CÆSAR, GAIUS JULIUS; GRACCHUS; MARIUS; POMPEIUS; SULLA.

OPTIMISM (from Lat. *optimus*, best; connected with *optare*, to choose, *apisci*, Skt. *āp*, to obtain). The name given to the doctrine of those philosophers and divines who hold that the existing order of things, whatever may be its seeming imperfections of detail, is nevertheless, as a whole, the most perfect or the best which could have been created, or which it is possible to conceive. Some of the advocates of optimism content themselves with maintaining the dogmatic position, that although God was not by any means bound to create the most perfect order of things, yet the existing order is *de facto* the best; others contend, in addition, that the perfection and wisdom of almighty God necessarily require that His creation should be the most perfect which it is possible to conceive. The full development of the optimistic theory as a philosophical system was reserved for Leibnitz (q.v.). His main thesis may be briefly stated to be that among all the systems which presented themselves to the infinite intelligence of God, as possible, God on account of His goodness selected and created, in the existing universe, the best and most perfect, physically as well as morally. The details of the controversial part of the system would be out of place in this work. It will be enough to say that the existence of evil, both moral and physical, is explained by Leibnitz as a necessary consequence of the finiteness of created beings; and it is contended that in the balance of good and evil in the existing constitution of things, the preponderance of the former is greater than in any other conceivable creation. The great argument of the

optimists has always been in essence identical with Leibnitz.

OPUNTIA, ô-pûn'shî-â. A genus of cacti. See PRICKLY PEAR.

OPZOOMER, ôp'zô-mêr, CORNELIS WILLEM (1821-92). A Dutch philosopher and jurist, born at Rotterdam. He studied at the University of Leyden, became professor of philosophy at the University of Utrecht in 1846, and in 1861 was chosen president of the Royal Academy of Science. He was a leader of the empirical school of philosophy. Among his works are: *De weg der wetenschap* (1851); *Het wezen der kennis* (2d ed. 1867); *De Bonapartes en het recht van Duitschland, ook na Sédan* (1871); and *Scheid-ing van Kerk en Staat* (1875).

OQUASSA TROUT (North American Indian name). The blueback trout, or 'quasky,' of the Rangeley lakes, Me. See TROUT.

OR (Fr., gold). In heraldry (q.v.), the metal gold.

ORACHE (formerly also *arrach*, from Fr. *arroche*, from Lat. *atriplex*, orache, from Gk. ἀτράφαξ, *atrāphaxys*, orache), *Atriplex*. A large genus of plants of the natural order Chenopodiaceæ, some species of which are common weeds in gardens and waste places throughout Europe and the United States. Garden orache, mountain spinach (*Atriplex hortensis*), an annual native of Tatory, with thick greenish or reddish slightly acid leaves, was formerly much cultivated as a substitute for spinach. Sea orache (*Atriplex littoralis*), a native of the British coasts, and *Atriplex patula*, a garden weed, are similarly used.

ORACLE (Lat. *oraculum*, from *orare*, to pray, from *os*, Skt. *asyá*, mouth). The place where a deity gives responses to the inquiries of votaries, or the response itself. The belief that the gods could and would reveal the future was common among the nations of antiquity, and few undertakings were entered upon without consultation of those who were able to interpret the signs by which the future was manifested. Thus we find the kings of Egypt, Babylonia, and Assyria seeking divine advice or sanction before their campaigns, while among the Hebrews the high priest made use of the Urim and Thummim to determine the will of Jehovah. The Greeks and Romans were fully convinced of the importance of signs and omens, and the need of their correct interpretation, as well as of the possibility of predicting the future by means of various methods, which are treated under DIVINATION. While consultation of the gods was thus possible anywhere, there were certain places especially chosen by the gods as seats of answer to human inquiries, and these oracles played an important part in ancient life. They were naturally connected with sanctuaries, and the answers were usually imparted or interpreted by the priests. The number of such oracular shrines was very great, and most of them doubtless enjoyed little more than a local reputation. Only a few reached a national or international importance, but these may fairly be taken as typical. They fall naturally into three classes: (1) those in which the answer was given through signs; (2) those in which the god spoke through the mouth of some inspired person; (3) those where the

god manifested his will by dreams or visions in the sanctuary.

In the first class belongs the very ancient oracle of Zeus at Dodona (q.v.) in Epirus, where answers seem at first to have been given by the rustling of the leaves of the sacred oaks, though later other methods of divination, including the lot, were also employed. At Olympia the family of Iamidæ, in whom the prophetic gift was hereditary, answered inquiries and predicted the future from the sacrifices at the great altar, and a similar method was followed in early times at the oracle of Ismenian Apollo near Thebes. Next to Dodona, and in later times surpassing it in fame, was the oracle of Zeus Ammon, in the oasis of Siwah in Libya, noted for the visit of Alexander the Great, who was there hailed as the divine son of Ammon. It was, however, frequently consulted by Greeks in earlier times. The answers were determined by the swaying of the image of the god, as it was carried in solemn procession on the shoulders of the priests. At some places the answer was given by casting lots, or throwing dice bearing characters or numbers, which were interpreted by the priests or by a key. Thus at Attaleia in Phrygia the numbers referred to a collection of oracles in verse, and the answer was sought in the verses indicated by the number.

The second class were far more numerous, and seem to have been prevailingly oracles of Apollo, for this god was the special minister of Zeus in declaring the future. Here belongs far the most famous of the ancient oracles, that of the Pythian Apollo at Delphi (q.v.). The responses were here given by a prophetess, the Pythia, who after ceremonial purifications drank from the sacred water of the Cassotis, chewed leaves of the sacred laurel, and seated herself on the sacred tripod, which was placed in the shrine of the temple over a subterranean chasm from which issued a cold vapor, whose fumes threw her into an ecstasy. The questions were propounded by a prophet, and the mutterings or ravings of the Pythia were reduced by the priests to hexameter verses, and thus communicated to the inquirer. Responses were at first given in but one month each year; later, however, they could be obtained on all but unlucky days. The favorable days were determined by examining the sacrificial victims. The order of the inquirers was determined by lot, unless precedence in consulting the oracle had been granted as a mark of honor by the community. The oracle early attained wide fame, and in the sixth century B.C. received rich gifts from King Cræsus of Lydia. Later it was frequently consulted by Athenians, Spartans, and other peoples before venturing to decide critical questions of policy, especially in matters connected with religion. In spite of *Medism* during the Persian wars and some undoubted cases of deception, the oracle maintained its reputation through the best period of Greek history, and with some fluctuations enjoyed prosperity even under the Roman emperors. Other famous oracles of Apollo where inspired prophets or prophetesses revealed the answers of the god were at Branchidæ near Miletus, at Abæ in Phocis, at Claros near Colophon, at Patara in Lycia, and at Argos. The inspiration was in most cases communicated by drinking from a sacred spring or of the blood of a sacrifice.

The third class of oracles finds its best examples in the temples of *Æsculapius* (q.v.), where the sick who came to consult the god slept in a hall attached to the sanctuary, and were either cured by a vision of the god during the night, or received directions which were later interpreted to them by the attendants. The most celebrated of these shrines was the Hieron of *Epidauros* (q.v.), and the inscriptions found there throw much light upon the character of these establishments. The dream-oracles were not confined, however, to the sick. In the sanctuary of *Amphiaræus* at *Oropus* in Attica visions not only helped the sick, but enlightened the inquirer on other subjects. Before the incubation certain sacrifices and purifications with fasting were required, and fees were of course collected, especially from those who had been cured of disease. Peculiar in many ways, and not above a very strong suspicion of charlatanry, was the procedure at the oracle of *Trophonius* at *Lebadea* in *Bœotia*. After prolonged preparatory rites and sacrifices, the inquirer, a honey cake in each hand, descended by a ladder into an artificial subterranean chamber, where he thrust his feet through a hole in the side wall. He was then seized by some unseen power and borne below the earth, where by apparitions or voices the future was revealed, and he then found himself hurried feet foremost into the chamber he had left, whence he was removed by the priests in a dazed and bewildered condition. By Lake *Avernus*, near *Cumæ*, in Italy, was a celebrated oracle where the future was revealed by the spirits of the dead, and we hear of other places where necromancy was practiced, either by calling the spirits in person to answer the inquirer, or by means of dreams.

As it was believed that many of the great prophets of the past had predicted the distant future, there were also in circulation in the ancient world many collections of oracles attributed to *Bacis*, *Museus*, *Orpheus*, and other famous seers, and these predictions were freely cited at any time of national calamity or consulted for guidance in difficulties by the less educated.

Consult: *Bouché-Leclercq, Histoire de la divination* (Paris, 1879); *Stengel, "Griechische Kultusaltertümer,"* in *Müller's Handbuch der klassischen Altertumsforschung* (Munich, 1898); *Buresch, Klaros* (Leipzig, 1889); *Stütze, Das griechische Orakelwesen* (Ellwangen, 1887, 1891); *Schömann-Lipsius, Griechische Altertümer II.* (Berlin, 1902).

ORAN, *ô-rân'*, *Fr. pron. ô-rân'*. A department of Algeria (q.v.), sometimes called the Department of the West, from the fact of its forming the western frontier of the country. It is bounded on the north by the Mediterranean, on the east by the Department of Algiers, on the west by the Empire of Morocco, and on the south by the desert. Area, 44,616 square miles, of which 13,514 belong to the Tell (q.v.) and a large portion to the Sahara. Population, in 1891, 942,000; in 1901, 1,107,354, four-fifths being Arabs. Besides the capital, *Oran* (q.v.), the seats of arrondissements are the communes of *Sidi bel-Abbès* (population, in 1901, 25,739), *Mostaganem* (population, 17,956), *Mascara* (population, 20,914), and *Tlemcén* (population, 35,382).

ORAN (*Ar. Waran*). A seaport and Catholic episcopal city of Algeria, capital of the department of the same name. It stands at the inner extremity of the Gulf of *Oran*, an inlet of the Mediterranean, 260 miles west-southwest of *Algiers*, with which it is connected by rail (Map: Africa, D 1). The town, girt by walls and defended by strongly armed forts, is situated at the foot of a high mountain, crowned by the forts *Santa-Cruz* and *Saint-Grégoire*. The ravine of *Oued Rekhi*, laid out with boulevards and buildings, divides the port and old Spanish town on the west from the modern French town on the east. The streets and promenades are generally spacious, the houses elegant and airy. The principal edifices are the *Château-Neuf*, the residence of the general of division; the departmental offices, including the *Hôtel de la Préfecture*, the civil, criminal, commercial tribunals, etc.; the great mosque of *la Rue Philippe*; the Catholic cathedral, and the barracks. The city has a college, primary and native schools, a geological and archæological society, Protestant and other churches, synagogues, mosques; a branch of the Bank of Algeria; exchequer, post, and telegraph offices; an immense military hospital, with accommodations for 1400 beds; and various splendidly appointed magazines and Government stores. The town has a good water supply. Formerly vessels had to find shelter in the roadstead of *Mers-el-Kebir*, three miles distant, but the construction of moles since 1887 has improved the harbor, and vessels with an aggregate tonnage of 2,310,000 entered and cleared the port in 1898. There is a large trade with interior Africa and with Spain, *Almería* being only 140 miles and *Gibraltar* 220 miles distant. The exports include agricultural produce, iron ore, and alfa. The United States is represented by an agent. The country in the vicinity is bare and arid, although the land is not sterile. To the south of the town the country is uncultivated, but toward the southeast highly cultivated lands are seen. Cattle are raised, and grain, tobacco, and cotton are grown. The vine covers large tracts of land, and its cultivation is attended with great success; the wines produced are of good quality.

The town of *Oran* was built by the Moors. It was taken by the Spaniards in 1509, by the Turks in 1708, and again by the Spaniards in 1732. In 1791 it was destroyed by an earthquake, and shortly after it was altogether abandoned by the Spaniards. *Oran* was taken by the French in 1831, and has been developed by them into a large and prosperous town. Population of commune, comprising the three suburbs, *Mers-el-Kebir*, *La Senia*, and *Ain-el-Turk*, in 1891, 75,000; in 1901, 88,235.

ORANGE, *ô-rânzh'*. The capital of an arrondissement in the Department of *Vaucluse*, France, in a beautiful plain, on the *Aigue*, 18 miles north of *Avignon* by rail (Map: France, L 7). There are several notable Roman remains here and in the vicinity. The triumphal arch, 60 feet high, is celebrated for the beauty of its architecture, and its richly sculptured bas-reliefs. The ancient theatre, the largest of its kind in France, is a well-preserved stage. The Church of *Notre Dame* dates from the eleventh century. *Orange* has a college and a library. It had a university till the French Revolution. It manufactures silks, mus-

lins, serges, etc., and there are oil-works, dye-works, and tanneries. A trade in wine, spirits, oils, honey, and fruit is carried on. Population, in 1901 (commune), 10,096.

Orange is the Roman Arausio. It was the capital of the independent Principality of Orange from the eleventh century. On the death of Philibert of Chalon in 1530 the estates and title passed to the House of Nassau. William of Orange, surnamed the Silent, and his son, Maurice of Nassau, founded the greatness of the House of Orange by the rôle which they played in the foundation of the Dutch Republic. (See NASSAU and NETHERLANDS.) William III., Prince of Orange and King of England, died in 1702 without issue; and at the Peace of Utrecht (1713) the King of Prussia, one of the principal claimants to the principality, ceded the territory of Orange to the King of France. The title Prince of Orange is now borne by the heir presumptive to the Dutch throne.

OR'ANGE. A town, including several villages, in Franklin County, Mass., 86 miles west by north of Boston; on Millers River, and on the Boston and Maine Railroad (Map: Massachusetts, C 2). It has a public library of 7000 volumes. Its parks—Central, Brookside, and Goddard—are very attractive. The town is actively engaged in manufacturing, the products including sewing-machines, sewing-machine needles, furniture, lumber products, clothing, especially Russian vests, boxes, tapioca, automobiles, water wheels and other kinds of machinery. The government is administered by town meetings. The water-works are owned and operated by the town. In 1783 Orange was created out of parts of Warwick, Athol, Royalston, and New Salem, and incorporated as a district. In 1810 it became a town. Population, in 1890, 4568; in 1900, 5520.

ORANGE. A city in Essex County, N. J., four miles northwest of Newark; on the Lackawanna Railroad, a branch of the Erie, and electric railroads connecting with Newark, Montclair, Bloomfield, East Orange, South Orange, and other towns of the vicinity (Map: New Jersey, D 2). It is situated at an elevation of from 150 to 200 feet, near the base of First (Orange) Mountain, a great ridge of trap rock, which extends for many miles in a northeast and southwest direction rising to a height of over 600 feet above tide water. Among the picturesque spots in the neighborhood are Llewellyn Park of 750 acres (West Orange), with many fine residences; Eagle Rock, on the east brow of the mountain, now a part of the new public park system of Essex County; and Hemlock Falls (South Orange), situated amid wild scenery. The city is noted as a residential place, having the homes of many New York business men, and from its elevated suburbs commands magnificent views of the surrounding country. In the city and vicinity are many miles of excellent roads. The noteworthy buildings include the Stickler Memorial Library, Columbus School Building and Theatre, Decker Building, Metropolitan Building, Music Hall, Orange Memorial Hospital, with the Shepard pavilion and a training school for nurses, Orphan Home, House of the Good Shepherd, Masonic Temple, and the First Presbyterian Church, originally built in 1719, and several

times remodeled. The city has a public library, a bureau of associated charities, a well-known Mendelssohn Union, a New England Society, Essex County Hunt and Essex County clubs, and other athletic and social clubs. Orange is widely known also as the seat of an extensive hat-manufacturing industry. Adjoining Llewellyn Park is the Edison laboratory. The government, under a revised charter of 1879, is vested in a mayor, biennially elected, and a council. The board of education is independently elected by popular vote. The water-works are owned and operated by the municipality. Population, in 1890, 18,844; in 1900, 24,141.

Orange, originally a part of Newark and called the 'Newark Mountain,' was probably settled as early as 1666 or 1667. In 1718 the settlers established a separate Church and called it 'The Mountain Society.' This in 1781 became the 'Second Church of Newark,' and still exists as the 'First Presbyterian Church of Orange.' In 1806 Orange was separated from Newark and incorporated as a town under its present name, the name Orange Dale having been in use from about 1791. In 1870 it was chartered as a city. Out of Orange were created South, West, and East Orange in 1861, 1862, and 1863 respectively. Consult: Whittemore, *The Founders and Builders of the Oranges* (Newark, 1896); and Wickes, *History of the Oranges from 1666 to 1806* (Newark, 1892).

ORANGE. A city and the county-seat of Orange County, Texas, 271 miles east of Austin; on the Sabine River, and on the Southern Pacific Railroad (Map: Texas, H 4). It is especially noted for its extensive lumbering interests, and is also an important shipping centre for the rice, cotton, and live stock of the vicinity. Lumber mills, cotton gins, and a rice mill constitute the principal industrial establishments. The water-works are owned by the municipality. Population, in 1890, 3173; in 1900, 3835.

ORANGE (OF. *orange*, Fr. *orange*, from It. *arancia*, *arancio*, from Ar. *nāranj*, orange, from Hind. *nāraṅgi*, from Skt. *nāraṅga*, *nāgaraṅga*, orange; influenced by popular etymology with Fr. *or*, Lat. *aurum*, gold, in allusion to its yellow color; with loss of initial *n* as in *adder*, *apron*, *augur*, *umpire*, cf. dial. It. *naranza*, *naranz*, Sp. *naranja*, Wall. *naranze*, orange), *Citrus aurantium*. A low-branching, long-lived evergreen tree of the natural order Rutaceæ. In cultivated orchards it seldom exceeds 30 feet in height. The leaves are oval or elliptical; the blossoms pure white and very fragrant. The fruit is a large, globose, 8 to 10-celled berry, yellow when ripe, and containing a refreshing acid juicy pulp. The orange is used as a dessert fruit and for preserves, marmalade, etc. The principal types of oranges are as follows: *Citrus aurantium sinensis*, which includes the common sweet oranges of commerce, including more than 70 horticultural varieties. *Citrus aurantium amara*, which includes the sour, bitter, or Seville oranges, largely used as budding stocks for sweet oranges and for the oil obtained from the rind of the fruit for use in perfumery. *Citrus aurantium bergamia*, which includes the bergamot orange, from which bergamot oil is obtained. The species *Citrus aurantium*, var. *nobilis*, includes the mandarin or kid-glove oranges, and tangerines. These are mostly small early sorts and hardier than sweet oranges.

The trifoliate orange (*Citrus trifoliata*) is valuable chiefly on account of its hardiness and compact growth, which makes it a good hedge plant as far north as New York City. It has a value as a stock for the Satsuma variety and the kumquat, rendering them more hardy than when worked on their own roots. Promising hardy hybrids between this and *Citrus aurantium* are being obtained.

The fruit of these various species varies exceedingly in form, size, juiciness of pulp, thickness of rind, etc. Some varieties have very numerous seeds, while others are seedless. The navel orange is so called because of a remarkable development of adventitious cells which at the apex of the orange give the fruit an umbilical mark. The orange is a native of India or Southern China, whence it has been distributed by successive stages to all parts of the subtropical world and the warmer temperate regions. It was introduced into Florida and South America by the early Spanish explorers, and now flourishes wild there in many localities. It is cultivated in nearly all the countries bordering on the Mediterranean Sea, Portugal, India and Southern Asia, Japan, East Indies, Brazil, Jamaica, Florida, Louisiana, California, Australia, etc. In the United States the production of oranges has declined somewhat since 1896, owing to the severe winter freezes of 1894-95 and again in 1899, which ruined many of the orange groves of Florida. The twelfth census estimates the number of orange trees in the United States in 1899 at 8,397,710, and the production that year at 6,171,259 boxes. California, with 5,648,714 trees, produced 5,882,193 boxes; while Florida, with 2,552,542 trees, produced but 273,295 boxes.

Oranges are usually propagated from seed. Some varieties come true or nearly true to seed, but most do not, and so are propagated by budding. They thrive on nearly all kinds of fertile soils and are found in high, dry situations as well as low, alluvial lands subject to occasional overflow. They cannot be grown in situations subject to severe frosts during the growing season. The trees are set in the orchard when about two years from the bud, the distance apart usually favored in California being 10 feet for dwarfs, 18 to 24 feet for semi-dwarfs, 24 to 30 feet for standards, and 30 to 40 feet for seedlings. Clean, thorough cultivation is practiced during the growing season and irrigation given wherever necessary. Nearly all California orchards are irrigated. Orange trees under favorable conditions continue in bearing to a great age. Blossoms and green and ripe fruit are frequently seen on the trees at the same time, but the bulk of the crop ripens at about the same time. In harvesting the fruit is usually gathered by hand, being cut off and placed in sacks or cloth-lined baskets. It is kept for a few days in baskets or shallow bins in the packing house for the skins to dry and soften a little, then graded, each fruit wrapped in tissue paper, and packed for market in boxes holding two cubic feet each. Boxes hold from 96 to 252 oranges, according to the size of the fruit. Average sized fruit runs from 176 to 200 to the box. Oranges stand shipment well and when properly handled sometimes keep for months.

ORANGE DISEASES. The orange, in common with many of the other citrus fruits, is sub-

ject to a number of injurious diseases by which the trees are destroyed or stunted in their growth and the fruit injured or rendered unsightly. One of the widest spread diseases, especially destructive of lemons and sweet oranges, is the 'foot-rot,' which is of unknown origin, but occurs in Florida, California, Europe, and Australia, and, according to estimates, has caused annual losses of more than \$100,000 in Florida alone. It may be recognized by copious exudation of gum near the base of the tree, sparse, small yellow leaves, and dead small branches, and patches of dry bark which fall off. Other centres appear and the disease spreads until the whole tree is girdled. Removing the soil from around the crown of the tree seems to be the most effective treatment. Over cultivation is to be avoided and good drainage secured. 'Die-back,' so named from the dying of the young twigs for several inches from their tips, is a serious trouble in Florida. No variety or age of tree appears exempt from this disease, which seems to be due to malnutrition, resulting in part at least from improper cultivation and improper drainage. The fruit on trees is not abundant, ripens prematurely, and frequently splits, dropping from the tree before ripening. Withholding nitrogenous fertilizers, stopping cultivation, mulching about trees and thorough drainage have given good results in overcoming this disease. The sooty mold (*Meliola camelliae*) is a fungus that follows scale and other insects which exude honeydew upon the trees. It covers the leaves and stems, interfering with their functions, and renders the fruit unsalable by the covering of black, almost felt-like mycelium. By destroying the insects with resin washes or by fumigation, the excretion of honeydew (q.v.) is stopped and the sooty mold disappears. Not only citrus trees, but many others are subject to this pest. 'Blight,' a destructive and apparently contagious disease of unknown cause, for which no cure is as yet known, seems to attack bearing trees only. The leaves suddenly wilt, even in rainy weather; numerous sprouts appear upon the trunk, and die after a season or two. The trees blossom profusely the season following the wilting, but are usually leafless, and set few fruits and ripen fewer. A single branch, or the whole tree, may be affected, but in any case the tree is finally destroyed. The scab is due to a species of *Cladosporium* which causes warts or scabs on the leaves and fruits, especially of lemons. Thorough spraying with ammoniacal copper carbonate will prevent this disease. At least five applications should be given. See Colored Plate of CITRUS FRUITS.

Consult: Bonavia, *Cultivated Oranges and Lemons of India* (London, 1890); Risso and Porteau, *Histoire naturelle des orangers* (Paris, 1822); *Culture of the Citrus*, in California State Board of Horticulture Report (Sacramento, 1902); Mills, *Citrus Fruit Culture*, California Agricultural Experiment Station, Bulletin 138; Harcourt, *Florida Fruits* (Louisville, Ky., 1886); Wickson, *California Fruits* (San Francisco, 1891); B. Aliño, *El naranjo* (Valencia, 1900); *Treatise and Handbook of Orange Culture in Florida, Louisiana, and California* (4th ed., New York and Jacksonville, 1892).

ORANGE, PRINCE OF. See WILLIAM I., the Silent'; WILLIAM III., King of England.



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ORANGE-TREE SEEDLINGS, RIVERSIDE, CALIFORNIA

OR'ANGEBURG. A city and the county-seat of Orangeburg County, S. C., 51 miles south by east of Columbia; on the north fork of the Edisto River, and on the Southern and the Atlantic Coast Line railroads (Map: South Carolina, D 3). It is the seat of Claflin University (Methodist Episcopal) for negroes, opened in 1869, and of the Colored Normal, Industrial, Agricultural and Mechanical College. There are cotton and cottonseed oil mills, lumber mills, a furniture factory, machine shops, brick yards, etc. Orangeburg has a considerable trade in cotton, lumber, and turpentine. The water-works and electric light plant are owned by the municipality. Population, in 1890, 2964; in 1900, 4455.

ORANGE CITY. A town and the county-seat of Sioux County, Iowa, 45 miles north-northeast of Sioux City; on the Chicago and Northwestern Railroad (Map: Iowa, A 2). It has the Northwestern Classical Academy, with the Rapelye Library of 3000 volumes, and is interested principally in farming and stock-raising. The new court house here is a handsome structure. Population, in 1890, 1246; in 1900, 1457.

ORANGE FREE STATE. See ORANGE RIVER COLONY.

ORANGE INSECTS. The insects which affect the orange, also, as a rule, affect the lemon and other trees of the genus *Citrus*. The most important and injurious are the scale insects of the family Coccidæ, which attack the leaves, twigs, branches, and trunk. The long scale (*Mytilaspis Gloveri*) and the purple scale (*Mytilaspis citricola*) were for a long time the principal insect enemies of the orange groves in Florida, but the Florida red scale (*Aspidiotus ficus*) and the chaff scale (*Parlatoria pergandei*) have become numerous and injurious. In Louisiana the chaff scale has been the principal enemy, although the purple scale has done some damage. The orange chionaspis (*Chionaspis citri*) also occurs abundantly in this State as well as in Mexico and the West Indies. In California none of these species are noted as pests in the orange groves, although the purple scale and the long scale have been accidentally introduced into some localities during the past few years. The principal California scales are the California red scale (*Aspidiotus citricola*), the white or fluted scale (*Icerya Purchasi*), and the black scale (*Lecanium oleæ*). The white or fluted scale has been practically exterminated by the introduction of the Australian ladybird (*Novius cardinalis*—see LADYBIRD), and the black scale is more of a pest to the olive orchards than to the orange groves. The California red scale is therefore the only serious scale-insect enemy to the citrus trees of California, and is kept in check by fumigation with hydrocyanic acid gas, and by spraying with the kerosene distillate emulsion. The soft scale (*Lecanium hesperidum*), the hemispherical scale (*Lecanium hemisphaericum*), the Florida wax scale (*Ceroplastes Floridensis*), and the barnacle scale (*Ceroplastes cernipediformis*), as well as the common mealy-bug (*Dactylopius citri*), are also found in orange groves, but seldom do any great damage. See SCALE INSECTS.

A rather serious pest in Florida, and to a lesser extent in Louisiana, is the white fly (*Aleyrodes citri*) which sometimes swarms upon the leaves of citrus fruits, stopping the pores and extracting the sap, and which through its saccharine

excretion is also the nidus for the spores of a black smut-fungus which further damages both the health and appearance of the trees and fruit. A mite enemy of the orange injures the fruit to some extent, and is especially harmful to the salable value of the fruit. This is *Phytoptus oleivorus*, called the 'rust mite' of the orange and the 'silver mite' of the lemon, since it produces a rusty appearance on orange fruit and a silvery appearance on lemons. The sovereign remedy against these mites is flowers of sulphur added to kerosene emulsion spray. Another mite which occurs upon oranges, and which is closely allied to the so-called 'red spider' of greenhouses, is the six-spotted mite (*Tetranychus sex-maculatus*). It feeds mainly on the under sides of the leaves, and it is also readily controlled by the use of sulphur in some form or another. (See MITE.) Some damage is occasionally done to orange trees by termites or so-called white ants, but usually because of some prior damage.

The leaves are injured by the orange aphid (*Siphonophora citrifolia*), and by several sucking bugs, such as the green soldier bug (*Nezara hilaris*) and the thick-thighed metapode (*Metapodius femoratus*). A number of caterpillars feed upon the leaves, the most conspicuous of which is the larva of *Papilio cresphontes*, sometimes known as the 'orange dog.' The saddle-back caterpillar (larva of *Empretia stimulea*), and the bagworm (larva of *Oiketicus Abbotii*), and several other less prominent lepidopterous larvae eat the leaves to a greater or lesser extent, and there are several leaf-rollers which also damage the foliage. The cotton-stainer (q.v.) or red-bug (*Dysdercus suturellus*) punctures the fruit; as does also the leaf-footed bug (*Leptoglossus phyllopus*). A very serious enemy of the orange in Mexico, and one the advent of which is greatly feared by the orange-growers of the United States, is the Morelos orange worm or fruit-fly, the larva of *Trypeta ludens*. Here the fly lays her eggs upon the skin of the young orange, and the maggots which hatch from these eggs penetrate the pulp and ruin the fruit. Nearly all of the species just mentioned occur in Mexico and the West Indies, and several of them are found in the orange groves in Mediterranean regions. In South Africa and Australia the orange has a different insect fauna, but the species are allied to those in America and represent practically the same groups.

Consult: Hubbard, *Insects of the Orange* (Department of Agriculture, Washington, 1886); Marlatt, "The Scale Insect and Mite Enemies of Citrus Trees," in *Yearbook, Department of Agriculture for 1900* (Washington, 1901).

ORANGEMEN. The members of the Irish society called 'The Loyal Orange Institution.' After the battle of the Boyne (q.v.) in 1690, the Irish Catholics, who on account of their Jacobite leanings were oppressed by the English, began to form various semi-revolutionary societies. In opposition, the Irish Protestants formed the above-named society, the object of which was to oppose Roman Catholicism and to maintain the union of England and Ireland and the Protestant succession to the crown. Though it derived its name from William III. (of Orange), who drove out the Catholic James II., it was first definitely established in Ulster in 1705. It extended rapidly, and even had some lodges in England and Canada. Parliament was compelled

to check the turbulence of the organization on several occasions, and from 1813 to 1828 it was suspended in Ireland. It had a complex organization, and the grand lodge had a meeting twice a year, in May and on November 5. In Ireland the society has for a long time had no influence, but there are numerous lodges still existing in the United States. July 12th, the anniversary of the battle of the Boyne, is 'Orange Day.' Consult: *View of the Present State of Ireland and of the Disturbances in That Country* (London, 1797); *An Unbiased Irishman, Orangeism Exposed* (New York, 1824); *Parliamentary Report on the Orange Association* (London, 1835); *Lilburn, Orangeism: Its Origin, Constitution, and Objects* (ib., 1866); *Lecky, History of England in the Eighteenth Century*, vols. vii., viii. (ib., 1878-90).

ORANGE-NASSAU, ORDER OF. A royal order of the Netherlands, with five classes, founded in 1892 in the name of Queen Wilhelmina. It is conferred as a reward for services to the country or to the royal house, and may be given to foreigners as well as natives. The decoration, a blue enameled cross with eight points, surrounded by a laurel wreath, bears the national arms on a blue ground with the legend, *Je maintiendrai*, on the reverse a W with the inscription *God zij met ons* ('God be with us').

ORANGE OIL. An essential oil obtained from the rind of the orange. *Essence de Bigarade*, from the bitter orange, is distinguished from *essence de Portugal*, from the rind of the sweet orange. The oil is extracted sometimes by distillation, but more commonly by the sponge process, which consists in pressing the peel of the fruit forcibly against a piece of flat sponge in such a manner as to break the cells, from which the oil exudes and is absorbed by the sponge. When exhausted the peel is thrown aside and the sponge wrung out into a bowl, where the oil separates from the watery liquid which accompanies it, and is then decanted. This oil, which is a pale yellowish liquid, consists of nearly 98 per cent. of a terpene called lemonene, and is used for flavoring and in perfumery. The essential oil obtained by the aqueous distillation of the fresh flowers of the bitter orange is chiefly used in perfumery under the name of oil of orange flowers, or oil of neroli. The yield from one ton of flowers is about forty ounces, and the finest trees afford about sixty-six pounds of flowers. The neroli oil is a yellowish or brownish liquid with an odor of orange flowers and a bitter aromatic flavor. Both orange oil and oil of neroli are made chiefly in the south of France.

ORANGE RIVER (Hottentot *Gariiep*, Great Water). The principal river of the extreme southern part of Africa (Map: Africa, F 7). Its farthest headstream rises on the slope of Champagne Castle, a peak of the Drakenberg on the boundary between Natal and Basutoland, scarcely more than 100 miles from the Indian Ocean. It flows across the continent in a general westward course, first southwestward through Basutoland, then forming in a large bend the southern boundary of the Orange River Colony, after which it flows across the northern part of Cape Colony, and finally forms the boundary between the latter and German Southwest Africa until it empties into the Atlantic Ocean. Its total length is nearly 1300 miles. It receives in the upper two-fifths of its

course practically all its permanent tributaries, the last and largest of which is the Vaal (q.v.), which is by some geographers considered as the true upper course of the river. Below its confluence with the Vaal the Orange flows through the arid wilderness of the southern Kalahari region and Namaqualand. In the last 500 miles of its course it receives no permanent tributaries, though several large wadis lead into it. Its volume decreases by evaporation, and at its mouth it is almost exhausted. A sand bar blocks the mouth. In the wet season the river becomes an impetuous torrent. About 20 miles from its mouth it is completely obstructed by rapids, and farther inland, above its confluence with the Molopo Wadi, it forms the famous 'Hundred Falls' or the Great Anghrabies. Here the river descends 400 feet in a course of 16 miles in a continuous series of rapids and cataracts between a confusion of high rocky crags. The river received its present name in 1777 in honor of the House of Orange. Consult Chavanne, *Afrikas Ströme und Flüsse* (Vienna, 1883).

ORANGE RIVER COLONY (formerly the ORANGE FREE STATE). A British colony in South Africa, lying between the Orange River and its tributary the Vaal (Map: Africa, G 7). The latter separates the colony from the Transvaal Colony on the north, and the former from Cape Colony on the south. Cape Colony (Griqua Land West) also forms the western boundary, while on the east the colony is bounded by Natal and Basutoland. The area is estimated at 48,226 square miles.

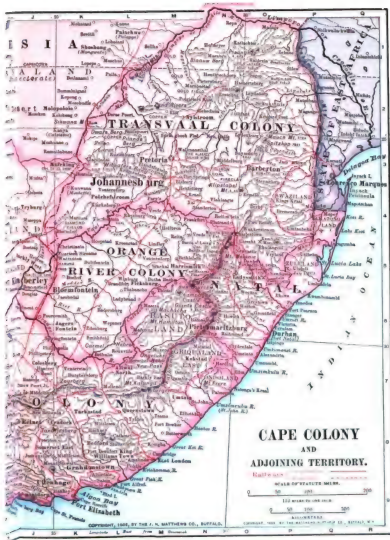
PHYSICAL FEATURES. The surface is an undulating plateau lying at an elevation of 3000 to 4000 feet above the sea. This plateau is bounded on the east by the Drakenberg, with a height of 7000 to 11,000 feet, and slopes mainly westward and northwestward toward the Vaal River. It is for the greater part a prairie country, affording good pasturage in summer, but very sparsely wooded except in the eastern mountains and along the rivers, which are fringed with willows. The colony is watered entirely by the tributaries of the Orange and the Vaal. The climate, owing to the high altitude and the dryness of the air, is very healthful and agreeable. The region is, however, subject to hot winds from the interior, so that the temperature rises actually higher than in the lower ground of Natal. The mean temperature is about 61°, and the average extremes are: highest 95°, in January; lowest 40°, in June. The dominant flora is herbaceous, becoming shrubby toward the west. The large wild animals have entirely disappeared. The country suffers occasionally from the locust plague.

The northeastern portions of the country consist mainly of Triassic sandstones and shales interbedded with horizontal coal seams which outcrop especially in the Kroonstad and Heilbron districts in the extreme north. The southwestern portion belongs to the great South African lacustrine basin, the surface rock being of the Karoo series with intrusions of igneous rocks.

MINING. The mining industry of the colony is confined principally to the production of diamonds, which are found at Koffyfontein and Jagersfontein, in the Fauresmith district. They are also found to some extent in the neighborhood of Kroonstad, in the north. During the last decade of the nineteenth century considerable prog-



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ress was made in the exploitation of the diamond fields, the output having increased from 99,225 carats, valued at £224,000, in 1890, to 307,000 carats, valued at £1,508,000, in 1898. The large coal deposits in the north around Kroonstad are extensively exploited. Gold is also found.

AGRICULTURE. By the conformation of the surface the soil is better adapted for grazing than agriculture, and, although grain-raising is on the increase, it is still inferior to the pastoral industry. There are at present about 10,000 holdings, comprising about 30,000,000 acres, of which a very small part is under cultivation.

COMMERCE AND TRANSPORTATION. The principal exports of the colony are wool, hides, corn, and diamonds. The commerce was almost entirely suspended by the Boer War, exports falling off from about £2,000,000 in 1898 to about £23,000 in 1901. The imports, consisting mostly of general merchandise, were less affected. The colony has about 400 miles of railways, the main line entering from Cape Colony and connecting Bloemfontein with the Cape and the Transvaal railway systems. There is also another line connecting the northeastern part of the colony with the Natal system. The railways were originally constructed by Cape Colony and acquired by the Orange Free State in 1897.

GOVERNMENT. Since the establishment of civil government after the annexation of the colony to Great Britain, the Orange River Colony has been under the supreme authority of the Governor of Orange River and the Transvaal colonies, who is represented in the former colony by a Lieutenant-Governor, assisted by an executive council. The revenue is derived principally from customs. The revenue and expenditures for 1902-03 were estimated at £775,000 and £760,000 respectively.

There is a system of Government schools, but education is neither compulsory nor free. The population of the colony in 1890 was 207,503, of whom 77,716 were white and 129,787 natives. The majority of the white inhabitants belong to the Dutch Reformed Church. Capital, Bloemfontein (q.v.).

HISTORY. Before 1836 the region between the Vaal and Orange rivers was a wilderness, inhabited by wandering bands of Bushmen and broken tribes of refugees from the armies of the great Zulu rulers, Chaka, Dingaan, and Maselikutse. In 1836 there was a great emigration of Boers from Cape Colony, owing to dissatisfaction with the British Government. This movement, the 'Great Trek,' had Natal for its goal, but, the British not allowing the Boers to remain in possession of this region, a part of them settled in the country north of the Orange and another in the territory north of the Vaal. The republic thus established between the Orange and Vaal (1842) proved a disturbing neighbor to Cape Colony, so that after some friction it was forcibly annexed by the British in 1848. The country continued in their possession until 1854, when it was formally given up. The independence of the Orange Free State was declared on February 23d and a constitution adopted on April 10th, which was revised February 9, 1866, May 8, 1879, and May 11, 1898. About the year 1862 a large number of Griquas (q.v.) sold their farms to the Free State Government, and migrated in a body to the coast side of the mountains in independent Kaffraria, occupying a large tract of country there known by

the name of No Man's Land. In 1866 a treaty was concluded with Moshesh, chief of the Basutos, by which a portion of the territory known as Basuto Land was ceded to the Orange Free State. The boundaries agreed on by this treaty were, however, somewhat modified by the Governor of Cape Colony in 1869. The intimate relationship of the Orange Free State and the South African Republic established a community of interests between them whenever local jealousies were put aside, and a party in each State always desired their union, or at least a close alliance. When in 1890 the jealousy between the Boers and the Uitlanders, or foreign settlers in the two republics, together with the pugnacious diplomacy of President Kruger of the South African Republic and Joseph Chamberlain, the British Colonial Secretary, brought on war between the countries they represented, the Orange Free State cast its lot with its sister republic. This was in accordance with a treaty, arranged in April, 1897, for mutual support in case of attacks upon the independence of either. After the first aggressive campaigns of the Boers, the Orange Free State was overrun by the tide of British success; and on May 24, 1900, Field-Marshal Lord Roberts, commanding the British forces, issued at Bloemfontein, the capital, a proclamation annexing the Orange Free State to the British Empire as the Orange River Colony. The Orange Free State witnessed much of the guerrilla fighting after the formal annexation of the Boer republics; it was repeatedly traversed by British columns in 1900-1902, and its President, Steyn, was one of the last to submit to the British. See TRANSVAAL; SOUTH AFRICA; SOUTH AFRICAN WAR.

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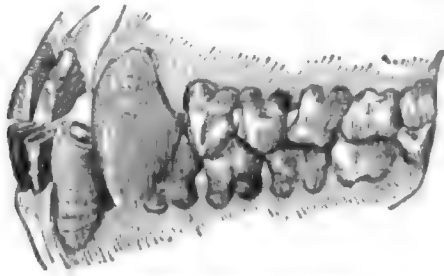
ORANGE ROCKFISH. See ROCKFISH.

ORANGE ROOT. See HYDRASTIS.

ORANGE-TIP. Any one of several butterflies of the family Pieridæ, which are usually white in color marked with black, and have a conspicuous orange spot at the end of the front wings, the lower surface of the hind wings being mottled with a greenish network. The most noted species in the United States is *Anthocharis genutia*. It is found throughout the Southeastern United States, reaching as far north as Connecticut.

ORANG'-UTAN' (Malay, man-of-the-woods). One of the three great anthropoid apes (*Simia satyrus*). It inhabits Borneo and Sumatra, and differs in several important respects from its African relatives, the chimpanzee and gorilla (qq.v.). Its individual features are the height

of the skull, the long arms, nine bones in the wrist and sixteen dorso-lumbar vertebræ, of which twelve bear ribs. In external appearance the orang is not so human as the gorilla, the reddish-brown hair with which the body is clothed, the long arms, with a very short thumb,



TEETH OF ORANG-UTAN.

and the long slender hands and feet, combining to emphasize the resemblance to monkeys. The head is more anthropoid, as the skull lacks the prominent superciliary ridges of the gorilla and is strikingly brachycephalic; moreover, the openings of the nostrils are more pear-shaped than in the other apes. The brain is noticeably like that of man, more so than that of either the gorilla or chimpanzee, as the cerebral hemispheres are much convoluted. The teeth, however, are more ape-like than human, for the canines, especially of the male, are strongly developed. The formation of the larynx is extraordinary, as there is a large sac, developed from its united ventricles, which hangs down in front of the trachea. The thumb and big toe are very small and often lack nails, and sometimes even the terminal phalange is missing. The body is bulky and the legs are short and comparatively weak, but the arms are so long that they reach to the ankles when the animal is erect, and are exceedingly muscular. In walking the weight is born on the knuckles of the hands and the outer sides of the feet, so that neither the palms nor the soles are placed squarely on the ground. Only when assisted by some artificial support do these apes walk on the feet alone. In height the orang is about 50 inches or less, the males being much the larger.

These apes are now inhabitants of the swampy forests of Borneo and Sumatra alone, but there is reason to believe that species of this genus formerly inhabited the southeastern portion of the Asiatic continent. They have few natural enemies, of which large serpents and crocodiles are the most important, but even for these the orangs have little fear, nor are they alarmed at the appearance of man. They are arboreal in their habits and rather deliberate in their movements, but are agile and very much at home in trees. They build nests or platforms of branches at a height of 30 or 40 feet from the ground, and there they are said to sleep, being diurnal in habit. The female also brings forth her single young one in such a home, which it is said the male builds for her. Wounded orangs build such shelters for themselves, when escape by flight is impossible. These apes are purely vegetarian in diet, living chiefly on fruit and young, tender shoots, and they rarely have occasion to go to the ground for food. Sometimes, however, they go in search of water and are thus obliged to travel on the earth. They ordinarily go on all fours, but may raise themselves on

their feet, and, by grasping overhanging branches with their hands, progress rapidly in an erect position. In traveling in this way or from tree to tree, they make as much as five or six miles an hour. They are not gregarious, but are usually found single or in pairs. Though naturally peaceable, they can make a fierce resistance when cornered and compelled to defend themselves. When taken young, they can be readily tamed, and are frequently seen in zoölogical gardens.

Consult: Hartman, *Anthropoid Apes* (New York 1886); Wallace, *Malay Archipelago* (New York, 1869); Hornaday, *Two Years in the Jungle* (New York, 1885); Forbes, "Monkeys," in Allen's *Naturalist's Series* (London, 1894); Haeckel, *Aus Insulinde* (Bonn, 1901). See Plate of ANTHROPOID APES, under APE.

ORANIENBAUM, ô-râ'nê-en-boum. A town in the Government of Saint Petersburg, Russia, 19 miles west of that city, on the Gulf of Finland, opposite Kronstadt (Map: Russia, B 6). It has a fine palace, built by Mentchikoff, now belonging to the Grand Duke of Mecklenburg-Strelitz, a summer theatre, many fine villas, a marine hospital, and other benevolent institutions. Its proximity to Saint Petersburg and its sea-bathing facilities make it a popular summer resort. The place was originally the private estate of Prince Mentchikoff, and the palace was for some time occupied by Peter III. Population, in 1897, 5300.

ORÂONS, ô-râ'ônz. Inhabitants of the west and northwest of Orissa and Chota Nagpur, in India, one of the groups of tribes speaking Dravidian languages. They are still a very primitive people. Their dances and marriage customs are of considerable interest. The young people have great freedom in their choice of wives and husbands. The Orâons, or Uraons, call themselves Krurnkh; and are also known as Dhangar ('mountaineers'). Consult: Batsch, "Notes on the Orâon Language," in the *Journal of the Royal Asiatic Society of Bengal* for 1866; Dalton, *Descriptive Ethnology of Bengal* (Calcutta, 1873); Rowney, *The Wild Tribes of India* (London, 1882).

ORATORIO (Ital., oratory). A form of sacred music chiefly epic in character, consisting of choruses and soli accompanied by the orchestra, and generally preceded by an instrumental overture. The name is derived from the oratory of churches, where the first performances took place. The full title of such a work was *Rappresentazione per il oratorio*. Gradually the name of the place came to be used for the art-form itself. The originator of the oratorio is Philip Neri (q.v.), who, soon after his ordination to the priesthood (1551), began a series of public lectures on Bible history. In order to make his talks more interesting, Neri engaged the services of Animuccia, the master of the Papal chapel, who composed so-called *Laudi Spirituali* (hymns) for these lectures. The success of this undertaking was pronounced. After the death of Animuccia no less a master than Palestrina furnished the music. At the beginning these *Laudi* had but a loose connection with the subject matter of the lecture, but they soon grew into a kind of mystery with moralizing tendencies. The characters generally were personifications of abstract ideas. The first work of this kind was Cavalieri's *Anima e corpo* (1600), in which the composer makes use of the new kind of recita-

tive that had just then been originated by the founders of the Florentine musical drama (*stilo rappresentivo*). These first oratorios were called *Azioni sacri*, and differed in nothing from operas except in choice of the subjects. Even the ballet is introduced. Carissimi (1604-74) banished scenery and acting from these performances. But to compensate he introduced the character of the *historicus* (later called *narrator*), a person who sang the narrative portions of the text. Alessandro Scarlatti (1659-1725) introduced the aria into the oratorio, thus relieving the monotony of the purely declamatory style of his predecessors. For the passages assigned to the narrator he wrote *Recitativo secco*. Along these lines followed Caldara, Leo, and Stradella.

In Germany the oratorio also developed from the mysteries. The earliest work of this kind is Stephani's *Passio secundum Matthæum* (1570), but it remained the only one for some time. Not until 1623 do we meet another oratorio, Schütz's *Die Auferstehung Christi*. Whereas the Italian composers favored the new monodic style, Schütz clung to the polyphonic manner to such an extent that the words of a single personage, the Evangelist, were set to a chorus with elaborate accompaniment. His second oratorio was *Die sieben Worte Christi*. The subject matter of these oratorios indicated the direction in which that form was to develop in Germany, for all succeeding composers limited themselves to the story of the Passion of Christ. Thus the oratorio became the *passion oratorio*, or briefly the *passion*. In 1704 two oratorios appeared in Hamburg, one by Keiser, the other by Handel, which attracted the attention of other composers, especially Mattheson (1681-1764) and Telemann (1681-1767). These works placed the oratorio upon a higher level than it had attained in Italy. The German masters, while not repudiating the monodic style, worked in the polyphonic style and won great popularity for the new art-form by the frequent use of the chorale (q.v.). They even employed phrases of chorales as subjects for the fugues. The way was now prepared for Bach (1685-1750), in whose *Passion According to Saint Matthew* the form found its loftiest expression (1729). Into some of the choruses a contemplative element is introduced, consisting of meditations upon the events just narrated. After Bach only one other composer, Graun (1701-59), wrote a passion that has not fallen into oblivion. This was *Der Tod Jesu* (1755).

In Hamburg Handel had written a German passion. Four years later, in Italy, he wrote two oratorios: *Il trionfo del tempo e del disinganno*, an allegorical work entirely after the manner of Carissimi; and *La Resurrezione*, a real Italian oratorio like those of Scarlatti. In 1716 he wrote one other German passion. All these works were only a preparation for his great English oratorios, upon which the fame of Handel (1685-1759) rests, and which to this day mark the perfection of this art-form. When the master wrote his first English oratorio, *Esther* (1720), he had completely formed his style. The excellent choruses which were at his disposal in London led him to assign the chief portions of the oratorio to the chorus. And it is just in these numbers that Handel's genius shines most. In the masterly treatment of vocal fugues Handel stands without a rival, as does Bach in his

mastery over the instrumental fugue. The chorus is used for various purposes; sometimes it is contemplative, as in Bach's passion, at other times didactic, teaching a moral lesson; then again he uses it in a dramatic manner to mark a climax, and again at times for descriptive or narrative purposes. In the matter of the arias Handel does not hesitate to employ all the various kinds in common use then in the opera, even the bravura-aria. The recitative is generally the dramatic recitative; the *recitativo secco* is practically banished, for it appears only in very short numbers, and even then with changing harmonies. His subjects Handel chose from the whole range of biblical history, a proceeding that has been followed by all subsequent composers of oratorios.

At the same time that Handel perfected the oratorio in England this art-form rapidly deteriorated in Germany. The baneful influence of the decadent opera affected all forms of sacred music. The oratorio, like the opera, soon consisted of a number of arias or duets, loosely strung together, and served no other purpose than the exhibition of bravura singing. There was practically no difference between the music of an oratorio and an opera. The works of this period have, therefore, very aptly been called 'concert oratorios.' What has just been said regarding the oratorio in Germany applies with equal force to that form in Italy. The oratorio had entirely lost its distinctive traits and assimilated those of the opera. It is not at all surprising, then, that when the reforms of Gluck brought about a change in operatic music, some change at once became noticeable in the oratorios. But even the best works of that time have not attracted more than passing attention. The first master since Handel who has written oratorios of sterling merit is Haydn (1732-1809) (*The Creation, The Seasons*). But Haydn's style is radically different from Handel's; while the latter's might be characterized as epic, the former's is rather lyric and descriptive. Even the instrumental introductions show the difference between the two masters. Those of Handel are fugal and belong entirely to the polyphonic-contrapuntal style, those of Haydn are descriptive and belong to the homophonic-harmonic style. In Haydn's works the orchestra is a far more important factor than in Handel's. Strictly speaking, only the *Creation* is an oratorio; the *Seasons* is entirely secular in character and really a charming idyl in oratorio-form. Spohr (1784-1859) chooses loftier subjects and treats them in an individual manner, although he does not depart from established forms, while the sixteen oratorios of his contemporary, Schneider (1786-1853), who enjoyed great popularity during his life-time, were soon forgotten. The next great master in the history of the oratorio is Mendelssohn (1809-47). His two oratorios, *Saint Paul* and *Elijah*, are undoubtedly the greatest works in this form since the days of Handel. On the whole, Mendelssohn follows the principles that guided Bach, for, like the great Leipzig Cantor, he insists upon the chorale. The overture to *Saint Paul* begins with an instrumental setting of one of the most famous chorales; then follows some fugal writing in which motives from the chorale are skillfully interwoven. The fugal writing in many choruses is more in the manner of Handel. But although

Mendelssohn adopted general art principles from his great predecessors, his music preserves throughout its own individuality, so that nothing could be further from the truth than to regard Mendelssohn as an imitator of either Bach or Handel. Liszt (1811-86) also tried his talents in the oratorio (*Christus, Saint Stanislas, Saint Elisabeth*), but these works do not mark any distinct phase in the development of the art-form. Rubinstein (1829-94), when he found that he was unable to compete with his formidable rival Wagner in the field of dramatic composition, turned his attention to the oratorio. His determined efforts to be original led him to make several attempts to revive scenic representations of the oratorio under the name of *sacred opera* (*Geistliche Oper*). His works in this form, *Paradise Lost*, *The Tower of Babel*, *Moses*, met only with a *succès d'estime*. Not even the idea of sacred opera is original with Rubinstein, for, as we have seen, up to the time of Carissimi oratorios were practically sacred operas. But even much later biblical subjects had been introduced upon the operatic stage, as *Joseph*, by Mehul, and *Mosè in Egitto*, by Rossini.

In France the form of the oratorio never found much favor. Not only have French composers not added to the repertoire of oratorios, but the performances of such works by Handel and other composers are very rare. The first biblical oratorios written in France are those of Lesueur (1763-1837). All of these are very short and were never performed outside of France. The first French oratorio that was heard outside of its native land was *L'enfance du Christ*, by Berlioz (1854). It only enjoyed a short popularity when after 1870 the Berlioz cult was at its height. Gounod's *Redemption* (1882) and *Mors et Vita* (1885) are probably the most important of the French oratorios, and they have both been given outside of France. The sacred works for the stage written by Saint-Saëns (1835—), *Samson et Dalila* and *Déluge*, are constantly performed, both as operas and, without scenic accessories, as oratorios. The elaborate choruses are certainly in true oratorio style. Massenet's *Eve* (1875) and *La Vierge* (1880) and the four-act sacred drama *Marie-Madeleine* (1873) continue the tradition of the French school of oratorio.

Among modern oratorios the *Franciscus* (1888) of Tinel and the *Saint Ludmilla* (1886) of Dvořák have attracted considerable attention, while *The Dream of Gerontius* (1900), by Elgar, a young English composer, has been accepted by many writers as the finest specimen of English oratorio since the days of Handel. Quite recently (1897) a young Italian composer, Perosi (1872—), has come forward with a most ambitious work, an oratorio-trilogy, the three parts of which bear the titles: *Passion according to Saint Mark*, *The Transfiguration of Christ*, *The Resurrection of Lazarus*. The composer evidently attempted nothing less than a combination of the art-styles of Palestrina, Bach, and Wagner. But if we except the oratorios of Mendelssohn it would seem that the nineteenth century has produced no oratorios that are likely to live long. This inability of composers to write successful biblical oratorios led to the establishment of a form that has been called *secular oratorio*. It is true Handel (*Heracles, Semele*) and Haydn (*Seasons*) wrote such works, but these appear

to be rather isolated instances, and besides attempt to preserve some connection with the real oratorio by occasional religious choruses. Schumann may be regarded as the founder of the 'secular oratorio.' His *Das Paradies und die Peri* (1843) was the first work in which the form of the oratorio was employed for a purely secular work. To this class belong also Schumann's *Faust* (1853) and *Der Rose Pilgerfahrt* (1851). Next to Schumann the greatest master of the secular oratorio is Bruch, whose *Odysseus* (1873) and *Achilleus* (1885) are frequently performed by the larger choral societies of Germany and England. Of other composers of this form the following are deserving of mention: Gade (*Die Kreuzfahrer*), Vierling (*Der Raub der Sabinerinnen, Alarich*), Lorenz (*Otto der Grosse*), Goldschmidt (*Die sieben Todsünden*), and Benoit (*Die Schelde*). See MIRACLE PLAY; MORALITY; MYSTERY; OPERA; and consult: Patterson, *The Story of Oratorio* (New York, 1902); Kretzschmar, *Führer durch den Concertsaal* (Leipzig, 1895-99); Upton, *The Standard Oratorios* (Chicago, 1890).

LIST OF IMPORTANT ORATORIOS.

Armes, P.....	{	Hezekiah (1878).
	{	St. John the Evangelist (1881).
Arne, Abe.....	{	Abel (1755).
	{	Judith (1764).
Arnold, S.....	{	Abimelech (1768).
	{	Prodigal Son (1767).
Atterbury, L.....	{	Goliath (1773).
	{	Christmas Oratorio (1734).
Bach.....	{	St. Matthew Passion (1729).
	{	St. John Passion (1720).
Barnby.....	{	Rebekah (1870).
Barnett, J. F.....	{	The Raising of Lazarus (1876).
Beethoven.....	{	Christus am Oelberg (1799).
	{	St. Cecilia (1866).
Benedict.....	{	St. Peter (1870).
Bennett.....	{	The Woman of Samaria (1867).
Berlioz.....	{	L'Enfance du Christ (1854).
Brahms.....	{	The German Requiem (1868).
Carissimi, G.....	{	Jephthé.
(c.1604-74.)	{	Balthazar.
	{	Jonas.
Cavaliere.....	{	La Rappresentazione dell' Anima ed il Corpo (1600, first oratorio).
Cimarosa, D.....	{	Il Sacrificio d'Abramo (1786).
	{	L'Olimpiade (1787).
Costa.....	{	Eli (1855).
	{	Naaman (1864).
Cowen, F. H.....	{	The Deluge (1878).
	{	Ruth (1887).
Crotch.....	{	Palestine (1812).
	{	The Captivity of Judah (1834).
Cusins.....	{	Gideon (1871).
David, F. C.....	{	Moïse au Sinaï (1846).
Dvořák.....	{	St. Ludmilla (1886).
	{	The Light of Life (1896).
Elgar, E.....	{	The Dream of Gerontius (1900).
	{	Ruth (1867).
Goldschmidt, O....	{	La Redemption (1882).
Gounod.....	{	Mors et Vita (1885).
Graun.....	{	Der Tod Jesu (1755).
	{	Israel in Egypt (1738).
	{	Il Trionfo del Tempo (1707).
	{	Esther (1720).
	{	Saul (1738).
Handel.....	{	The Messiah (1741).
	{	Samson (1742).
	{	Joseph (1743).
	{	Judas Maccabæus (1746).
	{	Occasional (1746).
	{	Theodora (1749).
Haydn.....	{	The Creation (1796-98).
	{	The Seasons (1800).
	{	Die Zerstörung Jerusalems (1840).
Hiller, F.....	{	Saul (1858).
	{	Gideon (1860).
Horsley, C. E....	{	David.
	{	Joseph.
Jenkins, D.....	{	The Legend of St. David (1894).
Kiel, F.....	{	Christmas (1874).

Klein, B.....	{ Jephthah (1828). David (1830). Hob (1820).
Leslie, H. D.....	{ Immanuel (1853). Judith (1858).
Liszt.....	{ Die Legende von der heiligen Elisabeth (1864). Christus (1866).
Loewe.....	{ Die Festzeiten (1829). Die Zerstörung Jerusalems (1829).
Loreto, V.....	{ St. Ignatius Loyola (1622).
Macfarren.....	{ St. John the Baptist (1873).
Mackenzie.....	{ The Rose of Sharon (1884).
Marx, A. B.....	{ Moses (1850).
Massenet.....	{ Marie-Madeleine (1873). Eve (1875).
Mendelssohn.....	{ La Vierge (1880). St. Paul (1836).
Meyerbeer.....	{ Elijah (1838-46).
Molique, B.....	{ Christus (1844-47).
Mollue, B.....	{ Gott und die Natur (1811).
Molique, B.....	{ Abraham (1860).
Neukomm.....	{ Mount Sinai (1830). David (1834).
Ouseley.....	{ The Martyrdom of St. Poly- carp (1855).
Palne.....	{ Hagar (1873).
Parry, C. H.....	{ St. Peter (1873). Judith (1888).
Parry, Jos.....	{ Job (1892).
Pergolesi.....	{ King Saul (1894).
Pierson.....	{ Saul of Tarsus (1892).
Porpora.....	{ Emmanuel (1880).
Rheinthalen.....	{ San Guglielmo d'Aquiltania (1731).
Rossini.....	{ Jerusalem (1852).
Rubinstein.....	{ La Martiria di Santa Eugenia. (1886-1766.)
Saint-Saëns.....	{ Jephthah (1856).
Scarlatti, A.....	{ Stabat Mater (1832-41).
Schneider, F.....	{ Der Thurm zu Babel (1870).
Schubert.....	{ Das verlorene Paradies (1876).
Schumann.....	{ Moses (1887).
Schütz, H.....	{ Christus (1895).
Spoehr.....	{ Noë (188-).
Stanford.....	{ Dolori di Maria. Sacrificio d'Abraham. The Judgment of the World (1819).
Sullivan.....	{ Paradise Lost (1824).
Verdi.....	{ Pharaoh (1828).
Winter.....	{ Christ the Child (1829).
Zingarelli, N.....	{ Gethsemane and Golgotha (1838).
	{ Lazarus (1823).
	{ Paradise and the Peri (1843).
	{ Resurrection. Passion. Last Judgment (1812).
	{ Calvary (1833).
	{ Fall of Babylon (1840).
	{ St. Mary Magdalen (1883).
	{ The Crucifixion (1887).
	{ The Resurrection (1875).
	{ The Three Holy Children (1885).
	{ The Prodigal Son (1869).
	{ The Light of the World (1873).
	{ Manzoni Requiem (1874).
	{ Pilgrimage to Calvary (1792).
	{ The Passion (1787).
	{ The Flight into Egypt (1837).

ORATORIO SOCIETY. See CHORAL SOCIETIES.

ORATORY (Lat. *oratorius*, relating to an orator, from *orator*, orator, from *orare*, to pray, as a legal petitioner). The art or act of speaking persuasively to an audience, with elevation of thought and sentiment and corresponding expression.

The art of speaking in public in such a manner as to convince and persuade was one of the first to be developed in comparative perfection. Like other attainments of primeval man, it was crude in its early forms. The oldest record of such speech is what might be expected of Methusael's son Lamech, who, having commanded his small audience to hear his voice and hearken to his speech, declares that he will slay a man for

wounding him, and cites an historic precedent in justification. It is the earliest type of oratory—the war harangue, either by way of rousing warlike ardor in the tribe, or of bragging about heroic deeds, as happens among savages to-day. Similar examples of the war speech occur in the *Iliad* and in Herodotus and Thucydides, all the while growing longer and fuller of form and art with progress in literary cultivation.

After the military address, as of generals to armies, and often with it, other forms began to be evolved as races emerged from barbarism. When a sense of equity and regard for human rights prevailed over despotic might sufficiently to establish tribunals, it became necessary that men should defend their own interests. As these soon began to be sacrificed to the difference in natural ability which prevails in communities, the monopoly of speaking in courts passed to the skilled advocate, who first had written the client's argument for him to deliver in person, and who later became his proxy in speaking. Three names mark the progress of this movement in the fifth and fourth centuries B.C.—Corax of Syracuse, who attempted to make every man his own advocate by furnishing him a blank brief which needed but little variation in filling at a time when the purpose of most litigation was to recover alienated estates; Lysias, who wrote arguments with more reference to the character and rank of the several clients who were to deliver them; and finally Isocrates, who instructed men of native ability in the principles and practice of oratory, into whose hands the business of advocacy at length passed from the unskilled citizen and the professional logographer. In this school of Isocrates the great orators of Greece were trained, and by him eloquence was raised to a height corresponding to that of the contemporary art of sculpture. His own Eulogy on Athens was the labor of years, and at the age of ninety-eight he is said to have been still revising and correcting it. With others it was copied and recited in all Hellenic lands.

To the oratory which arose from the maintenance of personal rights in courts of law another kind was added when government by popular legislation succeeded to despotism, and deliberative speaking in the assembly followed forensic in the tribunal. This political oratory Isocrates principally taught, and from his school proceeded a group known as the Attic Ten (eight in addition to Isocrates and Lysias), who contributed to the literature of ancient eloquence its choicest examples. At the same time they illustrated several styles which have proved most effective, establishing the truth that excellence is not the sole prerogative of any one of them. Andocides, for example, represented natural orators, who rely upon native gifts and have a corresponding contempt for rhetorical precepts and methods. As a consequence he was sometimes obscure, irrelevant, and careless in arrangement; carrying his point by keeping in sympathy with his audience, interesting them by anecdotes, and by making his plain speech still clearer by abundant illustration—his energy and self-conceit bringing him through difficulties that might have foiled more sensitive speakers. Isæus exemplified a step forward by his skill in arranging his arguments and massing them with cumulative force, without loss of the animation and vivacity which are the dependence of the natural orator. Hyper-

ides used still greater craft in the disposition of his material—a matter of great importance to the ancients—emphasizing his strong points, artfully concealing his art, popularizing his diction with colloquialisms, a general speaker with a variety of graces, witty, sarcastic, playful, and grave by turns. *Æschines* was a man who did not permit a natural gift of spontaneous eloquence to lead him into the pitfalls of extemporization, but habitually practiced composition, to which he added a careful study of literature, together with such training in delivery as the stage could give. In consequence his speeches were sometimes called greater than himself, too theatrical for reality. This was not the charge against *Demosthenes*, with whom he had the honor to be associated in the famous case of the Crown, and in whom Attic oratory culminated. Having had its rise in the dialectics of the Sophists and the formal rhetoric of the Sicilian forensics, it took on by turns leading phases in the solemnity of *Thucydides*, the majesty of *Pericles*, the stateliness of *Antiphon*, the plainness of *Lysias*, the ornateness of *Gorgias*, the elegance of *Isocrates*, the artlessness of *Andocides*, and the vigor of *Isæus*. All these were aspects of eloquence by which *Demosthenes* profited. By study of them all he gathered from each the best, making such selection and combination with his own personal gifts as placed him above them all.

These gifts did not at first promise the final achievement. With neither good voice nor commanding presence, short-breathed, defective in articulation, clumsy in manner, *Demosthenes* on his first appearance in the assembly aroused uproarious and derisive laughter. But he determined to be heard later. He ran up hill, declaimed by the seashore, gestured before a mirror, and learned from actors the outward signs of eloquence. To getting the inner spirit and power were devoted seven years of apprenticeship in speech-writing and studies in history and law, politics and economics, with civil cases in courts, until he began to discuss State affairs in the assembly and to assert for Athens her leadership and to rouse her slumbering patriotism. Then there was the ethical element as the basis of all, giving irresistible force to his clear, terse, and direct address. What is honorable, for States as for citizens, as distinguished from what is expedient, was the undercurrent of his discourse; so what was best for the whole country rather than what was profitable for his own city. With this main motive underlying the power he had gained by patient toil, he won the primacy in a group not easy to approach. It is not possible to sum up briefly the secret of his surpassing power; but the vast variety which follows exact adaptation to present purpose as related to a final issue covers in a general way the many phases of *Demosthenes*'s eloquence. Like all great masters of art, he could go out of himself to become a part of occasions and opportunities. Losing himself in these, he gained the whole world's tribute of admiration, and his fame still survives as the most eloquent orator of antiquity.

With the decline of liberty Greek oratory began to be imitative, and an age of original production was followed as usual by classification, criticism, and partial reproduction.

Early Roman oratory, like the people, was

sturdy and energetic, more practical than imaginative. War, politics, legal and political rights were controlling ideas. Extension of domain and the sway of law were the main purpose of national life, and public speech took its tone from these sentiments. At first it was martial, to soldiers on the field and to the populace on the return from war, when the victor found eloquence an aid in winning civil honors. The courts, too, were an early training ground for speakers, as also the primitive drama had been in both Rome and Greece, in which lengthening speeches of actors finally outgrew dialogue.

Pristine oratory in Italy was exemplified by *Cato the Censor* in the first half of the second century B.C. Austere, reserved, morose, as *Cato* was, his speaking was rude, unpolished, and ungraceful, yet clear, concise, and direct, making him a formidable accuser and a strong defender. Contemporary eloquence was marked by a similar vigor and vehemence unaccompanied by Athenian graces, until the *Gracchi* dropped early harshness and introduced a milder and freer mode. Their successors, condescending to learn at Athens, began to elevate the art to the eminence attained by Greek genius. *Marcus Antonius* was master of point and pathos; *Licinius Crassus* of perspicuity and the union of brevity with elegance; *Cicero* reached the height of Roman eloquence.

For one hundred years increasing refinement had been adding imported grace to native strength. *Cicero*, after the custom of his time, sought foreign accomplishments in the rhetorical schools of Greece and Asia. At forty he was skilled beyond his contemporaries as a forensic and deliberative orator. His excellence lay in harmonious and full development more than in possession of special aptitudes alone. Skilled in all the arts of discourse, like the rhetorician that he was, methodical in arrangement, adroit in treatment of subject and audience, resourceful, versatile, adaptive in discussion; copious, lucid, graphic in diction; flexible, rhythmical, harmonious in style; plausible, felicitous, brilliant in manner; knowing the power of an apposite word and a fitting phrase, always adapting his mood to that of his hearers in order to bring them eventually to his own position—these were *Cicero*'s virtues, ranging over the whole field of oratorical possibilities. Adapting himself to every class of subjects, he also brought himself into harmony with the structure of the Latin language, which required fullness for perspicuity; also into sympathy with Roman taste, which loved the swell and the rhythm, the balance and the cadence of sonorous sentences. His copiousness sometimes runs into verbosity and his elaboration into artificiality; but his customary wealth of diction, solid argument, philosophic sentiments, and fervent declamation captivated his hearers and carried his points by persuasion, if not by conviction. *Cicero* spoke right onward toward the end and object of discourse, reducing his usual amplification to briefest enumeration, making his speech both clear and stimulating. Better than all else, he possessed the ethical element which is the foundation essential to all effective speaking, an honesty and sincerity which is everything to the unskilled, and without which brilliant eloquence is mere trickery. His aim was to do right; his mistakes were those of his judgment rather than his heart. In a sense his eloquence was

complementary to Demosthenes's, his acknowledged master. If not so energetic, it was more vivacious, enlivened with a wit which the terribly earnest Greek did not possess. If it did not sweep down throngs with chain shot, there was much display of flash and fire, which pleased by picturesqueness and accomplished the same purpose with superficial hearers, that is with the majority. If it was more wordy, the people whom it addressed and the language they used demanded more leisurely thought and more expanded expression; but together these two leaders of speaking men in the two dominant nations of ancient Europe achieved every excellence of oratorical form and manner. What they lacked was not yet revealed—the higher reaches of ethics and a more comprehensive kindness.

When this revelation came, after the decline in eloquence with the loss of liberty that followed Cicero's age, a new spirit seized upon old forms. While Quintilian, the rhetorician, was gathering up the remains of Latin oratory, as Aristotle had done with Greek oratory, a provincial, Paul of Tarsus, was declaring Christianity at Rome and Athens and in the provinces. Later, Athanasius took up its defense and propagation at Alexandria, Chrysostom at Antioch, Basil and the Gregories in other cities, while the Latin Tertullian at Carthage, Ambrose at Milan, and Leo at Rome exemplified the new eloquence, and founded a new empire upon the ruins of the old. This eloquence had a freedom and irregularity which could not be restrained within classic bounds, as the new wine could not be kept in old bottles; but it was suited to the work it had to do, and it did it well.

When zeal took on a crusading temper another and wilder style of preaching was addressed to mobile multitudes, starting them toward Palestine by its harangues and keeping them moving by continual exhortation. Such was the oratory of Peter the Hermit. These pilgrimages from the West into the East being over, oratory subsided into the eccentricities of mediæval preaching against which Dante inveighed, angrily declaring that certain priests were bent only on amusing with jests and idle tales, so that their flocks went home fed on wind. The *Exempla* of Jacques de Vitry bear witness, also, to the mediæval, yet not wholly mediæval, appetite for anecdotic sermons. Oratory was once more infused with earnestness at the Reformation; its classic forms were recalled with the rise of great preachers like Bossuet; it reflected the stormy aspects of the French Revolution, and reappeared in its better phases in the parliamentary eloquence of Great Britain in the last half of the eighteenth century.

This was nearest to a repetition of the ancient periods of classical eloquence that has occurred, and one of the results of the revival of Greek learning. The education of deliberative orators like Pitt and Mansfield, Burke and Fox, was chiefly in the oratory of antiquity. From its best examples each gathered such features as were worth most to him: Pitt, simplicity of treatment, luminousness of statement and illustration, enforced by impetuosity of delivery; Mansfield, a statement of his case better than most men's arguments, leading hearers step by step irresistibly to his conclusions; Burke, who combined the study of ancient classics with those of his own country, gaining from both the power

of common words effectively placed, and of the sonorous sentence when needed; Sheridan, more Asiatic in manner, as Fox was Attic—all of them, and others, too, having their counterpart in men who lived twenty centuries before, a group of statesmen-orators whose equals collectively and individually have appeared but once in history, and whose works remain as the second embodiment of eloquence in the records of human speech.

It is not an idle boast to say that a third period is found in the century between 1765 and 1865 in our own land. Questions of colonial confederation, of independence, of self-government under a constitution, of reserved and delegated rights, of extension or extinction of slavery, of war and reconstruction, formed a series of issues demanding political wisdom and involving earnest discussion, which incidentally trained three generations of orators. Their model at first was British eloquence. The fathers read it and replied to it in a manner to compel the respect and praise of English statesmen. Patrick Henry, Richard Henry Lee, Drayton, and the Rutledges and their compeers in the South, and James Otis, the Adamses, Hamilton, Jay, and their fellow patriots in the North, led the people in the war of ideas and words which preceded the strife of arms. In the Congress of the new nation three men came to the front in the early part of the nineteenth century, who represented as many sections of the country and styles of oratory. Of these Henry Clay was earliest and longest in legislative halls. Frank and bold in nature, honest and sincere in conviction, ardent and hopeful in temperament, he had a rare power of inspiring others with his own sentiments and expectations. His clear and positive views were expressed in lucid terms addressed to the understanding of the people with a freedom and unconstraint that belonged to a new country, and on the floor of Congress his magnetic presence and flowing speech won the hearts of many who could not agree with his political doctrines. He reached more of his countrymen in all sections than any other contemporary, standing as he did on middle ground geographically and politically. An extreme Southern position was held and defended by Calhoun, a man of rigid logic, commanding more respect than enthusiasm, sincere, devoted, persistent; calm and impressive in manner, or vehement and fiery, but relentless in his inexorable demonstration of what he believed to be true. For the North of his day Daniel Webster stood and spoke. Though somewhat academic in his early manner, he found later the value of plain words with plain people and of the best English with everybody. Having a strong grasp of legal principles at the bar and broad views of national questions in Congress, he added perspicuity and energy, vigor of reasoning and felicity of diction to a majesty of voice, presence, and personality which delighted, impressed, and awed assemblies beyond all that the printed pages of his speech can convey. History and tradition alone can prolong his fame.

In the department of occasional addresses, commemorative, eulogistic, and expository, Webster had an eminent successor in Everett, whose eulogy upon Washington is the best example of its kind. The approach of the Civil War gave a fresh impulse to genuine oratory through the magnitude of the issues at stake. In Congress,

Sumner, whose academic discourse had been heavy as cloth of gold with ancient spoils, now devoted his wide learning, moral force, and commanding eloquence to the cause of unqualified freedom throughout the land. The same demand was made before popular assemblies by Wendell Phillips in his own way and by a manner of speech that for convincing an audience against its understanding and persuading it against its will has seldom been surpassed.

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ORATORY. A chamber or building designed for worship of a private or domestic character. From the earliest days of the Christian Church the use of oratories is traceable; and before the regular organization of parishes they had probably a considerable place in the common, although not in the public worship. Until the middle of the third century A.D. Christians gathered for worship almost entirely in the main hall of some large private house, and when independent church buildings became the rule, the service of prayer and even the celebration of the mass were continued, by superior permission, in many houses. One oratory of the third and another of the fourth century have been recently discovered in Rome. The councils of the Church then legislated against the abuse of such private oratories. Another class of oratories were the memorial chapels erected to noted persons, where mass could be celebrated at the anniversary; only

prayer at other times. These were usually circular or polygonal in shape, like that of the father of Saint Gregory Nazianzen. Oratories took on a different character with the opening of the Middle Ages and the distinction was more closely drawn between those where prayers alone could be held and those where mass could be celebrated either on certain days or at any time. The Papal, episcopal, royal, and feudal castles and palaces were not complete without their chapels or oratories. Oratories for mass were under the strict supervision of the local bishop and required his consecration. The Council of Trent placed them under stringent regulations, which have been enforced and developed by later popes, especially Benedict XIV. During the Middle Ages oratories were attached to monastic, cathedral, and other churches, like the famous San Venanzio at Saint John Lateran in Rome.

ORATORY, CONGREGATION OF THE. The name of two religious associations in the Roman Catholic Church.

(1) The Oratory of Saint Philip Neri, the account of whose origin is given in the article on this saint. Unlike most other founders of religious Orders, he had never committed to writing any definite body of rules for the government of the members; even his scattered papers, from which his intentions might have been collected, had been burned by his orders a short time before his death. Soon afterwards, the fathers, at the instance of Baronius, who was then superior, compiled from the existing practices and from memory a rule framed so as to embody the spirit of the founder. This was approved by Paul V. in 1612. The object of the congregation was to carry on Saint Philip's work in his own spirit; its members are a body of priests living in community, but without monastic vows and under a constitution of a very democratic character. They are at liberty to withdraw at any time, and to resume possession of any property they brought with them. There is no general superior; each house is independent, with a superior elected for three years. Seven houses were already in existence at the founder's death; the number increased rapidly, and reached one hundred in Italy alone, twenty-one in Spain, six in Portugal, and eight in France. It is now, however, reduced to a few houses in Italy and Spain. It took a fresh life in England in the middle of the nineteenth century, when John Henry Newman, soon after his change of religion, established at Maryvale, near Birmingham, a house which was afterwards transferred to the town, and later another in King William Street, Strand, London, since transferred to Brompton, near the South Kensington Museum. The English Oratorians, who have mainly been converts, have numbered not a few distinguished men. An account of the London Oratory is given in Bowden, *Life of Frederick William Faber* (London, 1869). The Italian houses also counted many men of eminence in various branches of sacred learning: the great historian Baronius and his continuators; the celebrated explorers of the Roman catacombs, Bosio, Severano, and Aringhi; and the historian Theiner. Consult Villarosa, *Scrittori Filippini* (2 vols., Naples, 1837-42).

(2) The Oratory of Jesus, a French congregation, founded in 1611 by Pierre (later Cardinal) de Bérulle. As early as 1601 he had conceived

the idea of founding a community of priests not bound by monastic vows, and spent a long time in preparation, endeavoring to secure Francis de Sales or César de Bus as its first superior. At the bidding of the Archbishop of Paris he finally undertook the work himself, and began the community life with five associates. The new congregation received Papal confirmation in 1613, under the name of 'Oratory of our Lord Jesus Christ,' when it already numbered seventeen or eighteen members. It soon spread through France, and established a house in Rome in 1618. Unlike the Italian Oratory, it was under one superior-general, elected for life. The founder, who died in 1629, was succeeded by Père Condren. Under the third general, Bourgoing, who held the office from 1641 to 1662, the Oratory began to be implicated in the Jansenist troubles. Some outspoken Jansenists, such as Quesnel, left the congregation to secure greater freedom of action; but others remained, and in 1711 the superior-general, de La Tour, was at the head of the opposition to the Constitution *Unigenitus*. (See JANSENISM.) In spite, however, of the drawbacks which this recalcitrant attitude entailed, the congregation had at the outbreak of the Revolution 70 houses, with 751 members, of whom about one-third were priests. Such distinguished men as Malebranche, Massillon, and Thomassin are among its glories. It was practically extinguished by the Revolution, and did not come into full life again until 1852, when it was revived by six men, among them the famous orator Gratry and the future cardinal Perraud. It was confirmed anew, with some slight modification of the rule, in 1864. Consult: Perraud, *L'Oratoire de France au XVII^{ème} et au XIX^{ème} siècle* (2d ed., Paris, 1866); Tabaraud, *Histoire de Pierre de Bérulle* (ib., 1817); and the historical memorials of the early days contained in the *Bibliothèque oratorienne* (ib., 1880 sqq.).

ORBEGOSO, ór'bá-gō'só, LUIS JOSÉ (1795-1847). A Peruvian general. He was born in the Province of Huamachuco, was well educated, and successfully managed the great estates left by his father, besides gaining some military reputation in the war for independence, to which he devoted his wealth. In 1833 he was chosen President by the Constitutional Assembly. A civil war, which broke out in 1834, was peaceably settled, but the revolts of the next year were so much more serious that the President asked help from Santa Cruz, then President of Bolivia. Peru and Bolivia were united in 1836, and Orbegoso became President of the State of Northern Peru, from which post he was ousted (1837) by a force of independent Peruvians and soldiers from Chile. He was exiled, but returned to Trujillo shortly before his death.

ORBICULOIDEA (Neo-Lat. nom. pl., from Lat. *orbiculus*, diminutive of *orbis*, circle). An extinct genus of hingeless brachiopods allied to and closely resembling the modern genus *Discina*, with which it was formerly considered identical. The shells are thin, depressed, subcircular in outline with eccentric beaks and concentric growth lines, and they vary from one-tenth to two inches in diameter. A slit-like opening in the lower valve served for the passage of a tough muscular pedicle that attached the shell to foreign objects. The genus is represented in all formations from the Ordovician to the Cretaceous

in America, Europe, and Asia, and is especially abundant in some shales of Devonian and Carboniferous age.

ORBIGNY, ór'bé'nyé', ALCIDE DESSALINES D' (1802-57). A French paleontologist, born at Couëron (Loire-Inférieure). He early devoted himself to the study of natural history. In 1826 the Museum in Paris sent him to South America, whence he returned in 1834 with a large collection of notes and specimens. The results of his travels appeared in *Voyage dans l'Amérique méridionale* (1834-47). In 1840 he began the publication of his valuable *Paléontologie française* (14 vols., 1840-54), which he continued until within three years of his death. In 1853 Orbigny was appointed to the chair of paleontology at the Jardin des Plantes, Paris. Among his principal works are: *Galerie orinithologique des oiseaux d'Europe* (1836-38); *Mollusques vivants et fossiles* (1845); and *Prodrome de paléontologie stratigraphique universelle des animaux, mollusques et rayonnés* (1850).

ORBILIUS PUPILUS (c.113-c.13 B.C.). A Roman grammarian remembered chiefly as the teacher of Horace, who has immortalized him as the 'flogging' (*plagosus*) Orbilius (*Epistolæ*, ii. 1, 71). He was a native of Beneventum, but settled at Rome during the consulship of Cicero, B.C. 63. After his death a statue was erected to him at Beneventum.

ORBIS PICTUS (Lat., World Illustrated). The title of the first successful illustrated manual of instruction for the young, and the most popular and widely circulated school-book ever issued in Europe. It was published by the celebrated educator Johann Amos Comenius in 1657, has been translated into all the European and some of the Asiatic languages, and in various modified forms has continued popular, having been issued in many editions down to recent times. This work can be considered as the beginning of the introduction of object-teaching and nature-study into school work. See COMENIUS; EDUCATION; NATURE-STUDY; OBJECT-TEACHING.

ORBIT (from Lat. *orbita*, track of a wheel, course, orbit, from *orbis*, circle). In astronomy, the path described in space by a heavenly body. The paths described by the different planets are of elliptic form, and would be accurately an ellipse, were it not for disturbing influences of the other heavenly bodies known as perturbations (q.v.). The complete determination of a planet's orbit is of the greatest importance to astronomers, as it enables them to predict the planet's place in the heavens at any period, and thus to determine the exact date of eclipses of the sun and moon, of transits and occultations of the planets. For the determination of a planet's orbit, it is necessary to know three things: (1) The situation of the plane of the orbit in space; (2) the position of the orbit in this plane; and (3) the situation at a given epoch, and rate of motion, of the planet in its orbit. Since the plane of the ecliptic (q.v.) is for convenience taken as the reference plane, the position of the plane of a planet's orbit is known when its inclination to the plane of the ecliptic (1) and the line of intersection of the two planes (2) are known. The orbit cannot lie wholly above or below the plane of the ecliptic, but must cut it in two points, called *nodes* (q.v.), and the position of

the line of intersection, or line of nodes, is generally given in terms of the longitude of the ascending node. The situation of a planet's orbit in its plane is determined when we know its shape (3), magnitude (4), and the position of its major axis or line of apsides (5). The shape and magnitude of the orbit depend upon the length of its major and minor axes, but astronomers prefer to employ the major axis and eccentricity (see ELLIPSE); and the position of the major axis is known by determining the heliocentric longitude of its *perihelion*. To complete our knowledge of a planet's motion, all we now require are the epoch of its appearance at some determinate point of its orbit, say at the perihelion (6), and the velocity of its motion in its orbit (7), for when this last is known, the law of areas, as given in Kepler's second law, enables us to determine the position of the planet in its orbit at any future period. These seven facts, the possession of which gives us a complete clue to a planet's motion, are called the seven 'elements' of a planet's orbit. What has been here stated concerning the planetary orbits is similarly true of the comets and satellites, though in the case of the latter the effect of disturbing forces is so great as to produce a considerable change of the elements in one revolution. See ELEMENTS.

ORB-WEAVER. A spider of the family Epeiridae, that spins a wheel-shaped web. The framework of the web is composed of strands of silk that radiate out from the centre like the spokes from the hub of a wheel. When this framework is completed, the spider begins at the centre to spin a spiral line out toward the edge. Whenever the spiral line crosses the spokes it is attached to them. When the outside is reached, the spider begins to spin a closer spiral, gradually approaching the centre. While the threads of the first spiral were smooth, those of the last are sticky. These are the snare threads. The threads of the first smooth spiral, which served merely as a stay, are bitten away during the course of the construction of the new sticky spiral. The webs of some of the orb-weavers are strengthened by zigzag ribbons, while the webs of other species are not complete orbs.

OR/CA. A killer-whale. See KILLER.

ORCAGNA, ór-kä'nyä, ANDREA (c.1308-c.1368). The greatest Italian artist of the fourteenth century, excepting Giotto. His real name was Andrea di Cione, and he was probably born about 1308 at Florence. He is supposed to have first studied in the workshop of his father, Cione, a famous goldsmith, and to have then passed to the studio of Andrea Pisano, then at work on the bronze baptistery gates. Perhaps he also studied with Giotto, but Pisano's influence upon his art was decisive. His masterpiece of sculpture is the tabernacle at Or San Michele (1359), the most beautiful product of Gothic sculpture in Italy; that of wall-painting, the "Paradise," in the Strozzi Chapel at Santa Maria Novella; that of mosaic-work, the façade of the Cathedral of Orvieto; that of tempera-painting, the altar-piece in the Strozzi Palace at Florence. The "Last Judgment" and the "Inferno" in the Strozzi Chapel are inferior to the other part of the trilogy, the "Paradise." Orcagna is more spiritual in feeling and more

sculpturesque in rendering than Giotto, and more epic in his compositions. His figures are far more graceful and well proportioned. He mastered tenderness as well as energy of expression, and in painting made great advances in perspective, and in the treatment of light and shadow in sculpture.

Modern study has shattered several of Vasari's and other ancient writers' attributions to this master. It is known that he did not build the famous Loggia dei Lanzi at Florence, nor paint the "Triumph of Death" and the "Last Judgment" in the Campo Santo at Pisa. Orcagna's influence was great even beyond Tuscany. Consult Vasari's *Lives* in the edition annotated by Milanesi (Florence, 1878-85), and in the Blashfield translation (New York, 1896); also, Crowe and Cavalcaselle's *History of Painting in Italy* (London, 1864-66); Marcel Reymond, "La sculpture florentine," in *Gazette des Beaux-Arts* (1893-94); Dobbert, in Dohme, *Kunst und Künstler Italiens* (Leipzig, 1878).

ORCEIN, ór'sé-lín, C₇H₇NO₂. An amorphous red coloring matter produced by the action of oxygen and ammonia upon orcin (q.v.). It is freely soluble in alcohol, but only sparingly in water. With metallic salts it yields insoluble colored precipitates (lakes), which are of considerable value in dyeing. Orcein is the chief constituent of commercial archil (q.v.).

ORCHARD (AS. *ortceard*, *ortgeard*, Goth. *aurtígeards*, from *ort*, Goth. *aurti*, Olcel. *urt*, herb; connected with AS. *icurt*, Goth. *waúrta*, OHG. *icurz*, Ger. *Wurzel*, OIr. *frem*, Lat. *radix*, Gk. *ῥάδις*, *rhadamenos* + *geard*, Goth. *gards*, OHG. *gart*, Ger. *Garten*, garden; connected with OIr. *gort*, crop, Lat. *hortus*, garden, Gk. *χόρτος*, *chortos*, yard). Any plantation of cultivated fruit trees. The fruits usually classified as orchard fruits include apples, peaches and nectarines, plums and prunes, pears, cherries, quinces, and apricots. These are all deciduous fruits. Plantations of citrus fruits, olives, etc., are sometimes referred to as groves and sometimes as orchards, and the same is true of plantations of cultivated chestnuts, pecans, walnuts, etc. In this article only deciduous fruits are considered. In Europe, especially in Germany and France, much of the deciduous fruit is produced on the fruit trees which line the principal highways. There also large quantities of deciduous fruit are grown on walls, espaliers, and cordons, requiring special pruning and training. Practically every farm in America, more particularly in the Northern States and Canada, contains an orchard for family use. The largest commercial orchards in the world are found in America, where the trees are allowed to grow naturally with but relatively little pruning, and where attention is given to thorough cultivation, spraying, and fertilizing. The total value of the orchard fruits produced in the United States in the census year 1899 was \$83,751,840. The total number of fruit trees that year is reported as 367,164,694, of which 55 per cent. were apple trees, about 27 per cent. peaches and nectarines, 8 per cent. plums and prunes, and 4.5 per cent. pears; cherries stood next in importance, and apricots last. Among the more striking developments in modern orchard fruit-growing are (1) the increased attention given to orchard tillage; (2) the practice of spraying to control insect pests

and fungous diseases; (3) fertilizing; (4) thinning; (5) use of small packages in marketing; and (6) the development of cold storage and refrigerator car transportation.

Formerly the orchard in America was a small adjunct of the general farm. After setting out the trees the orchard was largely left to itself. Occasionally the trees were pruned, but the orchard was seldom fertilized or tilled, and was either left in sod or planted to farm crops. With the increased demand for fruit among all classes of people, greater attention was paid to orchards. In favorable localities they become the most important part of the farm. Gradually whole farms and localities come to be given up to orchards, which in many districts occupy hundreds of square miles.

With the development of the orchard came increased attention to cultural details. Orchards are prepared by deep plowing, subsoiling in heavy lands, and thorough harrowing. After the trees are set they are given as clean cultivation as other farm crops. Hoed crops may be planted between the rows of trees for the first few years, but as the trees increase in size these are more and more restricted to the middle of the rows, until finally when the trees come into bearing the whole space is devoted to them alone. Neither cereals nor tall-growing crops that are likely to shade the trees are sown in the young orchard, nor is the orchard seeded down except under special conditions, as when the trees are growing too rankly and produce little or no fruit. In such cases seeding to cereals, grass, etc., may tend to check growth and throw the trees into bearing. The orchard is plowed in spring as early as the ground can be worked. This is followed by cultivation every week or ten days until about the middle or last of summer, or until the wood growth of the tree has practically ceased. At the last cultivation a cover crop is sown. If the soil is poor in nitrogen a leguminous crop is used, otherwise some cereal or grass may be sown or the weeds allowed to grow. The object of the cover crop is fully to check the growth of the tree for the season, so that the wood may ripen up well before winter. The cover crop also protects the soil from leaching, washing, and puddling in winter. The following spring the cover crop is plowed under, and the summer cultivation repeated. In arid regions irrigation (q.v.) must be practiced. Spraying to check the ravages of injurious insects and plant diseases is considered absolutely essential in American commercial orchards for the production of first-class fruit. (See FUNGICIDE.) The fact that the production of orchard fruits draws on the fertility of the soil in exactly the same manner that wheat, corn, or any other farm crop does, is well recognized, and the orchard is regularly fertilized. Orchards are no longer permitted to bear all the fruit the trees will set, so that the limbs have to be propped up to keep them from breaking. Crops thus produced were found to contain too many small and unmerchantable fruits, besides rapidly exhausting the energies of the tree. Especially is thinning practiced with the more expensive fruits, such as peaches, and in many orchards even the cheaper fruits, like apples, are thinned. The thinning is done soon after the fruits attain the size of the end of the thumb.

In the marketing of fruits much more attention is paid than formerly to the convenience of the ultimate purchaser, i.e. the consumer. Small packages which he can conveniently carry home from market are most in demand. (See MARKET.) Cold storage is being employed not only in the main centres of consumption, but in the fruit districts themselves. It makes possible the prolongation of the marketing from a few weeks to, in some cases, as many months, thus lessening the danger from glut on the market, increasing the net returns to the grower, and greatly prolonging the season when fresh fruits may be obtained by the consumer. Refrigerator cars also make possible the transportation of perishable fruits to distant and better markets. See also REFRIGERATION.

BIBLIOGRAPHY. Thomas, *The American Fruit Culturist* (New York, 1897); Bailey, *Principles of Fruit Growing* (New York, 1900); id., *Cyclopedia of American Horticulture* (New York, 1902). The agricultural experiment stations have published an enormous number of bulletins and reports on the various phases of orcharding, some of which are *Orchard Cover Crops* (New York Cornell Agricultural Experiment Station, Bulletin 198); *Improving an Orchard* (Rhode Island Agricultural Experiment Station, Bulletin 83); *Orchard Experiments* (Massachusetts Agricultural Experiment Station, Bulletin 82); *The Apple Orchard* (Missouri Agricultural Experiment Station, Bulletin 49). See also literature under the various orchard fruits. See FRUITS, CULTIVATED; HORTICULTURE.

ORCHARD GRASS, Cock's-FOOT GRASS (*Dactylis*). A genus of grasses, closely allied to *Festuca*, having the panicle of flowers mostly on one side of the stem, and the spikelets much crowded into clusters. The common orchard grass (*Dactylis glomerata*), a native of the Northern Hemisphere, grows in tufts in meadows, open woods, etc., from sea-level to high altitudes, and is an important natural pasture grass, since it is much relished by cattle, grows with great rapidity after being cut, yields a large quantity of herbage, succeeds well on most soils and in situations too shady for any other grasses. A large improved variety has been introduced into cultivation. It succeeds well in all parts of the United States except in the extreme South, and in the arid regions of the West, yields excellent hay abundantly, and is unexcelled by other grasses in its yield of aftermath, but its tendency to grow in tussocks is rather against it. This habit may be prevented to some extent by frequently rolling the ground. On this account also it is usually sown mixed with other grasses.

ORCHARD ORIOLE. See ORIOLE.

OR'CHARDSON, WILLIAM QUILLER (1835—). A Scotch genre and portrait painter. He was born in Edinburgh, and was educated at the Trustee's Academy. He exhibited his earliest pictures in the Scottish Royal Academy, but in 1863 he went to London, where he afterwards lived. He became associate to the Royal Academy in 1869 and member in 1877. His work is a pictorial representation of the social side of life, the pleasures of ballroom and drawing-room being attractively defined in movement and rich coloring, and graceful and richly robed figures. Among his most important pictures are: "The Challenge" (1865); "The Queen of Swords"

(1877); "Napoleon on Board H. M. S. Bellerophon" (1880), South Kensington Museum; "Un Mariage de Convenance" (1884); "Un Mariage de Convenance—After" (1886); "The Salon of Madame Récamier" (1885); "The Young Duke" (1889); "In the Gloaming" (1901).

ORCHESTRA, ὀρχήστρα (Lat. *orchestra*, from Gk. ὀρχήστρα, from ὀρχεῖσθαι, *orcheisthai*, to dance, from ὄρχος, *orchos*, row; connected with Skt. *rgh*, to rage). In the Greek theatres, the place allotted to the chorus of dancers; in modern theatres, the part of the building assigned to the instrumentalists, also the parquet; and in the modern concert-room, the place occupied by the instrumental and vocal performers. The word orchestra is also used to denote the musicians collectively, and especially the instruments on which they play.

The modern orchestra (referring to the instruments) is the result of a long and slow development. Before the seventeenth century composers had employed various instruments in the accompaniment of their vocal works. But in the choice of instruments the composers seem to have been influenced more by chance than by any definite plan. In fact, the manner in which many instruments were treated gives conclusive evidence that their nature and possibilities were not at all understood. The development of the orchestra coincides with that of the opera (q.v.). In the first opera ever performed in public, Peri's *Euridice* (1600), the orchestra consisted of a harpsichord, a lute, a theorbo, a lyre, and three flutes. The function of this combination of instruments was to give the very simplest kind of accompaniment to the dramatic recitative. Claudio Monteverde (1567-1643) was the first to discover the nature and relative value of some of the instruments. Yet the instrumentation of his first opera, *Orfeo* (1607), differs little from that of his predecessors. But his *Combattimento di Tancredi e Clorinda* (1624) shows a consciousness of purpose and is full of original and striking orchestral effects. Here we find for the first time the *tremolo* of the strings. The strings, in fact, form the foundation of the orchestra. In this work is also found the first instance of *pizzicato*. Monteverde had discovered that instruments had their own peculiarities, and acting upon this knowledge he became the inventor of a distinctively *instrumental* style; whereas his predecessors wrote a truly *vocal* style for all instruments. Since Monteverde the strings have been regarded as the foundation of the orchestra, and with him the various kinds of viols were employed for this purpose. Alessandro Scarlatti (1659-1725) employed violins, violas, and basses, although their treatment is still very crude. The celli generally played in unison with the basses. But occasionally the violas were treated with freedom and were even divided into two parts. The principal wood-wind instrument was the oboe; bassoons were used only to strengthen the basses. Legrenzi (1625-90) strengthened the violins, so that his orchestra consisted of 20 violins, 2 violas, 2 viole di gamba (the precursor of the cello), 4 flutes, 2 bassoons, 2 cornets, and 3 trombones. About this time the kettle-drums also found their way into the orchestra. But the real art of writing for the strings was not yet known; there was no sonority. To render the harmony

fuller the harpsichord was used. Even so great a master as J. S. Bach did not know how to use the instruments. He treats them throughout like voices without the slightest appreciation of tonal color. Handel is not much more advanced. This composer scored heavily for the wood-wind, but with no other purpose than that of reinforcing the strings. In fact, many of his works were reorchestrated by Mozart, and to-day Handel's works are almost exclusively heard with the instrumental rearrangement of Mozart.

Joseph Haydn (1732-1809) is universally known as the father of the symphony (q.v.). At the same time he is also the father of the modern orchestra. When Haydn began his work the string orchestra was pretty well established and its resources known. But the employment of the wood-wind was utterly planless. In 1760 Haydn was appointed director of music to Prince Paul Anton Esterházy. At first his orchestra numbered only 17 instruments, 6 violins and violas, 1 cello, 1 double-bass, 1 flute, 2 oboes, 2 bassoons, and 4 horns. In order to obtain the best effects from this little orchestra, the master directed all his energies to discover and make use of the true nature of the wood-wind. In his first symphony (1759) Haydn uses in addition to the strings (the violins being divided into *first* and *second*) only two oboes and two horns. In his last symphony (D major, written in London, 1795) the score calls for 2 flutes, 2 oboes, 2 clarinets, 2 bassoons, 2 horns, kettle-drums, and the regular strings. In two of his last works, the *Creation* (1798) and the *Seasons* (1801), Haydn employs 2 flutes, 2 oboes, 2 clarinets, 2 bassoons, 1 contra-bassoon, 2 horns, 2 trumpets, 3 trombones, kettle-drums, and the strings. And here we have the modern *symphony orchestra* (which, however, usually has four horns).

Mozart did not add any new instruments. His great merit is the development of the clarinets as permanent orchestral instruments. In fact, Haydn himself admits that he learned the use of not only the clarinets, but of several other instruments, from the considerably younger Mozart. Strange to say, Mozart does not employ clarinets in his *Jupiter Symphony*. In the score of the *G Minor Symphony* the clarinets were added later. In his first two symphonies Beethoven employs the same instruments as Haydn in his last, with the addition of two trumpets. In the *Eroica* (1803) Beethoven separates the celli and basses and introduces a third horn. In all subsequent symphonies the master continues to separate the celli and double-basses, but returns to the use of only two horns. In his last symphony, the *Ninth*, the orchestra is considerably increased. This score calls for 2 flutes, 1 piccolo, 2 oboes, 2 clarinets, 2 bassoons, 1 double-bassoon, 4 horns, 2 trumpets, 3 trombones, kettle-drums, cymbals, triangle, bass drum, and the regular strings. This is the *grand symphony orchestra* of to-day. All composers since Beethoven (Schubert, Schumann, Mendelssohn, Brahms, Tchaikowsky, Dvořák) have used it, the only addition being the *bass tuba* as the lowest instrument of the trombone choir.

The modern *opera orchestra* is still larger and employs many other instruments to obtain special characteristic effects. This colossal combination of instruments was developed by two men, almost independently of one another—Wagner and Berlioz. Wagner started with the

grand symphony orchestra of Beethoven. Since *Tannhäuser* (1845) the division of violins into four parts has been frequently employed. In *Tristan* Wagner divides the strings into no less than fifteen parts! Since *Lohengrin* (1850) the opera orchestra consists of three of each family of the wood-wind instruments. The number of flutes and bassoons is increased to three; to the two oboes is added the cor anglais (q.v.) (an alto oboe); to the two clarinets the bass clarinet. This increase naturally calls for an increase in the number of the strings. For the *Ring des Nibelungen* Wagner requires 3 large flutes, 1 piccolo, 3 oboes, 1 English horn, 3 clarinets, 1 bass-clarinet, 3 bassoons, 1 contra-bassoon, 8 horns, 3 trumpets, 1 bass trumpet, 2 tenor trombones, 1 bass trombone, 1 contra-bass trombone, 4 tubas (specially constructed for Wagner, 1 tenor, 2 bass, and 1 contra-bass), 6 harps, 2 pairs of kettle-drums, 1 glockenspiel, bass and snare drums, cymbals, tamtam, and even tuned anvils. It goes without saying that the number of strings must be in proportion. Wagner demands as a minimum 34 violins (18 first, 16 second). The demands made by Berlioz in his *Requiem* are unique. He calls for 4 flutes, 2 oboes, 2 clarinets, 8 bassoons, 12 horns, 4 cornets, 12 trumpets, 16 trombones, 4 ophicleides, and 8 pairs of kettle-drums, and indicates the strength of the strings by demanding 18 double-basses.

The following table shows the number of instruments composing some of the most celebrated orchestras of to-day:

	Gewandhaus, Leipzig	Philharmonie, Vienna	Philharmonie, London	Philharmonie, New York	Boston Sympho- ny, Boston	Conservatoire, Paris	Crystal Palace, London	Bayreuth Festi- val, 1876	N. Y. Festival, Theo. Thomas (1882)	Handel Festival, London (1884)
Flutes.....	2	2	2	3	3	4	2	3	6	8
Piccolos.....	1	1	1	1	1	1	1	1	2	6
Oboes.....	2	2	2	3	2	2	2	3	7	8
English horns.....	1	1	1	1	1	1	1	1	2	1
Clarinets.....	2	2	2	3	3	2	2	3	6	8
Bassoons.....	2	2	2	3	3	4	2	3	6	8
Double bassoons.....	1	1	1	1	1	1	1	1	2	2
Horns.....	4	4	4	4	4	4	4	8	11	12
Trumpets.....	2	4	4	3	4	2	2	3	14	6
Trombones and tubas.....	4	4	4	4	8	4	4	9	12	12
Harps.....	1	2	1	1	1	1	1	6	6	—
Violins (First).....	14	20	14	20	16	15	14	16	50	92
Violins (Second).....	14	20	12	16	14	14	14	16	50	85
Violas.....	9	6	10	14	10	10	10	12	36	57
Celli.....	12	12	10	14	10	12	10	12	36	58
Basses.....	6	10	8	14	8	9	10	8	40	48

Consult: Elson, *Orchestral Instruments and Their Use* (Boston, 1903); Henderson, *The Orchestra and Orchestral Music* (New York, 1899); Corder, *The Orchestra and How to Write for It* (London, 1896). See INSTRUMENTATION.

ORCHESTRATION. The art of scoring a musical composition for the different instruments of the orchestra. See INSTRUMENTATION.

ORCHESTRION, ōr-kēs'trī-ŏn (from *orchestra*). A mechanical instrument with powerful reed pipes. By skillful devices almost all the wind instruments of the orchestra are imitated. The idea was originally conceived by a Frenchman, M. de Saint Pern, in 1870. It was then perfected by F. T. Kauffmann, and is to-day extensively used in places of amusement instead of a regular orchestra.

ORCHID, ōr'kīd (from Lat. *orchis*, from Gk. ὄρχις, testicle, orchid, so called from the shape of the roots). The common name of members of the family Orchidaceæ, which has the most highly organized flowers among monocotyledons. Although beautiful orchids occur in the temperate regions, such as species of *Habenaria* (rein orchis), *Pogonia*, *Calopogon*, *Calypso*, *Cypripedium* (lady's slipper, moccasin-flower), etc., their chief display is in the tropics. There are more than 400 genera and a conservative estimate puts the number of species at 6000, while those that have been proposed amount to 10,000 or more. The flowers, which may be solitary, racemed, or spiked, are exceedingly irregular, and most elaborately adapted to the visits of insects, a fact discovered by Sprengel in 1793 and more widely proved by Robert Brown in 1833 and later verified in detail by Darwin, Müller, Gray, and others. (See POLLINATION.) The brilliant coloration of the flowers, some of which are fragrant, and their bizarre forms have made them much prized in hot-house cultivation. The most conspicuous structure of the flower is the so-called labellum or lip, which is one of the three petals. This lip is of the greatest importance in attracting insects, guiding them to the nectar, the pollen, and the stigma. In most orchids it is a conspicuous flat and more or less pendant organ, but in *Cypripedium* (lady's-slipper) it forms a sac which suggests the common name. Another conspicuous feature of the flower is the spur, which is really a prolongation of the base of the

labellum, and in the bottom of which the nectar is secreted. In a curious Madagascarean orchid the spur attains the length of 10 or 11 inches. A prominent technical character of the family is the fusion of the one or two stamens with the style or stigma, forming a central mass called the column. In general also the pollen is not granular, but the pollen grains cling together in one or more masses (pollinia), which are carried away by insects. The fruit is usually a capsule, the seeds are like fine sawdust in appearance, and are so numerous that a single capsule of a *Maxillaria*, it has been estimated, may contain more than 1,700,000. The root is usually composed of simple cylindrical fibres, which are often accompanied by one or more fleshy tubercles or bulbs, a tubercle dying and a new one being produced annually. The habits of orchids

are almost as varied as their floral structure, and upon this basis they are often grouped under these heads. Some are saprophytes, and have lost entirely the green color of independent plants, being usually of a brownish or yellowish hue, as the ordinary coralroots of the United States. Other orchids are epiphytes, and are found in the moist atmosphere of tropical or sub-tropical regions. On account of the special food reservoirs which they develop, they are distorted-looking plants, in general resembling coarse bulbs with not very attractive leaves, but their flowers are often exceedingly brilliant. Among the epiphytic orchids two forms of roots are developed, clinging roots by which attachment is secured, and aerial roots which hang down to absorb water for the plant. The third group comprises the terrestrial orchids, among which are some of the largest and many of the most prized forms. Orchids are found in all parts of the world except the coldest and the most arid, but are most numerous in the humid forests of the torrid zone, and especially in Mexico and Central and South America, which furnish such well-known genera as *Cattleya*, *Odontoglossum*, and *Oncidium*. *Calypso borealis* ranges in British America, as far north as latitude 68°.

Fully 3000 species are under cultivation, while the hybrids and varieties are innumerable. In the United States, including Alaska, there are about 75 species, distributed in 20 genera, and of these, seven or eight, belonging to the genus *Epidendrum*, and found in Florida and other Gulf States, are epiphytes, all the other species being terrestrial. Few genera except *Salep* and *Vanilla* have a commercial value aside from culture as ornamentals. The prevailing colors of orchids are rose, or lilac, yellow, white, and green. The odor of some species resembles that of violets or orris-root. Of North American orchids a number are very striking, especially *Arethusa bulbosa*, *Pogonia ophioglossoides*, the purple, white, and the yellow fringed orchids or *habenarias*, and the showy, the yellow, and the pink lady's-slippers (*Cypripedium*).

The culture of orchids began in England about 1820, but did not become general in the United States before 1865. There are many fine public and private collections of growing orchids, and almost fabulous prices have been paid for single rare specimens. Many epiphytal orchids may be planted in pots filled with loose fibrous peat; the roots of others are placed in baskets or are fastened to blocks of wood or cork, with a little moss around them to retain moisture, and are thus placed on shelves, or are suspended from the roof of the hot-house. Ventilation and temperature must be carefully attended to, and the atmosphere must not be constantly very hot and humid, but seasons of rest must be given to the plants, since in their native climate they have generally a wet and a dry season. Most of the American species can be easily grown in shaded gardens.

Consult: Lindley, *Folia Orchidacea* (London, 1852); Darwin, *The Fertilization of Orchids by Insects* (ib., 1862); Müller, *The Fertilization of Flowers* (trans., ib., 1883); Sander, *Reichenbachia, Orchids Illustrated and Described* (Berlin and London, 1880); Moore, *Illustrations of Orchidaceous Plants* (London, 1857); Warner, *Orchidaceous Plants* (ib., 1877-78); Burbidge, *Cool Orchids and How to Grow Them* (ib.,

1874); Williams, *The Orchid-Grower's Manual* (ib., 1885); Jennings, *Orchids* (ib., 1874); Miner, *Orchids, the Royal Family of Plants* (Boston, 1884); Linden, *Les orchidées exotiques et leur culture* (Brussels, 1894); Bohnhos, *Dictionnaire des orchidées hybrides* (Paris, 1895); Cogniaux, *Dictionnaire d'iconographie des orchidées* (Brussels, 1897); Rand, *A Complete Manual of Orchid Culture* (Boston, 1888).

ORCHIL. See **ARCHIL.**

ORCHOMENUS (Lat., from Gk. Ὀρχομενός). A famous ancient city of Bœotia, situated on a spur of Mount Acontium, on the northwest shore of Lake Copais. It seems to have played a great rôle in legendary times as capital of the Minyæ and chief city of Bœotia. A relic of this early age is the bee-hive tomb, or Treasury of Minyas, a work of the Mycenaean civilization, and but little smaller than the Treasury of Atreus at Mycenæ. (See **ARCHÆOLOGY.**) It was excavated by Schliemann in 1880 and 1886. After the Bœotian conquest Orchomenus was a member of the confederacy, and second only to Thebes. In the fourth century B.C. it appears as bitterly hostile to Theban supremacy and in close alliance with Sparta. In consequence after the battle of Leuctra (B.C. 371) the Thebans destroyed the city and sold the inhabitants into slavery (B.C. 368); restored by the Phocians, it was again destroyed in B.C. 346. Rebuilt by Philip or Alexander of Macedon, it continued to exist in Roman times. Orchomenus was chiefly noted for its worship of the Charites or Graces, here ancient and powerful goddesses of light and bringers of fruitfulness. Their festival, the Chari-tesia, was accompanied by musical and poetic contests, of which records are preserved in inscriptions containing the names of the victors. The remains of the ancient walls and the small castle which crowned the Acropolis are still well preserved, and are fine examples of the best period of Greek fortification. Consult: K. O. Müller, *Orchomenos und die Minyer* (Breslau, 1844); Leake, *Travels in Northern Greece*, ii. (London, 1835); Schliemann, *Orchomenos* (Leipzig, 1881; translated in *Journal of Hellenic Studies*, ii. 1881); Schuchhardt, *Schliemann's Excavations* (London, 1891); Frazer, *Pausanias*, v. (ib., 1898). (2) Orchomenus was also the name of a town in Northeastern Arcadia, represented in the legends as of much importance during the heroic age, but of little importance in later times. Its situation on a lofty hill commanding the roads from Mantinea to the north made it a position of some strategical value during the time of the Macedonian wars and the Achæan League.

ORCIN (from *orchil*, *archil*, from OF. *orchel*, *orcheil*, *orceil*, Fr. *orseille*, It. *orcella*, *oricello*, *archil*; of uncertain origin), $C_7H_5O_2 + H_2O$. A colorless substance contained in the lichens from which the commercial coloring matters *archil* and *litmus* (qq.v.) are made. It has a sweetish nauseating taste, but no odor, and is soluble in water, alcohol, and ether. In the hydrated state it melts at 58° C.; in the anhydrous state at 108° C. Its chemical constitution is represented by the formula $C_6H_4(CH_3)(OH)$, showing it to be a di-oxy-toluene. Besides being contained in the lichens ready-formed, it is produced in considerable quantities from the *orcellinic acid* contained in the lichens when the latter are heated

AMERICAN ORCHIDS



- 1 CALYPSO - CALYPSO BOREALIS
- 2 MOCCASIN FLOWER - CYPRIPEDIUM HUMILE
- 3 LADIES' TRESSES - SPIRANTHES CERNUA
- 4 SNAKEMOUTH - POGONIA OPHIOGLOSSOIDES

- 5 GRASS PINK - CALOPOGON PULCHELLUS
- 6 RATTLESNAKE PLANTAIN - GOODYERA REPENS
- 7 YELLOW FRINGED ORCHID - HABENARIA CILIARIS
- 8 PURPLE FRINGED ORCHID - HABENARIA FIMBRIATA

with lime. It has also been prepared artificially. When exposed to the simultaneous action of ammonia and oxygen, orcin is transformed into orcein (q.v.).

OR'CUS. The Latin name of Hades.

ORD, EDWARD OTHO CRESAP (1818-83). An American soldier, born at Cumberland, Md. He graduated at West Point in 1839, was commissioned a second lieutenant in the Third Artillery, and sent to Florida, where he took part in the Seminole War (1839-42). During the war with Mexico he performed garrison duty at Monterey, Cal. (1847-49), and in 1850 was promoted to be captain. During the following years he was engaged on frontier duty, and saw much active service against the Indians, but in 1859 he was ordered to the East and took part in the capture of John Brown at Harper's Ferry. At the outbreak of the Civil War he was commissioned brigadier-general of volunteers and defeated Gen. J. E. B. Stuart at Dranesville (December 20, 1861). He was promoted to be major-general of volunteers on May 2, 1862, and soon afterwards sent to the West, where he commanded the left wing of Grant's army. For his services at the battle of Iuka (September 19, 1862), he was brevetted colonel in the Regular Army. On July 21, 1864, he was appointed commander of the Eighteenth Army Corps, and took part in the Richmond campaign, but was wounded at the capture of Fort Harrison (September 29, 1864), and was on sick leave until December. For his gallantry on this occasion, he was brevetted major-general in the Regular Army (March 13, 1865), and after his recovery was given command of the Department of Virginia. It was largely owing to his skill and energy that Lee's troops were finally headed off and compelled to surrender. He was commissioned brigadier-general in the Regular Army in 1866, and soon afterwards was mustered out of the volunteer service. He retired in 1880, and the next year by special act of Congress was commissioned major-general.

ORDEAL (AS. *ordēl*, *ordāl*, OHG. *urteil*, Ger. *Urteil*, decision, judgment, from AS. *ā*, OHG. *ar*, *ir*, *ur*, Ger. *er*, out + AS. *dæl*, Goth. *dails*, *daila*, OHG. *teil*, Ger. *Teil*, part, connected with OChurch Slav. *dělu*, part). A practice, which has prevailed among various widely separated nations, of referring disputed questions, particularly such as relate to the guilt or innocence of an individual, to the judgment of God, determined either by lot, or by the success of certain experiments. Of its existence among the ancient Jews we have an instance in Numbers v., where a Hebrew woman, accused of adultery, is required to drink the 'bitter water' as a test of innocence; a similar ordeal for incontinence is said to be in use among the natives of the Gold Coast of Africa. The practice of ordeals as existing among the Greeks is referred to in Sophocles's *Antigone*. Among the Hindus the ordeal has been practiced in nine different ways—by the *balance*, by *fire*, by *water*, by *poison*, by the *cosha*, or drinking water, in which images of the sun and other deities had been washed, by *chewing rice*, by *hot oil*, by *red-hot iron*, and by drawing two images out of a jar into which they have been thrown.

The Celts in Ireland, the Germans before their conversion, and the early Slavs made use of ordeals. After their conversion to Christianity

they employed ordeals with the full sanction of the Church. In the early Middle Ages there was no trial in the modern sense of the word. The accused was required to prove his innocence by compurgation (q.v.), the wager of battle (q.v.), or an ordeal. In the wager of battle and the ordeal of the cross (see below) both plaintiff and defendant were put to the proof, but in all other ordeals and in compurgation the burden of proof rested upon the negative. Christian rites took the place of pagan ceremonies and God was called upon to show the truth. The forms most commonly employed were the ordeals of boiling water, of fire, of red-hot iron, of cold water, of the cross, of the *corsned*, and of the eucharist.

In the ordeal of boiling water the accused was obliged to insert his hand into a caldron of boiling water. Sometimes he had to take out a small object; in some cases he put in his hand only as far as the wrist; in the triple ordeal, as far as the elbow. After the trial the hand was sealed up for three days. Innocence or guilt was held to be proved by its condition when unsealed. In the ordeal of fire, the original custom may have been that the accused placed his hand in the fire. Later two piles of wood were laid a short distance apart and then were set on fire. The accused walked between the two. In such cases it is probable that fifteen days were allowed to the accused before his injuries were inspected. The genuineness of relics was often tested by this ordeal. The ordeal of red-hot iron was employed in two forms. In one case 6, 9, or 12 red-hot plowshares were placed on the ground, among which the accused walked blindfolded, and his innocence was shown by his avoidance of them; or he was compelled to step on each. In the second form the accused was compelled to carry a red-hot iron, usually for a distance of nine feet. This ordeal was generally chosen by persons of rank. The ordeal of cold water rested upon the belief that the water when sanctified by religious rites would refuse to receive the guilty, while the innocent would sink. This method long remained in use for witches. In the ordeal of the cross, both accuser and accused stood with uplifted hands before a cross and the one who kept his position longest won. This was prohibited by the Emperor Louis the Pious (814-40), but was frequently employed. The *corsned* was in use by the Anglo-Saxons and was carried out by giving the accused a piece of bread or cheese to swallow. If he was successful he was innocent. The ordeal of the eucharist was similar. In all of the forms the ordeal was administered only after special religious services.

Other kinds of ordeal were practiced under particular circumstances in different parts of Europe. In the ordeal of the *bier*, a supposed murderer was required to touch the body of the murdered person, and was pronounced guilty if the blood flowed from his wounds.

Trial by ordeal at first carried with it the sanction of the Church, as well as of the civil power, though the clergy in the course of time came to discountenance it. At the fourth Lateran Council in 1215 ecclesiastical ceremonies at ordeals were absolutely forbidden. Secular rulers followed the Pope's example in condemning the ordeal, and it was abandoned generally in the thirteenth century, although, as noted above, cer-

tain isolated usages long prevailed. Consult: Schlagintweit, *Gottesurtheile* (Munich, 1864); Lea, *Superstition and Force* (4th ed., Philadelphia, 1892); Patetta, *Le ordalie* (Turin, 1890); Brunner, *Deutsche Rechtsgeschichte* (Leipzig, 1892); Thayer, *Preliminary Treatise on Evidence*, etc. (Boston, 1896).

ORDER (Lat. *ordo*, row, series, orderly arrangement; connected with *oriri*, Gk. *ὀρνύμι*, *ornynai*, Skt. *ar*, to rise). A term used for a group of plants or animals in classification (q.v.).

ORDER. A term used in classic and neo-classic architecture to designate the fundamental characteristics of each architectural style as marked by a vertical section of the façade consisting of a column (q.v.) with its entablature (q.v.). The Greeks were familiar with two orders: the *Doric* and the *Ionic*; the *Corinthian*, though also invented by them, hardly attained to the dignity of an order until Roman times. The *Tuscan* was a variant of the *Doric*, invented by the Etruscans and other early Italian races, and perpetuated by the Romans. The *Composite* was a novelty of the Roman Imperial period, combining *Ionic* and *Corinthian* characteristics in a rich design pleasing to the Roman love of ornament. See **COLUMN**.

ORDERLY. In the United States Army, the term applied to officers or soldiers engaged in the transmission of orders from a superior officer to the details of his command. Duty rosters are kept by the regimental adjutant, regarding the detail of orderly officers, and by the regimental sergeant-major as regards the detail of non-commissioned officers. The orderly officer, or officer of the day, is the officer detailed for the superintendence of the interior economy of the command. (See **GUARD**.) In the company the first sergeant performs the duties of orderly sergeant. A guard orderly is a specially selected private soldier who is detailed from the guard for duty as commanding officer's orderly. A stable orderly is a soldier detailed for special stable duty under the stable sergeant. In the British Army, as in practically all other European armies, the duties of orderly officers are identical with those of the United States. Orderly sergeants, however, are detailed to attend orderly officers during their tour of duty, as are also orderly corporals. Company orderly sergeants are the duty sergeants of a company, who are detailed for duty with their companies, taking turn, week about, notifying and preparing men for duties, parades, or fatigues, and calling the roll of their companies on parade and in quarters. They are assisted by company orderly corporals, who accompany them when notifying men for duty and at roll call, and who also have the separate duty of superintending the drawing of the daily rations of their companies. This latter duty is performed by the orderly men, who are private soldiers detailed daily, to protect and keep in order the room or mess of which they are members, and in various ways assist the company cook.

ORDERS. Under the general title of orders are usually included monastic orders, orders of chivalry, and orders of merit. There is a certain connection between the first two, as the members of the earliest orders of knights took monastic vows. Again, there is a connection between the last two, as formerly persons distinguished by

meritorious service were sometimes, even when not noble, admitted to an order of knights, and gradually membership in these orders became wholly an honorary distinction. Thus, in spite of the vast difference between an ancient monastic order and the present 'Legion of Honor,' it is possible to see the evolutionary process which included under a common designation such widely different organizations.

Monastic orders were the earliest and became very important in the Middle Ages. Under the general term 'monastic' may be included the various orders of canons, such as the Premonstratensians (q.v.), as well as of monks and nuns. Of these orders many are no longer in existence, but the total number, of those extant and extinct, is over five hundred; of these about one hundred and seventy-five adopted the Rule of Saint Augustine; about one hundred and twenty-five the Rule of Saint Benedict; and about seventy-five the Rule of Saint Francis; the others adopted various special rules. For a fuller discussion of monastic orders, see **MONASTICISM**; **CANON**; and the names of the several orders.

Orders of knighthood are comparatively modern in their origin, although some have attempted to ascribe to certain ones great antiquity. In the ancient societies there was nothing of a similar nature. The 'equestrian order' or the 'order of decurions' in Rome was entirely different. (See **ROME**, **HISTORY**.) It was believed formerly that Clovis had founded in the fifth century an Order of the Holy Graal, but this is purely legendary. Equally mistaken is the attempt to attribute the beginnings of the orders of chivalry to Charles Martel, who was said to have established the Order of the Genette in 726. The romances of chivalry usually attributed the creation of knightly orders to Charles the Great or King Arthur; but the 'twelve peers of Charlemagne' and the 'Knights of the Table Round' are equally mythical. The mediæval orders, in reality, had their beginning in the Holy Land during the time of the Crusades. The Knights of the Hospital and the Knights of the Temple were the earliest orders, and were alike in requiring their members to be of noble birth, and also to take the three monastic vows of poverty, chastity, and obedience. (See **SAINT JOHN OF JERUSALEM**, **KNIGHTS OF**; **TEMPLARS**.) These religious military orders became very renowned and gained enormous wealth. Their example led to the foundation of other similar orders for the protection of the Holy Land. In all there were about twenty which originated in the Kingdom of Jerusalem. Later some transferred their sphere of action to crusades against the heathen in the West, or to service in the Papal armies. As their members were bound by no national ties, they were of great service to the Church in its wars. The destruction of the Templars and the temporal weakness of the popes in the fourteenth century led to a decline in the importance of these religious orders. Those which still exist, as the Hospitalers do under the name of the Knights of Malta, are merely honorary orders of nobility.

On the other hand, the rise of strong monarchs in the period of the Renaissance led to the creation of royal and noble orders whose members were selected by the kings. By this means the rulers were enabled to confer honorary distinc-

tion upon their favorites, and to bind closely to their own fortunes members of the nobility. Since the age of the Renaissance many orders have been created by monarchs to reward services or merit.

These orders may be classified as royal orders, noble or family orders, and orders of merit; but the last two are scarcely distinguishable in some respects. The royal orders, such as the Garter, the Golden Fleece, or the Black Eagle, are sometimes known as the 'Prime Orders of Christendom.' Membership is usually reserved for persons of royal stock and those who are of the most eminent rank in the European kingdoms. Noble orders, such as Calatrava or Montesa, are few in number, and their members are usually selected from the higher nobility. Family orders, such as the Royal Victorian or the Hohenzollern, are composed of those who have in some way rendered especial service to the reigning family from which the order takes its name. Orders of merit, such as the Bath, Pour le Mérite (in Prussia), or the Legion of Honor, are intended to recompense especially meritorious service of any kind.

Of late years there has been an enormous increase in the number of orders which are now purely honorary. The custom has spread from European countries to Asia, Africa, and the Pacific islands. Probably a majority of the civilized or semi-civilized countries of the world now have one or more orders intended to confer distinction upon their own citizens, but also awarded at times to foreigners who are favorites of the sovereign, or have performed some especial service to the country, or are noted for their conspicuous scientific ability. The *Almanach de Gotha* enumerates more than three hundred and fifty in the different countries of the world; but this list contains some agencies established for the recognition of merit which are not, properly speaking, orders. Thus the Medal of Honor established by the United States in 1862 does not confer upon its possessor membership in an order. In fact, in the United States there are no real orders, with the possible exception of the Cincinnati. The patriotic societies and the many organizations which have taken the name of orders could not be included among orders as usually defined; they are all, even the Cincinnati, omitted from the list in the *Almanach de Gotha*. (See PATRIOTIC SOCIETIES.) Neither is the Victoria Cross, awarded in Great Britain for conspicuous bravery, the insignia of an order. In comparatively recent times several orders, including the Royal Order of Victoria and Albert and the Imperial Order of the Crown of India, have been created especially for women.

The great orders usually have only one class; other orders commonly have three classes: Knight Grand Commanders (K.G.C.) Knight Commanders (K.C.), and Companions (C.). Sometimes an order contains more classes, as the Royal Victoria, founded in 1896, which has five classes, designated, respectively, as G.C.V.O., K.C.V.O., C.V.O., and M.V.O. The last constitutes the fourth and fifth classes; although they are all entitled 'members,' the insignia of those who belong to the fourth class is different from that of the fifth class. The Order of Merit, instituted by Edward VII. in 1902, contains but one class. The insignia naturally vary

greatly in the different orders, but almost all consist of either stars, crosses, or ribbons. The K.G.C. frequently, if not usually, have a cross or star on a ribbon worn over the shoulder. The K.C. have a star or other badge, but the ribbon is worn about the neck. The Companions have a badge, but no star or cross. These rules do not hold good for all orders, but they represent ordinary usage in European countries.

Membership in orders is highly prized, but in some countries, especially the United States and France, restrictions are placed upon the acceptance by citizens of such distinctions. By the Constitution of the United States no one holding an office of profit or trust under the Government is allowed, without the consent of Congress, to accept any decoration from a monarch or foreign State. In France, since 1815, although the law has been repeatedly modified, no citizen can be a member of a foreign order unless he receives the authorization of the Government.

The following is a list of the principal orders of the world. Those marked with the asterisk are described in their alphabetical order in this Encyclopædia.

ABYSSINIA.

**Seal of Solomon*.

ANHALT.

Albert the Bear.—An order with five classes, founded by the reigning dukes in 1836. The oval decoration shows a crowned bear mounting a wall, with the motto, *Fuerchte Gott und Befolge seine Befehle*.

Order of Merit for Science and Art.—Founded by Duke Frederick in 1873 and affiliated with the Order of Albert the Bear in 1895.

ARGENTINA.

Argentine Sun.—An order of unknown origin. The decoration is a golden medal, with the sun surrounded by a laurel wreath.

AUSTRIA-HUNGARY.

**Golden Fleece*. See also Plate of ORDERS.

**Maria Theresia*.

**Saint Stephen*. See also Plate of ORDERS.

**Leopold*.

Iron Crown.—A civil and military order, founded by Francis I. in 1816. The decoration is the iron crown of Lombardy under the double-headed Austrian eagle bearing upon its breast a shield of blue enamel with the initial F.

Franz Joseph.—A civil order of merit, founded in 1849 by the Emperor Francis Joseph. The decoration is a red cross with the double-headed eagle, the initials F. J., and the motto *Viribus Unitis*.

Elisabeth-Theresia.—A military order, founded in 1750 by the Empress Elizabeth Christina and reorganized by Maria Theresa in 1771. The order was instituted for twenty generals and colonels, and was conferred after thirty years' service in the Imperial army. It carries with it a yearly pension. The decoration is an eight-pointed star bearing the initials E. C. and M. T. in an oval, with the inscription *Maria Theresia Parentis Gratiam Perennem Voluit*.

Star and Cross.—An order for women of the old nobility, founded in 1668 by the Empress Eleonore to commemorate the recovery of a relic which had been lost.

**Teutonic Knights*.

Military Order of Merit.—An order founded by Emperor Francis Joseph in 1849.

Civil Order of Merit.—An order founded by Emperor Francis Joseph in 1850.

Order of Merit for Science and Art.—An order founded by Emperor Francis Joseph in 1887.

BADEN.

Order of Fidelity.—An order with one class, founded in 1715 by the Margrave Charles William, and conferred on foreign princes and State officials of high rank. The decoration is a cross of red enamel with eight points, the arms connected by intertwined C's, which appear also on the central white field above three rocks, with the legend *Fidelitas*.

Charles Frederick.—A military order of merit, with three classes, founded in 1807 by Charles Frederick, Grand Duke of Baden. The decoration consists of an eight-pointed cross of white enamel within a laurel wreath. The medallion bears the initials of the founder and the legend *Für Badens Ehre*.

Lion of Zähringen.—An order of merit, established by Grand Duke Charles Louis in 1812 and reorganized in 1877. The central shield of the decoration bears the ancestral castle of the family.

BAVARIA.

**Saint Hubert.*

**Saint George.*

**Saint Elizabeth.*

**Max Joseph.*

Bavarian Crown.—A civil order of merit, founded in 1808 by King Maximilian I. It is given to State officials of all classes, and confers noble rank on the recipient. Foreigners who have rendered service to Bavaria are also eligible for the order. The decoration is a white cross with eight arms bearing the inscription *Virtus et Honor*.

**Saint Michael.*

**Maximilian.*

**Louis.*

**Theresa.*

Cross of Merit.—A distinction for voluntary services to the army during the years 1870 and 1871, founded in 1871 by King Louis II.

Military Order of Merit.—An order founded in 1866 by King Louis II.

BELGIUM.

**Leopold.* See also Plate of ORDERS.

African Star.—An order founded in 1888 by King Leopold II. as a distinction for services to the Congo State and to African civilization in general. The decoration, a five-pointed star with laurel wreath, bears the legend *Travail et Progrès*.

Order of Merit.—A civil order, founded in 1867 by Leopold II. for civic virtue, and for bravery and self-sacrifice.

BRAZIL.

**Southern Cross.*

Order of Dom Pedro I.—An order founded by Dom Pedro I., Emperor of Brazil, in 1826, and suspended in 1889. It had three classes, the first of which was limited to crowned heads and restricted to 12 members, the other two classes being limited to 150. The decoration was a white cross with five arms on a golden five-rayed star.

**Rose.*

Order of Christ.—A Portuguese order, nationalized in Brazil in 1823. In 1843 it lost its religious character and became a civil order conferred for services rendered by natives and foreigners. It was dissolved in 1890. See CHRIST, ORDER OF.

Aviz.—Originally the Portuguese order of the same name extended to Brazil in 1823. The decoration is the same as that of the Portuguese order. See AVIZ.

**Saint James.* See SAINT JAMES OF THE SWORD.

BRUNSWICK.

Henry the Lion.—A civil and military order of merit, founded in 1834 by Duke William. The decoration is an eight-pointed cross of blue enamel, with red centre, bearing a pillar and a leaping horse in white. The arms of the cross bear peacock feathers and are separated by a W surmounted by a lion. The decoration is suspended by a lion and a crown from a red ribbon. The inscription is *Immota Fides*.

BULGARIA.

Alexander.—(1) A military order of merit, founded by Prince Alexander in 1881. The decoration, an eight-pointed white cross, with crossed swords between the arms, bears the Bulgarian lion on a red field, with the inscription *Za Chrabrost* (for courage), and the monogram of the Prince. (2) An order of civil merit, founded by Prince Alexander in 1879. The decoration is an eight-pointed white cross bearing in a red field the legends *Saint Alexander* and *God With Us*.

Order of Merit.—An order founded in 1891 by Prince Ferdinand.

CHINA.

**Double Dragon.* See also Plate of ORDERS.

Order of the Precious Star.—An order with three classes.

Order of Merit.—A civil order, with three classes.

CONGO FREE STATE.

**African Star.* See above under BELGIUM.

DENMARK.

**Elephant.*

**Danebrog.* See also Plate of ORDERS.

FRANCE.

**Legion of Honor.* This is the only existing order in France. So also Plate of ORDERS.

**Annunciation.* See ANNUNCIATION.

**Saint Louis.*

Our Lady of Mount Carmel.—An order founded by Henry IV. The Order of Saint Lazarus in France was later attached to it.

Military Order of Merit.—An order founded by Louis XV. in 1759 for Protestants who could not enter the Order of Saint Louis. It became extinct in 1830.

**Saint Esprit.* See HOLY GHOST, ORDER OF.

**Saint Michael.*

**Saint Lazarus.*

GREAT BRITAIN.

**Garter.* See also Plate of ORDERS.

**Thistle.*

**Bath.* See also Plate of ORDERS.

**Saint Patrick.*

**Saint Michael and Saint George.* See also Plate of ORDERS.

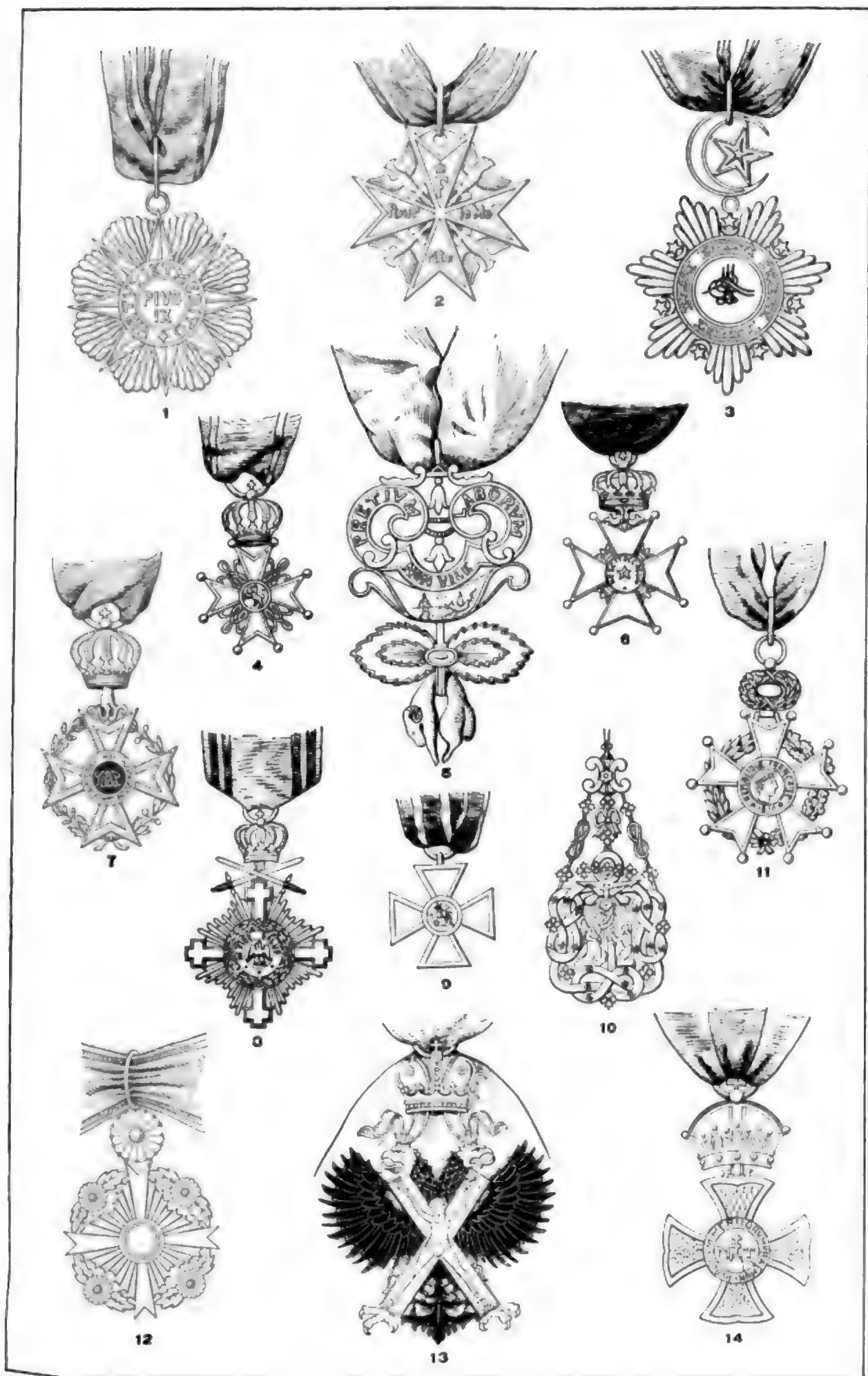
**Victoria and Albert.*

**St. Catherine.*

**Distinguished Service Order.*

**Victoria Cross.* See also Plate of ORDERS.

ORDERS I.



1. PIUS IX., PAPAL
2. POUR LE MERITE, PRUSSIA
3. MEDJIDIE, TURKEY
4. LION NETHERLANDS
5. GOLDEN FLEECE AUSTRIA

6. NORTH STAR, SWEDEN
7. LEOPOLD I., BELGIUM
8. STAR OF RUMANIA
9. ST. GEORGE, RUSSIA
10. ANNUNCIATION, ITALY

11. LEGION OF HONOR, FRANCE
12. CHRYSANTHEMUM, JAPAN
13. ST. ANDREW, RUSSIA
14. ST. STEPHEN, HUNGARY

**Red Cross.*

**Star of India.*

Imperial Order of the Indian Empire.—An order founded in 1878 by Queen Victoria on assuming the imperial title.

Imperial Order of the Crown of India.—An order for women, including natives of India, founded by Queen Victoria in 1878.

Order of British India.—An order, with two classes, founded by Queen Victoria in 1837.

Order of Merit for Native Soldiers.—An order with four classes, founded by Queen Victoria in 1887.

Military Order for Natives of British India.—An order founded in 1842.

**Royal Victorian Order.*

Order of Merit. See MERIT, ORDER OF.

GREECE.

**Redeemer.* See also Plate of ORDERS.

GUINEA.

Black Star.—An order founded by King Tossa in 1890.

HANOVER.

**Saint George.*

**Guelphic Order.*

Order of Ernest Augustus.—A royal military and civil order, established by King George V. in 1865. The decoration is a silver star with eight rays, the monogram E.A. appearing on a red ground, surrounded by a blue band with the motto *Suscipere et Finire*, and a white cross with a similar medallion. The decoration is conferred for services to the country or King, and for distinction in science and art.

HAWAII.

**Kamehameha.*

Kalakaua.—An order of four classes, founded in 1874 by Kalakaua.

Kapiolani.—An order of six classes, with a special class for women, founded in 1880 by Kalakaua. The decoration is an eight-pointed cross of red enamel, surmounted by a crown, with similar crowns between the arms. A central plaque of red bears on a white border the legend *Kulia*.

Hawaiian Crown.—An order with four classes, founded by Kalakaua in 1882.

**Star of Oceania.*

HESSE.

**Louis.*

**Philip the Magnanimous.*

**Lion.*

Military Service Cross.—A decoration founded in 1870 by Grand Duke Louis III. for men and women. The cross bears the inscription *For Care of Soldiers, 1870*.

**William.*

HONDURAS.

**Santa Rosa.*

INDIA.

See above under GREAT BRITAIN.

ITALY.

Annunziata. See ANNUNCIATE; also Plate of ORDERS.

**Mauritius and Lazarus.*

Civil Order of Savoy.—An order with one class, founded by King Charles Albert of Sardinia in 1831. It was included among the Italian orders in 1860.

Military Order of Savoy.—An order with four classes, founded by King Victor Emmanuel I. of Sardinia in 1815.

Crown of Italy.—An order commemorating the union of Italy, founded by Victor Emmanuel II. in 1868. The decoration is a white cross, with the iron crown of Lombardy, the black eagle, and the cross of Savoy.

JAPAN.

**Rising Sun.*

Chrysanthemum Order.—An Imperial order conferred only on monarchs and the highest State officials, founded in 1876 by the Mikado. The decoration is a star with 32 white rays with four chrysanthemums between green leaves. The obverse of one of the flowers bears the inscription, "Exalted deeds and honorable actions." See Plate of ORDERS.

Order of the Sanctified Treasure.—An order with eight classes, founded by the Mikado Mutsu Hito in 1888.

LIBERIA.

African Liberation.—An order with three classes, established by the Legislative Assembly in 1879.

LUCCA.

Saint George.—A military order of merit, founded in 1833 by Charles Louis, Duke of Lucca.

Saint Louis.—A civil order of merit, founded in 1836 by Charles Louis, Duke of Lucca.

LUXEMBURG.

**Oak Crown.*

Golden Lion.—An order founded in 1858 by Duke Adolph of Nassau and King William III. of the Netherlands. It consisted originally of only one class, but later was divided into five, and now exists only as an order of Luxemburg with one class. The white cross, the arms of which are separated by golden N's, has a central blue medallion with the lion; on the reverse the motto, "Je maintiendrai." The ribbon is orange with blue stripes.

Adolph of Nassau.—A military and civil order with five classes and two crosses, founded by Duke Adolph in 1858.

MECKLENBURG.

Order of the Griffin.—An order of merit, instituted in 1884 by Grand Duke Frederick Francis III. of Mecklenburg-Schwerin. The insignia are an eight-pointed red cross with a golden medallion bearing a griffin, and an eight-pointed silver star with the legend *Altior Adversis*.

**Wendish Crown.*

Military Order of Merit.—An order with two classes, founded in 1848 by Grand Duke Frederick Francis II. of Mecklenburg-Schwerin.

Military Order of Merit.—An order founded in 1871 by Grand Duke Frederick William of Mecklenburg-Strelitz.

MEXICO.

Order of Guadalupe.—An order commemorating Mexican independence, founded by Iturbide, restored in 1853 by President Santos, and reorganized in 1865 by Emperor Maximilian, after whose death it expired. The cross had an oval green medallion with the image of Our Lady of Guadalupe, and the inscription *Religion, Independencia, Union*; on the reverse *Al merito y virtudes*.

**Mexican Eagle.*

**San Carlos.*

MODENA.

Order of the Eagle of Este.—An order with three classes, founded by Duke Francis V. in 1855.

MONACO.

**Saint Charles.*

MONTENEGRO.

Order of Saint Peter.—A house order with one class, founded by Prince Danilo I. in 1852.

Danilo Order.—A military and civil order with four classes, founded in 1855 by Prince Danilo I. The cross bears the initials of the Prince, the inscriptions, "Prince of the Black Mountains," "For the independence of the Black Mountains," and the date, 1852-53. The grand cross is conferred only on princes.

NETHERLANDS.

**William.*

**Netherland Lion.* See also Plate of ORDERS.

**Orange-Nassau.*

NORWAY.

See below under SWEDEN AND NORWAY.

OLDENBURG.

Order of Duke Peter Frederick Louis.—A civil and military order, founded by Grand Duke Frederick Augustus in 1838. The decoration, a white cross, has a blue medallion with the monogram P. F. L., surrounded by a red band with the inscription *Ein Gott, Ein Recht, Eine Wahrheit.*

PAPAL.

Holy Sepulchre.—See HOLY SEPULCHRE, KNIGHTS OF THE.

**Golden Spur.*

Christ. See CHRIST, PAPAL ORDER OF.

**Saint Gregory.*

**Pius IX.* See also Plate of ORDERS.

**Pro Ecclesia et Pontifice.*

PARMA.

Constantine Order of Saint George. See SAINT GEORGE, CONSTANTINE, ORDER OF.

Saint Louis.—A civil and military order of merit, founded in 1849 by Charles III., Duke of Parma.

PERSIA.

Order of Aali.—An order with one class, founded by Feth Aali Khan in 1808.

Order for Women.—An order with one class, founded in 1873 by Shah Nasr-ed-Din.

**Sun and Lion.* See also Plate of ORDERS.

PORTUGAL.

**Ariz.*

Christ. See CHRIST, ORDER OF THE KNIGHTS OF; also Plate of ORDERS.

Saint James. See SAINT JAMES OF THE SWORD.

Order of the Castle and Sword.—An order founded in 1459 by Alfonso V. and reorganized in 1832 by Dom Pedro. The order is conferred upon foreigners as well as natives for merit, bravery, and distinguished services. The decoration is a five-pointed white cross, having between the upper arms a tower, by which it is suspended. On the medallion is a sword in an oak wreath. The reverse bears an open book. The inscriptions are *Valor, Caldade, Merito, and Pelo Rei e pela Lei.*

Our Lady of Villa Rica.—An order of merit, founded in 1819 in Rio de Janeiro by King John VI. The decoration is a nine-pointed star with the inscription *Padroeira do Reino.*

**Saint Isabella.*

PRUSSIA.

Black Eagle. See EAGLE, BLACK; also Plate of ORDERS.

Red Eagle. See EAGLE, RED.

**Pour le Mérite.* See also Plate of ORDERS.

Prussian Crown.—An order with four classes, founded in 1861 by King William I. in commemoration of his coronation. The cross bears the royal crown with the inscription *Gott mit uns.*

Hohenzollern.—A civil and military order of merit of the princely house of Hohenzollern, founded in 1841 by the princes Frederick William Constantine and Charles Anthony. It was under Prussian protection, and when Hohenzollern was united with Prussia was made in 1851 a royal order with two branches. The Prussian order has four classes. Its decoration consists of a black and white cross, and an eagle, each with the device *Vom Fels zum Meer*, and the date, January 13, 1851. The princely order has four classes, with a golden eight-pointed cross enameled in white and black as a decoration, with the motto, *Für Treue und Verdienst.*

**Iron Cross.* See also Plate of ORDERS.

**William.*

**Luise.*

Cross of Merit.—A distinction conferred on women for services during the War of 1870-71, founded by Emperor William I., in 1871.

RUMANIA.

**Star of Rumania.* See also Plate of ORDERS.

Order of the Crown.—An order with five classes, founded in 1881 by King Charles I. It commemorates the elevation of Rumania to a kingdom.

Order of Elizabeth.—An order with one class, founded by Queen Elizabeth in 1878.

RUSSIA.

**Saint Andrew.* See also Plate of ORDERS.

**White Eagle.*

**Saint Catherine.*

**Saint Alexander Nevski.*

**Saint Ann.*

**Saint Stanislas.*

**Saint George.* See also Plate of ORDERS.

**Saint Vladimir.*

**Red Cross.*

SAXONY.

**Rue Crown.*

**Saint Henry.*

Order of Merit.—A royal order, founded by Frederick Augustus I. in 1815, with five classes.

Albert Order.—A royal order with four classes, founded by Frederick Augustus II. in 1850. It is conferred for services to the State, for civil merit, science, and art. The white cross bears a portrait of Duke Albert the Bold of Saxony (1443-1500), founder of the Albertine line, surrounded by the inscription *Albertus Animosus*, and the Saxon arms with the date 1850.

**Sidonia.*

SAXE-WEIMAR.

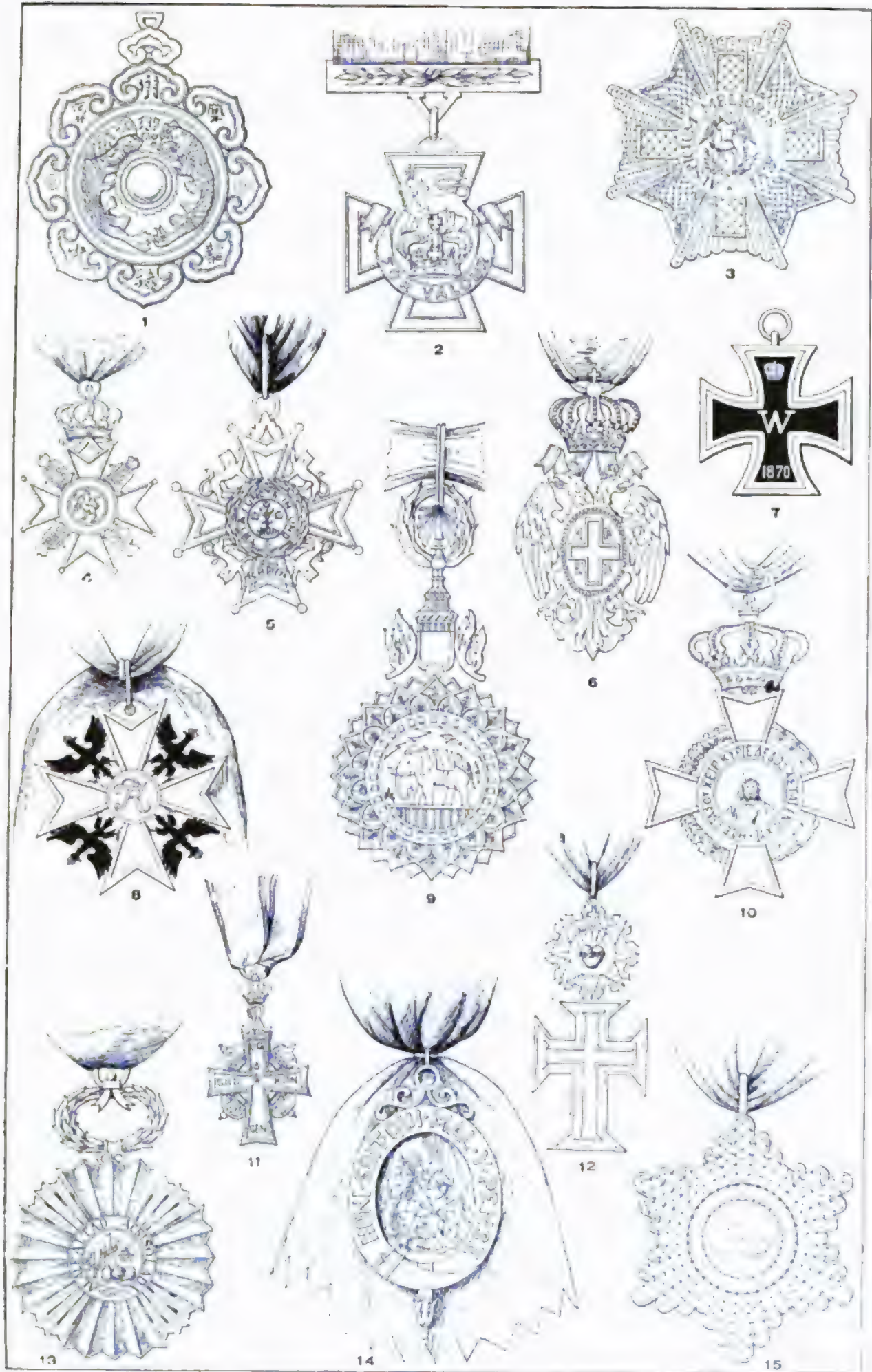
**White Falcon.*

Ernestine House Order.—An order founded in 1833 by the dukes of Saxe-Meiningen-Hildburghausen, Saxe-Coburg-Gotha, and Saxe-Altenburg. The order has five classes, and a silver cross of merit and gold and silver medals are connected with it. The grand cross of the order confers hereditary nobility. The decoration is an eight-pointed white cross edged with gold, having golden lines between the arms. Within a central wreath is the bust of Ernest the Pious with the inscription *Fideliter et Constante.*

SAN MARINO.

Order of Chivalry.—An order with five classes, founded in 1859.

ORDERS II.



- | | | |
|---|-------------------------|---------------------------------|
| 1. DOUBLE DRAGON CHINA | 6. WHITE EAGLE, SERBIA | 11. DANEBROG, DENMARK |
| 2. VICTORIA CROSS, GREAT BRITAIN | 7. IRON CROSS, PRUSSIA | 12. CHRIST, PORTUGAL |
| 3. ST. MICHAEL AND ST. GEORGE GREAT BRITAIN | 8. BLACK EAGLE, PRUSSIA | 13. ISABELLA THE CATHOLIC SPAIN |
| 4. OLAF, NORWAY | 9. WHITE ELEPHANT, SIAM | 14. GARTER, GREAT BRITAIN |
| 5. BATH, GREAT BRITAIN | 10. REDEEMER, GREECE | 15. SUN AND LION, PERSIA |

SAVOY.

See above under ITALY.

SERVIA.

**Takovo*.

**White Eagle*. See also Plate of ORDERS.

**Saint Sava*.

SIAM.

**White Elephant*. See also Plate of ORDERS.

**Sacred Order*.

Order of the Crown.—An order of merit founded in 1869. The decoration is a blue medallion with a circle of pearls, edged with red and green lotus blossoms.

Order of Chivalry.—An order with five classes, founded in 1874.

Chakri Order.—An order with two classes, founded in 1884.

Order of Chulakonklao.—A family order with three classes, founded in 1873 by the King of Siam on his accession to the throne. It was intended to be conferred on members of the families of previous kings and to form the basis of a high nobility.

SICILY.

**Saint Januarius*.

**Saint Ferdinand*.

Constantine Order of Saint George. See SAINT GEORGE, CONSTANTINE ORDER OF.

**Saint George*.

Order of Francis I.—A civil order of merit, founded in 1829 by King Francis I., and extinguished in 1861. The decoration was a white cross with golden lilies between the arms, bearing an oak wreath inclosing the initials F. I., with the legend *De rege optime merito*.

SPAIN.

**Golden Fleece*.

**Alcantara*.

**Calatrava*.

**Saint James of the Sword*.

**Montesa*.

Order of Charles III.—A civil and military order, founded by Charles III. in 1771 in honor of the Immaculate Conception. The order was dissolved by Joseph Bonaparte, and restored in 1814. It was conferred on nobles for distinguished services. The cross is of blue enamel with a white border, and the arms are separated by lilies. The central oval bears an image of the Virgin, and on both sides is the inscription *Virtuti et Merito*. The cross is suspended from a laurel wreath.

**Maria Louisa*.

**Saint Ferdinand*.

**Saint Hermengild*.

**Isabella the Catholic*. See also Plate of ORDERS.

Maria-Isabella-Louisa.—An order with one class, founded in 1833 by King Ferdinand VII.

Military Order of Merit.—An order with four classes, founded by Queen Isabella II. in 1864.

Order of Benevolence.—An order with three classes, founded by Queen Isabella II. in 1856.

Naval Order of Merit.—An order with three classes, founded by Queen Isabella II. in 1866.

Order of Maria Victoria.—An order with three classes, founded by King Amadeus in 1871.

Order of Maria Christina.—A military order with three classes, founded in 1890 by the Queen Regent Maria Christina.

SWEDEN AND NORWAY.

**Scraphim*.

**Sword*.

**North Star*. See also Plate of ORDERS.

**Vasa*.

Order of Charles XIII.—An order with one class, founded in 1811 by King Charles XIII. It is designed for Freemasons of the highest rank, and has 30 members. The order provides for the needy children of deceased members.

**Saint Olaf*.

TUSCANY.

**Saint Stephen*.

**Saint Joseph*.

Military Order of Merit.—An order with three classes, founded by Grand Duke Leopold II. in 1853.

TUNIS.

**Nishan-el-Aaman*.

Order of Hussein.—An order founded by Ahmed Bey, and worn in Tunis only by the Bey and princes, and two of the highest State officials. It may be conferred also on foreign reigning princes and on princes of the blood.

**Nishan-el-Iftikhar*.

TURKEY.

**Crescent*.

**Nishan-el-Iftikhar*.

**Medjidie*. See also Plate of ORDERS.

**Osmanic*.

**Nishan-i-Shefkiat*.

**Nishan-i-Imtiaz*.

VENEZUELA.

Order of the Bust of Bolivar.—An order commemorating Bolivar's services. It was founded at Caracas in 1854 by President Monagas.

Order of Merit.—An order founded in 1861 by President Paez. It has three classes.

WÜRTTEMBERG.

Order of the Crown.—A civil and military order of merit, founded by King William I. in 1817. The decoration is an eight-pointed cross with lions in the angles, bearing a medallion with the monogram of King Frederick and the motto *Furchtlos und Treu*.

Military Order of Merit.—An order with three classes, founded in 1759 by Duke Charles Eugene.

Frederick Order.—A civil and military order of merit, founded in 1830 by King William I. It had originally one class and conferred nobility. It has now five classes. The cross is of white enamel edged with gold and with golden rays between the arms. The medallion bears a relief bust of King Frederick surrounded by a blue band with the inscription *Friedrich, König von Württemberg*. The reverse bears the motto *Gott und mein Recht*.

**Olga*.

ZANZIBAR.

**Radiant Star*.

Consult: Lawrence-Archer, *Orders of Chivalry* (London, 1887); Gritzer, *Handbuch der Ritter- und Verdienstorden aller Kulturstaatn der Welt innerhalb des neunzehnten Jahrhunderts* (Leipzig, 1893); *Almanach de Gotha* (Gotha, 1902). See also the bibliographies under the separate orders.

ORDERS, HOLY. The distinction of rank or office which differentiates the clergy of various Christian bodies from the laity; also the rite by

which this office is conferred, which is one of the sacraments of the Roman Catholic and Eastern churches. As to the nature of the powers conferred by ordination, an acute controversy has raged for centuries. The principal divergent views will be found partly under BISHOP, especially as to distinctions of polity arising from them; but some further details remain to be given here.

The central point of the Roman Catholic and Eastern doctrine is the belief in the continuous existence of a real priesthood in the fullest sense of the word—of a body whose chief function is the offering of sacrifice. (See SACRIFICE; PRIEST; MASS.) While there is a sense in which the priesthood of all the faithful may be asserted, it is yet contended that in its definite sense and in the fullness of its powers, priesthood is conferred only by the laying on of a bishop's hands. (See APOSTOLIC SUCCESSION.) As a matter of hierarchical gradation, the Council of Trent asserts that the divinely instituted hierarchy consists of bishops, presbyters, and ministers. It follows, however, from what has been said that from another point of view the episcopate and the priesthood are not two separate orders, but the episcopate is simply the fullness of the priesthood, the power of ordination and confirmation being reserved to it. The orders, then, are seven: those of priest, deacon, and subdeacon (major or holy orders), acolyte, reader, exorcist, and ostiarius or doorkeeper (minor orders). The latter as distinct gradations are admitted to be of ecclesiastical institution, and the Eastern churches practically include them all in the single office of *anagnostes* or reader. As to the outward and visible sign which constitutes the 'matter' of the sacrament, there has been considerable difference of opinion among theologians, some making it the 'tradition of the instruments' (the delivery of the chalice and paten to the candidate), while the majority in modern times hold it to be the laying on of hands; practically both are considered necessary. The sacrament is believed to confer an indelible stamp or 'character,' so that a man once a priest is always a priest, and ordination can never be repeated. See DEPOSITION.

The Church of England, followed by her daughter churches, declares that "from the Apostles' times there have been three orders of ministers in Christ's Church, bishops, priests, and deacons," and requires them to be made by the laying-on of the bishop's hands. For various technical reasons, however, the Roman Catholic Church (while not questioning the orders of the Easterns, whom it regards as schismatics) has never in practice admitted the validity of Anglican ordinations; and an exhaustive discussion of the matter in 1896 was followed by a definite Papal decision against them. Much difference of opinion has prevailed in the Anglican communion about the powers conferred, some holding doctrines undistinguishable from those of Trent, while others as emphatically deny the existence of any vestige of sacerdotal power. In practice the indelibility of holy orders is recognized here also, though in England a clergyman may legally renounce his orders and be considered a layman before the law, thus becoming capable of sitting in the House of Commons.

The non-episcopal churches recognize but one order of the ministry, the presbyterate, as having

Scriptural sanction. They assert that bishop and elder in the primitive churches were identical in function and authority. There is in many cases in their politics no clear distinction between order and office. The Baptist churches declare that there are but two Scriptural officers of a Christian Church—pastor and deacon. In the politics of the Presbyterian and Reformed churches, the perpetual officers of the Church are declared to be bishops or pastors, ruling elders, and deacons. The Methodist Church in America, while it uses the title bishop, does not differ substantially from the other bodies in this class as to its view of the nature of the ministry.

No study of holy orders can be complete without a consideration of their civil aspects. Here great changes have come about through the changed relations of Church and State. Ever since the Christian Church received the recognition of the political power, and more especially since the development of ecclesiastical establishments, the possession of holy orders has impressed a peculiar civil character upon the individual. For many centuries in all the European States the possession of orders, even the minor ones, caused a greater or less exemption from the jurisdiction of the civil courts. (See BENEFIT OF CLERGY.) By the common law as it has developed in the United States ministerial orders are regarded as voluntary relations which may be terminated at any time by the possessor and as not containing any contractual element. Along with certain benefits there have been certain civil disabilities attached to holy orders. In England and in the State of Maryland a 'minister of the gospel' is not eligible for the Legislature. Exemption from jury duty and service in the militia still generally attaches to the possession of ministerial orders.

ORDERS IN COUNCIL. An English legal term, denoting orders issued by the sovereign with the advice of the Privy Council. The Privy Council of Great Britain has no power to legislate, except so far as authorized to do so by Parliament; but in periods of emergency it has nevertheless occasionally issued and enforced orders of a legislative kind, those who were concerned in passing, promulgating, or enforcing the orders trusting to Parliamentary protection, and taking on themselves the personal responsibility of the proceedings. In such cases a subsequent act of indemnity has relieved from liability those who advised the order or acted under it, and has given compensation to all who suffered by its enforcement. The most famous orders in council were those issued in retaliation for Napoleon's Berlin and Milan decrees. These are described in detail under CONTINENTAL SYSTEM.

ORDINAL (Lat. *ordinalis*, denoting order, from *ordo*, series, row, orderly arrangement). A book containing the forms to be used in making, ordaining, and consecrating bishops, priests, and deacons in use in the Church of England since the Reformation. The original form was prepared by order of the Crown by a commission appointed in the third year of Edward VI. (1550), and received the approval of Parliament. It was slightly amended in the year 1552, and again in 1662 on the recommendation of convocations. Although technically a separate book, the English Ordinal has since 1552 been

bound up with the Book of Common Prayer. In their general structure the offices are similar to those found in the ancient liturgies, although much more simple. The series of questions addressed to the candidates is, however, a feature peculiar to it.

ORDINANCE (ML. *ordinantia*, decree, from Lat. *ordinare*, to order, from *ordo*, row, series, orderly arrangement). In its broadest sense, any law or statute enacted or promulgated by a governmental authority, but more commonly used to designate laws or regulations passed by the governing bodies of municipalities. The term was formerly employed in England to describe a law or regulation which needed the assent of one of the three powers necessary to the validity of an act of Parliament, viz. the King, the House of Lords, and House of Commons. It is now used in England to designate any rule or regulation enacted by any authority less than sovereign. In the United States the term is almost exclusively applied to the laws or regulations passed by the common councils, boards of aldermen, or other governing bodies of municipalities. An ordinance differs from a resolution, which is an expression of the will of any organized body, generally to carry out some ministerial act relating to its own internal management, or other matter not affecting the general public, as a resolution of respect in honor of a deceased person. The formalities for the enactment, publication, enforcement, and repeal of ordinances are largely regulated by statutes. See ACT; BY-LAWS; MUNICIPALITY; RESOLUTION; STATUTE.

ORDINANCE OF 1787. An act of the United States Congress, of July 13, 1787, relating to the government of the Northwest Territory of the United States. See NORTHWEST TERRITORY.

ORDINANCES OF MANU. The English rendering of the Sanskrit *Dharmaśāstra*, or code of law, attributed to Manu (q.v.).

ORDINARY. A charge in heraldry (q.v.).

ORDINARY RAY. See LIGHT.

ORDINATE (Lat. *ordinatus*, arranged, ordered, p.p. of *ordinare*, to order). In a system of rectilinear coördinates, the coördinate which is measured parallel to or on the Y-axis. See ANALYTIC GEOMETRY.

ORDINATION (Lat. *ordinatio*, setting in order, from *ordinare*, to order). The ceremony by which a man is set apart to or invested with an order or office of the Christian ministry. Ordination is a general custom throughout the various Christian bodies, both episcopal and non-episcopal. In the Episcopal churches ordination includes as an essential feature the imposition of hands by a bishop. The act of elevating a priest to the episcopate is in strict technical use called consecration, not ordination. In a broader sense, ordination includes admission to the minor orders, when the act of admission consists in the delivery of the symbolic instruments. In the various Presbyterian churches the power of ordination rests with the presbytery, who appoint one or more of their number to conduct the ordination service, which includes the feature of the imposition of hands. In the Congregational and Baptist churches ordination is usually performed by the pastors of neighboring churches of the same denomination, but

is regarded as necessary only for the preservation of church order, not as conferring any special religious or ecclesiastical authority. See ORDERS, HOLY.

ORDNANCE (variant of *ordinance*, OF. *ordnance*, *ordonance*, *ordonnance*, Fr. *ordonnance*, ordinance, from Lat. *ordinare*, to order). The word ordnance is now commonly understood to comprise all cannon requiring a support or mounting of some form. The early projectile machines, the bow, cross-bow, sling, catapult, and ballista, are related to modern cannon by the similarity of their purpose only, and have in principle of action and construction no bearing upon the subject of ordnance. The blow-gun, acting by compressed air, has some analogy with the modern pneumatic gun, but teaches no lesson of importance. The use of gunpowder cannon as factors of any consequence in war dates from the fourteenth century, during which period they were used beside the existing catapults with, for some time, less actual effect. The first cannon were wide-mouthed bowls, like an apothecary's mortar, called mortars, vases, bombards, etc. They gave little velocity to the stone projectile, and had little accuracy or power. They were made of bars (like barrel staves) wrapped and hooped to obtain necessary strength. Some were breech-loaders, but were so crude that they were given up for the simpler muzzle-loader. The guns of this time had no trunnions, and many not even carriages, being fired from the ground. Some were mounted on blocks of timber to which they were lashed with no movement for aiming. Later improvements in shape were made, the bore being cylindrical with a narrow powder chamber, whereby the effect of the powder gas was more concentrated, the walls of the piece stronger, and the projectile always in the same position.

The fifteenth century witnessed increased use of cannon and many changes. The improvements in shape continued, and there was constant striving to increase size. Bombards were made as large as 18 tons and fired stone projectiles as heavy as 900 pounds. Some were of 20 inches and even 25 inches bore. Some guns were in this century forged of iron in one piece—some

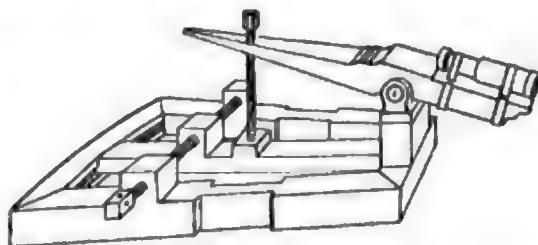


FIG. 1. FIFTEENTH CENTURY GUN AND MOUNT.

in several, separable for transportation. Framed carriages were made, some having the gun lashed to a hinged beam which could be altered in elevation. France, 1461 to 1483, made marked advances. Trunnions were introduced; stone projectiles gave way to cast iron, with improvement in carrying power and effect, due to greater density, which, however, increased pressures and forced a reduction in calibre and a thickening of the walls of the cannon. Brass casting was generally adopted for gun construction, while carriages were developed to move with troops.

At the beginning of the sixteenth century guns were generally of brass, but processes progressed sufficiently for them to be cast of iron. These were found to be too heavy for field use, and a return to the lighter brass was made for those requiring mobility, which rule held until the middle of the nineteenth century. Guns had handles and cascabels, and were much ornamented, and given individual names as well as complicated class designations, depending upon the size and proportion of length to calibre. During this century the field-carriage limber was introduced. Case shot and explosive shell were used to some extent, but as the fuzes for the latter had to be lighted before insertion in the gun, many accidents occurred. Shell were first made of two hollow hemispheres fastened together. Guns were sometimes made of extreme length, as, for instance, 58 calibres. It was thought that the range increased with the length without limit.

To increase mobility, Gustavus Adolphus brought forth his 'leather gun' of thin copper wound with leather for strength, and afterwards used an iron 4-pounder weighing 650 pounds. Stationary carriages were made of wood supporting the gun by trunnions and resting upon wooden wheels. Elevating was done by wedges under the breech, and change in direction was given by moving the carriage bodily. The Dutch introduced the howitzer, a cannon reduced to such length that shell could be put into it by hand. Gustavus Adolphus, in addition to his gun, introduced the method of inserting the powder charge in a package or cartridge, thus avoiding the danger and loss of time due to ladling it into the gun.

In 1747 the French made the important discovery that, if the earth tamping about a shell were omitted, the discharge would ignite the shell fuze. This expedited loading, removed the great danger of shell fire, and increased its use. At this time field carriages were still crude, made of wood, with wooden axletrees, low limbers, and horses harnessed in tandem. Commencing about 1765 remarkable improvements were made in ordnance by Gribeauval. He had his guns cast solid and bored to accurate dimensions instead of being cast to approximate size. This diminished clearance, with the result of no loss of power, in spite of reduced length and weight. Trunnion-rim bases, removable copper vent pieces, and iron axletrees were introduced, and draught lightened by making the wheels of the limbers higher. An improved vertical 'pin tail' facilitated limbering and unlimbering. Heavy guns had traveling trunnion beds provided on the carriage to distribute their weight over the four wheels. The powder cartridge and projectile were fastened together. Aiming was facilitated by the elevating screw and tangent scale, and for moving the piece unlimbered the prolonge and bricoles were used. All parts were made of standard dimensions, so that spare parts could be taken into the field for repair. Carriages for heavy guns were greatly improved by the use of a pivoted chassis.

Hollow projectiles were much used. Grape (a number of shot in a net) were used until superseded by Gribeauval's canister (a thin can to hold a number of small shot and break up as soon as discharged from the gun). Near the end of the eighteenth century carronades became

popular, especially at sea, and were much used. Being short, they were easily loaded, and at the ranges of that day their heavy projectiles with low velocity were very effective.

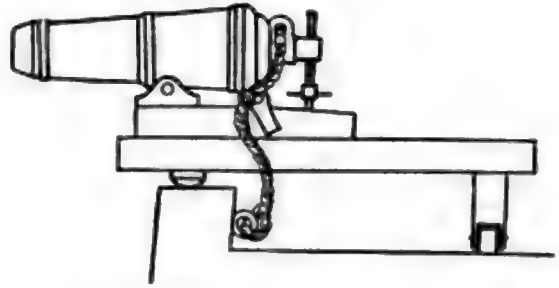


FIG. 2. CARRONADE (68-POUNDER) ON WOODEN NAVAL MOUNT. (Early nineteenth century.)

Early in the nineteenth century Colonel Bomford (United States) invented the 'columbiad' (q.v. for illustration), a gun of considerable length and having a long chamber, designed to fire at high velocity and low elevation either shot or shell. This idea was taken up abroad by General Paixhans (q.v.), of France, about 1822,

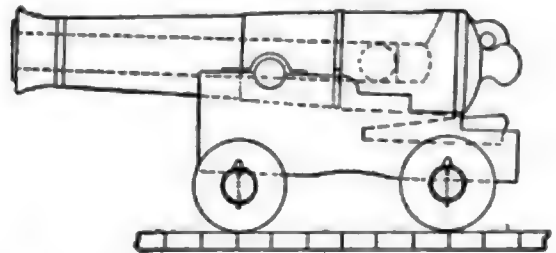


FIG. 3. ENGLISH 32 CWT. CAST-IRON SMOOTH-BORE 32-POUNDER, ON COMMON WOODEN SHIP CARRIAGE. (Early nineteenth century, but still in general use at sea in 1850.)

and 'Paixhans guns' came into very extensive use. They were important factors in rendering necessary the adoption of armor for ships. During the War of 1812 the most important guns in use were the columbiads and the carronades of the eighteenth century.

Admiral Dahlgren, United States Navy, in 1856, made the 'Dahlgren guns' for naval use of outline proportioned to the curve of pressures—therefore heavy at breech and light at muzzle. See GUNS, NAVAL.

RODMAN CAST-IRON GUNS. A casting cools and solidifies first on the surface, then progressively inward. The metal contracting as it solidifies draws inward from the solid outer shell, and the inner portion is thus put under tensile strain, while the outer is compressed by the reduction of its diameter. The effect of powder pressure in the bore is to strain the inner portion by tension. If now this inner shell be already under tensile strain, it is predisposed to rupture. General Rodman, Ordnance Department, United States Army, announced this condition, and proposed to avoid it by casting guns hollow and cooling them by water from the interior of the bore, while the exterior was kept hot by fire; the bore-surface then solidifying first would be compressed by the contraction of the outer layers, which would consequently be under tensile strain. The gun would therefore be stronger than a gun cast solid and cooled from the exterior, or even one without initial strain. Rodman's system of construction, used

in America and elsewhere for many years, gave the best results possible with cast iron, and was superseded only when the demand for rifles and higher power necessitated the use of stronger material. See ARTILLERY for illustration of Rodman gun.

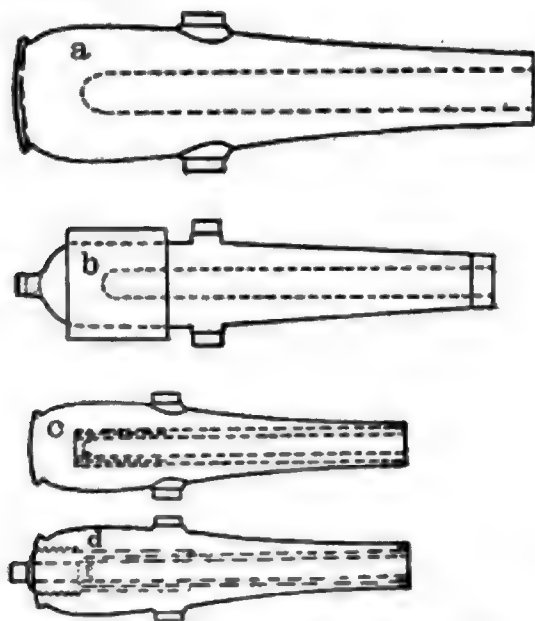


FIG. 4. NINETEENTH CENTURY TYPES OF CANNON.

a, 15-inch Rodman cast iron. b, Parrott 300-pounder rifle. c, 10-inch cast-iron smoothbore converted to 8-inch rifle by 'muzzle-insertion.' d, Same as c, converted by 'breach-insertion.'

Chambers (United States) patented in 1849 a gun of wrought-iron tube with strengthening hoops. In 1855 Blakely (England) and Treadwell (United States) invented guns with hoops shrunk on. To them is due the real origination of the built-up system. Sir W. G. Armstrong (q.v.) of England made built-up guns for the

ing and forced on by hydraulic pressure. The West Point Foundry (Parrott's) at Cold Spring, N. Y., to meet the demand for a cheap and quickly made rifle for use in the Civil War, made hollow cast-iron guns reinforced by a band of coiled wrought iron shrunk around the breech. These were the well-known 100-, 200-, and 300-pounder Parrott rifles, and served their purpose admirably, but the system was not capable of extension. Cast iron was, as always, unreliable.

The adoption of rifled guns, commencing about 1860, found all nations with large stocks of cast-iron smoothbores on their hands. Parsons (United States) in 1860 planned to convert these to rifles by inserting a steel tube through the breech and then closing that end by a permanent screw plug. Sir W. Palliser (England) in 1863 suggested a tube of coiled wrought iron inserted from the muzzle end of the gun. In the Palliser system the tube was prevented from forward motion by a collar screwed in front of it into the cast iron. Forward motion of Parsons's tube was prevented by several shoulders. This was the better method, as the tube was thus supported at several points with less danger of opening the welds between the coils. The Palliser system, which was cheaper, was adopted in England, and many guns converted by it. In America, between 1874 and 1880, many 10-inch guns were so converted into 8-inch rifles, comparing favorably with contemporaneous European rifles. Experiments were made in the conversion of larger calibre guns, in some of which the welds gave trouble, causing general distrust of muzzle-insertion, and the last 8-inch converted rifles had breech-inserted tubes. Variations of this conversion system were proposed for original construction, and several such guns were built and tested, notably the 12.25-inch rifle, between 1870 and 1880. Cast-iron bodies hooped with

MODEL 1890 M.I. STEEL- 13 TONS

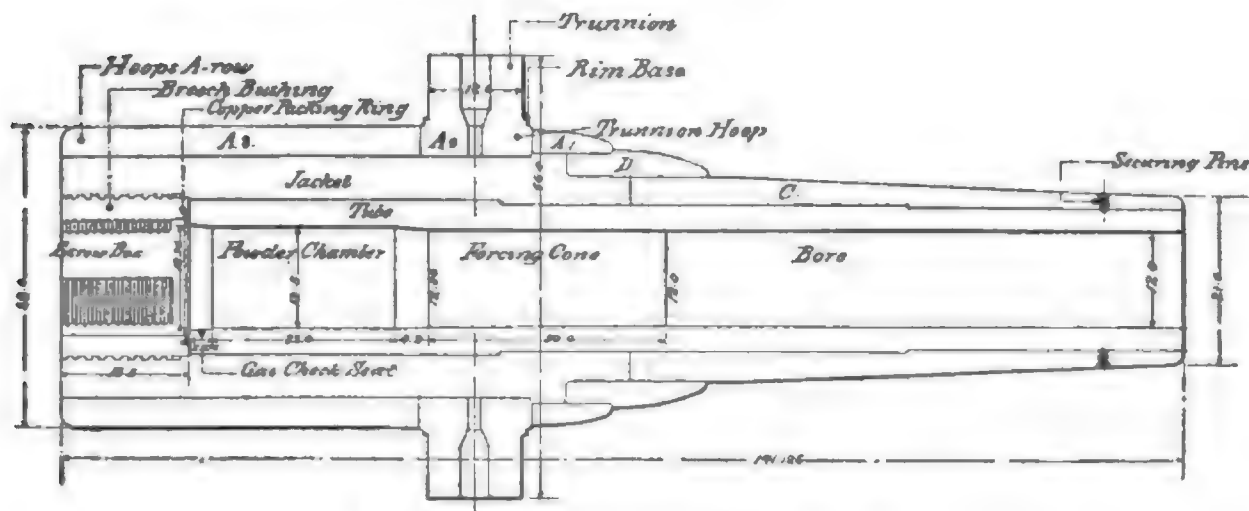


FIG. 5. 12-INCH BREECH-LOADING STEEL MORTAR.

Showing modern hooped construction, which is similar to that of guns, except in dimensions and details, arrangements, etc.

English service from 1858. For many years his hoops were formed by coiling a rectangular bar of iron helically about a mandrel, and then closing and welding the coils together. These hoops were shrunk on the tube with initial tension. Whitworth guns were built up of cast and forged homogeneous steel hoops without shrinkage, the hoops being made slightly taper-

steel were strongly advocated by some, and the United States model 1886, 12-inch breech-loading mortars, made in this way, are now in service.

It was not until 1880 that the first really modern guns were commenced in the United States (by both navy and army), and commencement of regular manufacture was several years later. The establishment of the Army

Gun Factory in 1889 may be regarded as the final commitment of the United States Government to the built-up forged-steel system. In 1890 the United States Navy had 6-inch, 8-inch, and 10-inch modern built-up guns in service; the army 3.2 inch guns and 12-inch mortars; both services had types of all calibres under test. Meanwhile elaborate calculations were being made in Europe, and reliable working formulas for the shrinkage deduced. By 1880 the system may be said to have been quite fully elaborated. Krupp in Germany, Armstrong in England, and Italy, the French, and others were then regularly turning out excellent built-up guns.

WIRE-WOUND GUNS. In 1872 Dr. Woodbridge's design for a 10-inch muzzle-loading rifle made of a thin steel tube wrapped with wire brazed together by immersion in melted bronze was much recommended. The gun after 93 rounds was torn apart longitudinally by the force of discharge. It was evident that brazing could never be relied upon for longitudinal strength. Two other 10-inch guns upon the Woodbridge design were recommended in 1881 to be made and tried. One of cast iron with breech wrapped with wire was abandoned before completion. The second consisted of a steel tube the full length of the gun, the rear half being surrounded by longitudinal bars of steel, and the whole wrapped with steel wire at high tension, decreasing toward the exterior. The pressure upon the breech was transmitted through the longitudinal bars to the trunnions.

The Crozier wire-wound gun, commenced in 1889, consisted of a forged-steel tube wrapped over its whole length with tinned square steel wire and incased by cast-steel jacket and hoops, the jacket carrying the breech block and trunnions. All circumferential strength was to be obtained from the tube and wire. The tube was first wound at such tension as to compress it beyond its elastic limit and thus give it a special elastic limit, then unwound and wound again with the designed tension. The wire was continuously wound, the ends of the pieces as manufactured being electro-welded.

The first Brown segmental tube wire-wound gun was of 5-inch calibre, and had a very thin tube of high elastic-limit steel extending only from the breech to a short distance forward of the seat of the projectile, and forming a mere lining for the main tube, which was of longitudinal steel bars the length of the gun. This was wire-wrapped throughout with such high tension that even when powder pressure acts the tube is under compression. This is necessary to prevent the joints from opening, but necessitates the tube being initially compressed beyond its elastic limit, which is not desirable. In the latest development of the Brown system, not as yet fully tried, the segmental bars are replaced by thin plates radially and bent into epicycloidal forms by the wire winding. They extend from the breech to the muzzle, and are designed to give longitudinal strength and some tangential resistance from their frictional hold upon each other. A steel jacket connects the trunnions to the breech block.

STEEL FOR ORDNANCE. Armstrong designed a steel tube for his built-up rifles of 1858, but was forced to abandon the idea after eight unsuccessful attempts to make one tube. In 1863

Sir Joseph Whitworth successfully made two steel guns, and by 1873 had perfected his fluid compression system for improving ingots, which led to renewed trials of steel for guns. Then and for some years the progress of gun-making was much hindered by efforts to cast guns of steel in one piece. Since 1890, however, steel has been universally used for guns.

BREECH-LOADING SYSTEMS. Of the breech-loading systems in use to-day nearly all can

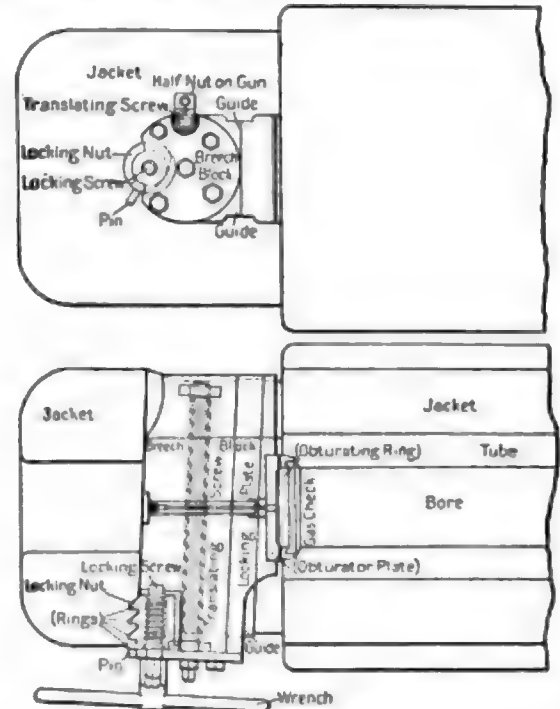


FIG. 6. KRUPP BREECH MECHANISM.

The upper figure shows a vertical view of the breech of a Krupp gun. The breech block, which is wedge-shaped and has its axis not perpendicular, but oblique to the axis of the gun, moves transversely as shown in the lower diagram, a horizontal section, and when moved to the right by the rotation of the translating screw allows the projectile and charge to be inserted in the gun by bringing an open portion of the block in line with the bore. To close the breech the translating screw, which has a quick pitch and works in a half nut on the gun jacket, is turned. This moves the breech block so that the solid part comes in front of the bore, but does not, however, lock the breech or force the gas check into its place. This is accomplished by the locking screw and accompanying mechanism, which forces the block forward and secures it firmly.

be classified under either the transversely sliding block system, of which Krupp's is the most important, or the longitudinal screw-block sys-

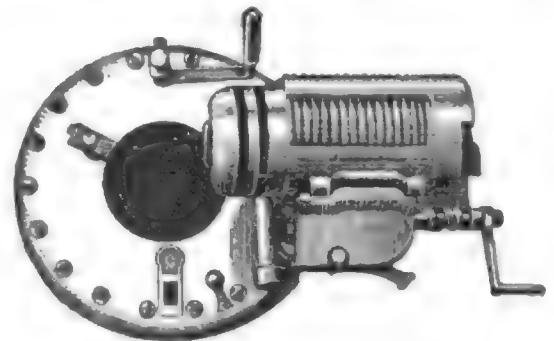


FIG. 7. BREECH MECHANISM (INTERRUPTED SCREW) OF U. S. A. 8, 10, AND 12-INCH BREECH-LOADING RIFLES, MODEL 1888.

Breech open, showing tray, double-threaded translating screw, block spindle, gas check, pad, and latch.

tem, of which the United States service types are prominent examples. In 1858 Armstrong's 32-pounder rifled breech-loading guns introduced

into the English Navy had a transverse block supported by a longitudinal screw block bored out to permit loading when the transverse block was removed. About the same time Krupp had a breech-loading system of transversely sliding wedge-shaped block, essentially his present system. In 1849 Chambers (United States) patented

gear, first rotates the block to bring the threaded sectors opposite the open ones of the gun, then draws the block to the rear clear of the gun, and finally swings it to one side on a tray hinged to the gun. These three motions are always

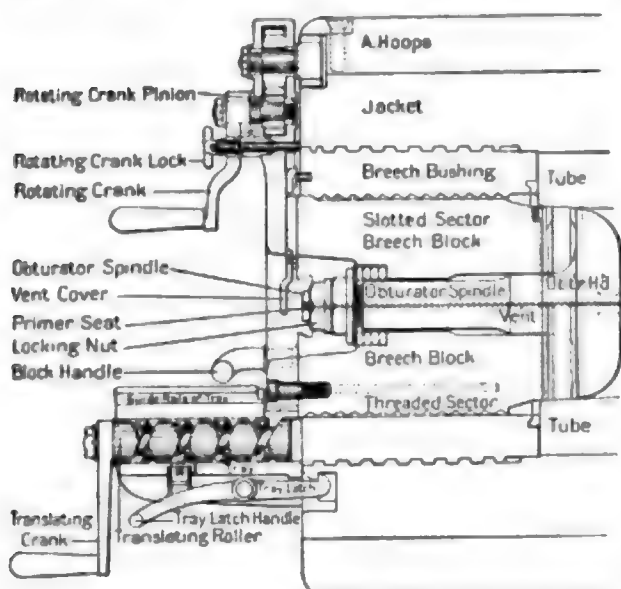


FIG. 8. SECTION BREECH MECHANISM OF U. S. 12-INCH BREECH-LOADING MORTAR, MODEL 1890, MARK I.

a longitudinal screw block with interruptions in the threads that permitted it to be slid to the rear after only a partial rotation. This is the present American system. The French developed the idea in their naval and land service in 1870, calling it the Reffye mechanism.

Both the Krupp and the French breech-loading systems, as well as many others, were tried in the United States before the final adoption of a modification of the French system. In the earlier guns much difficulty was experienced with gas checks; Krupp used a ring of steel, the thin edges of which pressed by the gas prevented escape; the De Bange check used by the French was a plastic pad of asbestos flour and tallow, held in a canvas bag which, being pressed back by a spindle receiving the powder pressure, was spread sidewise tightly against the walls of the bore, sealing the joint. (See illustration under GUNS, NAVAL.) Finally A. H. Gerdon designed steel split rings, one in front and one behind the pad, to act themselves as gas checks, the function of the pad being simply to press upon their beveled inner surfaces and wedge them outward. This gas check is now in successful use, and constitutes one of the most important of the American improvements of the system.

In its latest development, the breech mechanism for heavy guns is operated by a continuous rotation of a single crank in one direction, which, by means of a combined spiral and spur

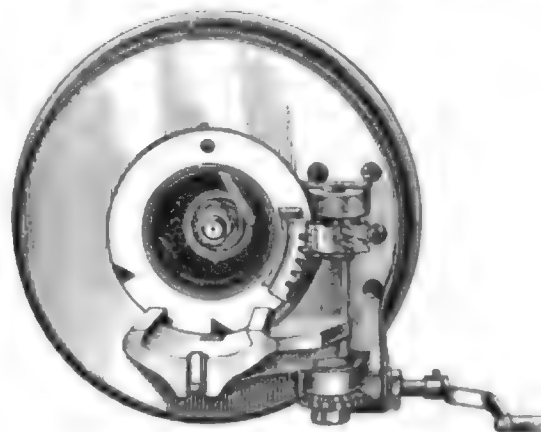


FIG. 9. BREECH MECHANISM (INTERRUPTED SCREW) OF 12-INCH BREECH-LOADING RIFLE, MODEL 1895.

Differs from that of model 1888 by device for opening by continued turning of crank. Breech closed and locked.

necessary to the withdrawal of the interrupted screw block. In guns of 6-inch calibre and less, they are accomplished by a single quick motion of a crank connected by links, gears, or otherwise, to the block so as to accomplish the rotation, withdrawal, and swinging successively and automatically. A very recent adaptation of the screw block is the Nordenfelt eccentric block, which is not withdrawn at all, but being rotated about a centre not in the axis of the gun, a hole in the block can be brought opposite the bore for loading, or the bore may be closed by the solid part of the block, while the block is at all times held by circular grooves and cuts in its housing. Great attention has been paid to locking the block of all systems, and to

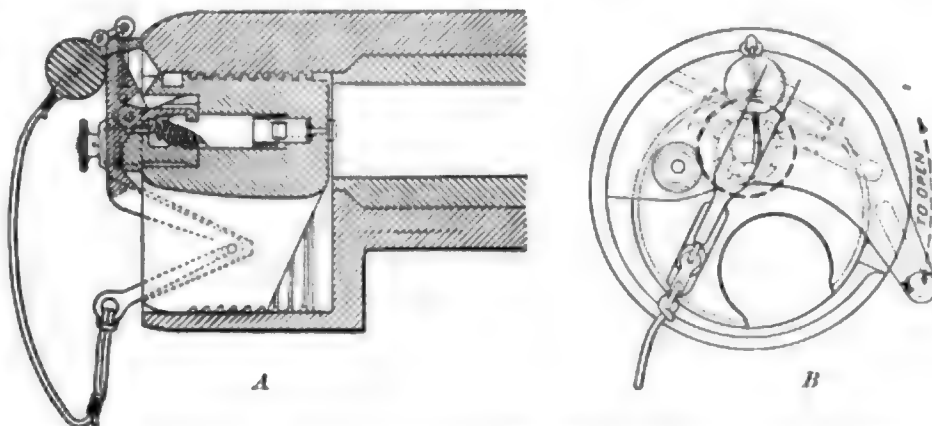


FIG. 10. NORDENFELT ECCENTRIC BLOCK BREECH MECHANISM FOR RAPID-FIRE GUNS. A, Longitudinal vertical section. B, Section through breech.

devices for preventing fire before this locking is complete.

SIZE AND POWER OF GUNS. By 1880 the introduction of large-grain slow-burning powder and of heavier projectiles had much increased the power of guns in proportion to calibre. At that time the English had guns weighing about 100 tons, of 17.72-inch bore, firing a 2000-pound projectile, with 1640 feet per second velocity. In the United States, to keep pace with this movement, a 16-inch gun was designed, to weigh

127 tons, and to fire a 2400-pound projectile, with a velocity of 2300 feet per second. This gun, when finished, was the most powerful ever built. The time elapsed since its design has, however, seen a reaction of opinion adverse to the construction of guns above 12-inch calibre, and the experience of several recent wars, meagre as it has been, has led to a strong sentiment in favor of a limit even lower.

PRINCIPLES OF DESIGN. A gun has to withstand three kinds of stress: (1) A pressure radially outward; (2) a force tending to stretch the gun longitudinally; (3) transverse stress due to the weight of the parts of the gun on opposite sides of the point of support. The first, tending to enlarge the bore, stretches the metal circumferentially, and due to resistance of outer layers compresses the inner parts radially. The powder pressure is at a maximum before the projectile has moved more than a few inches—due to sudden evolution of gas, restricted space, and resistance of rifling—and quickly falls as the projectile moves forward. Having determined the size of the interior of the gun and the conditions of loading, the intensity of the pressure to be expected at each point along the bore is calculated and a pressure curve plotted. The way is now clear for the design of the gun as an engineering structure to withstand these known forces at the various points. The tube of a built-up gun is strengthened by putting over it hot hoops, which when cool are of less diameter than the tube's exterior by an amount called the 'shrinkage.' The shrinkages are so calculated that at no time shall any portion of the metal be strained beyond its elastic limit, and that in case of accidental high pressures bringing the gun up to its limiting strength all the component cylinders would reach their elastic limits simultaneously. Thus it is necessary to calculate the shrinkage and strength under the assumption that the maximum powder pressure is acting, and again that no interior pressure is acting; i.e. the 'system at rest.'

CONSTRUCTION OF BUILT-UP STEEL CANNON. The material of which modern guns are made is 'low steel' containing about one-half of one per cent. of carbon. In the United States it is made by the open-hearth process. (See IRON AND STEEL.) In Germany crucible steel is used. Bessemer steel is practically debarred, because it is not pure or sound enough for use in cannon. The steel is cast into ingots roughly approximating in shape to the pieces to be made from them, but larger. United States Army specifications require about 30 per cent. at top and 6 per cent. at bottom of the ingot to be discarded. The metal is generally compressed by Whitworth's fluid compression.

After the ingot is cast, it is cooled very slowly to avoid strains, then the surplus portions cut off and specimens taken for chemical analysis and tensile test. The balance of the ingot is now bored in a lathe, then heated and forged on a mandrel.

After forging, the specifications require that the strains due to this operation be removed by annealing. The forging is then turned and bored in a lathe to nearly its finished size and specimens taken for test. It is then oil-tempered to give toughness, but this process is apt to induce strains in the metal, to remove which the forging is generally required to be again

annealed. Tubes are bored in a lathe with a long boring bar fed into the tube, which rotates while the bar remains stationary. The tool carried at the end of the bar is a 'hog-nose' or semi-cylinder of cast iron, which, by its pressure on the bore, already cut, steadies and supports a cutting tool at its forward end. The bore thus produced is straight (within a small fraction of an inch in the whole length of the tube), but rough, and is smoothed by a reamer, a cylinder of wood fitting the bore tightly and carrying long side cutters. During or after the boring, the outside of the tube is turned to diameters greater by the calculated shrinkages (about 0.0003 of the diameter) than the inner diameter of the hoop to encircle it. (The operations upon jackets and hoops are in general similar to those upon tubes.)

When ready for assemblage the hoop or jacket to be put on is heated in an oven (generally in a vertical position, in an oil furnace, to 500 to 800 degrees F.), and expanded to 0.03 inch to 0.08 inch larger diameter than the part it is to surround. It is then lowered over the latter, which stands in a vertical position, until it abuts against a shoulder on the tube. In order that it shall not in cooling grip the gun higher and draw away from this shoulder, water is poured on to the hot hoop near the joint to cool it there first, and then the water ring is gradually moved up to produce progressive cooling through the whole length of the hoop. The gun, as it begins to be called as soon as any pieces have been assembled on the tube, then goes to a lathe to have the surface turned for the next hoops to be shrunk on.

The sequence of assemblage of the jacket and the hoops is dependent upon the system used to transfer the longitudinal forces to the trunnion. In mortars generally, and in some guns, the tube is run through the jacket from the rear until its shoulder abuts against one in the jacket. In most 8-inch, 10-inch, and 12-inch United States guns the 'C' hoops (covering the chase or muzzle portion) are first put on from the front of the tube, then the jacket is put on from the rear. This leaves both jacket and hoops held from sliding off the ends of the tube by their grip only. The grip is very great, but is not regarded as sufficient security, and an 'L' hoop, or locking hoop, is put on, having a portion of its bore near the centre of greater diameter than the bores at each end. This portion corresponds to a raised shoulder on the forward end of the jacket and one on the rear of the first 'C' hoop, thus binding them together. The 'L' hoop is expanded sufficiently to allow its smaller diameters to pass over these raised shoulders in assemblage. The trunnions are forged solid with the trunnion hoop, which is assembled upon the gun by shrinkage like any other hoop. When all hoops have been assembled, the gun, after a careful inspection for dimensions and straightness, is finish-bored to its proper calibre, turned to the prescribed shape outside, rifled, and the powder chamber, forcing slope, and breech recess finished.

Rifling is done by pushing in from the muzzle a bar, carrying a planer tool to cut the grooves, and so rotated by rack-and-pinion and a forming bar, or by a guide-pin and groove in the bar, as to make the groove of the prescribed twist. The curve of the rifling, to reduce resistance at first,

increases from one turn in 50 calibres, at the commencement, to one turn in 25 calibres, at the muzzle (the United States standard), and is, when developed on a plane surface, a semi-cubic parabola. The forming bar referred to, being set to that curve as calculated for the particular gun, guides a straight bar, perpendicular to the rifling bar, in such a manner that by means of its rack and the rifling bar's pinion the proper rotation is imparted to the tool.

The powder chamber is in rear of the rifled part of the gun, and is of slightly larger diameter to hold more powder in a given length, and to allow for a narrowing cone at its front end to stop the projectile in the right position and bring it to a central position. Forward of this cone is the rifling, but, to prevent excessive pressures due to instantaneously overcoming the whole resistance of the rotating band to taking the rifling, it is customary to ream off about half of the depth of the lands (or ridges of metal between the rifling grooves) at this point, and this reaming is done in the form of a cone several feet long, so that the increase in height of the lands shall be gradual throughout this distance. The breech recess is the part in rear of the tube which is threaded and slotted for the breech block.

Each gun is required in the United States (and all nations have similar requirements) to be fired at least five rounds before it is issued for use in fortifications. Before the adoption of a new type of gun, one gun of this type must have withstood 500 rounds.

In the manufacture of wire-wound guns the tube must be machined as for the built-up gun, and is wound by rotating it in a lathe while the wire is fed from spools through a machine, giving the wire the tension calculated therefor. Whatever jacket and hoops are to be used in the design are shrunk on exactly as in built-up guns.

CLASSES OF CANNON. Cannon are classified as guns, howitzers, and mortars. Guns fire at high velocity and therefore low elevation, about 12° being the maximum; howitzers, shorter than guns of same calibre, have lower velocity, and therefore, range for range, higher angles of elevation, generally up to 20° ; mortars, still shorter in proportion, fire at still lower velocities and at 45° to 60° elevation.

Another classification of cannon, depending upon their use, whether for field, siege, or seacoast purposes, involves no essential differences in the guns themselves, other than the limits of weights imposed by the required mobility. (See **FIELD ARTILLERY**; **SIEGE GUNS**; and **COAST ARTILLERY**.) Yet another classification of cannon, depending upon their mode of operation and service, differentiates between the ordinary breech mechanism with separate loading of projectile, charge, and primer, and the rapid-fire (or quick-fire) gun, semi-automatic, automatic, and machine gun. The rapid-fire gun is one with a breech mechanism opened and closed by a single motion of a lever and loaded with fixed ammunition—projectile, charge, and primer fixed in a metal case, so that all can be inserted at one motion. (They will be found described under **RAPID-FIRE GUNS**.) Semi-automatic guns are those rapid-fire guns in which the energy of recoil is utilized to open the breech, reload, and cock—each round being, however, inserted

by hand and the trigger pulled for each discharge. Automatic guns are those in which the above utilization of recoil is extended to all operations, the cartridges being fed automatically in strips or belts, or otherwise, and the gun firing round after round automatically as long as a trigger is pressed.

Machine guns include all guns in which the action is as described for automatic guns, whether the power for operation is derived from the recoil as above, and as exemplified in the Maxim, Colt, and Hotchkiss automatic guns, or is supplied by a cannoner or motor continuously turning a crank as in the Gatling machine gun and the Hotchkiss revolving cannon. They will be found treated under **MACHINE GUNS**.

At one time much was promised for guns in which compressed air was employed to throw large quantities of dynamite or other high explosive relatively short distances. A pneumatic dynamite gun for coast defence was invented by Captain E. L. Zalinski, U. S. A., and after a number of experiments several of these guns were constructed and installed in fortifications in the United States, but these have since been removed as obsolete. These guns were smoothbore, the largest having a tube 50 feet in length and a calibre of 15 inches. Compressed air derived from a compression plant located near by and stored in reservoirs so that it could be used in the gun at a pressure of 1000 pounds to the square inch was employed. A range of about 5000 yards was attained with the 15-inch guns and projectiles containing 100 pounds of high explosives. The Zalinski gun has also been used at sea, the dynamite cruiser *Vesuvius* having been constructed with three tubes, and was employed at Santiago, but without the success anticipated. Another form of pneumatic gun is the Sims-Dudley gun, in which a projectile containing a charge of about four pounds of high explosives is fired by air compressed by the explosion of gunpowder in a lower barrel. This gun was used with some success during the Spanish-American War. See **AIR-GUN**.

The distinctions between smoothbores and rifles, and between muzzle-loaders and breech-loaders, are obvious; all modern guns are breech-loading and rifles, but it is customary to designate them as 'breech-loading rifles' (B.L.R.) to avoid confusion with the obsolete guns still in existence.

CARRIAGES. Gun carriages are either stationary (as seacoast) or mobile (siege and field); as to mode of action, barbette, disappearing, turret or casemate, or motor carriages, or rapid-fire mounts (recoil and non-recoil). The main function of a gun carriage is to support the gun during firing; secondly, means must be provided for pointing the gun. Mobile carriages must also possess the attributes of vehicles.

Modern seacoast carriages have a cast-iron base ring, solidly set in concrete, an iron or steel turntable or racer upon this, and the chassis assembled thereon. Generally a top carriage of some sort runs back on rails on the chassis, its motion in recoil controlled by a brake, generally hydraulic. Such a brake consists of a cylinder fastened to the top carriage, which contains a piston fastened to the chassis. Oil in the cylinder can pass the piston, as the cylinder moves to the rear, only through small orifices in the piston varying in size during recoil.

The first step in design is to construct a curve showing the velocity the gun would have if left free to recoil with no resistance but its own inertia. A certain constant resistance is now fixed upon for the brake, and the resulting velocity of retarded recoil is plotted. From this the opening in the piston, varying with the distance recoiled, to give the desired constant resistance, is calculated—resistance to flow through

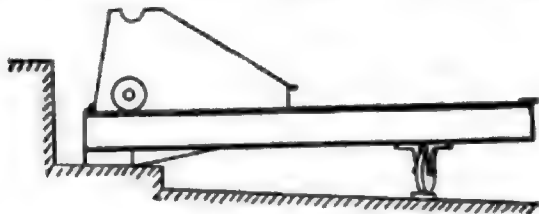


FIG. 11. U. S. IRON SEACOAST BARBETTE CARRIAGE FOR RODMAN SMOOTHBORE.

(In use up to 1875 and later modified for 8-inch converted rifle.)

an orifice being known to vary inversely as the square of the velocity. Thus the constant pull transmitted to the chassis by the piston rods, and hence the stresses borne by all parts, are determined and used to calculate their dimensions.

Prior to the adoption of the hydraulic brake various means of checking recoil were used. Up to about 1850 the friction of wooden wheels and axles was used with a rope for final stop. About 1860 naval carriages were made of iron and had no rear wheels but a shoe (for friction). The front wheels helped in returning the gun to

clearance. Sir W. Siemens introduced holes in the piston head. So far, the orifice being constant, the pressure varied, running up to high values, then decreasing. To obtain constant pressure (to do the same work with less maximum strain) the orifices came to be varied, by taper rods passing through them, by rotating disks partially closing them, by by-pass pipes with spring valves and by other methods, among which are the 'throttling bars' used in the United States carriages. Here the piston has notches in its circumference partly closed by bars of varying depth screwed to the cylinder. As the piston travels in the cylinder the orifices change with the depth of the bars.

Top carriages now recoil on rollers to eliminate as much as possible the uncertain effect of sliding friction.

Return to firing position is accomplished by gravity, springs, or pneumatic or air power.

For giving elevation, guns are generally rotated about their trunnions (at or near the centre of gravity) by a screw, rack-and-pinion, or similar device at the breech. In rapid-fire mounts the principle is the same although elevation is generally given to a cradle or slide in which the gun's axis is fixed. In field guns, to economize space, the motion is doubled by having one screw work inside of another.

For traversing, the early carriages were pried bodily sidewise by levers; then the chassis was pivoted and rotated by ropes and pulleys or later by gearing of one kind or another. Still later the chassis was fixed upon a turntable rotated

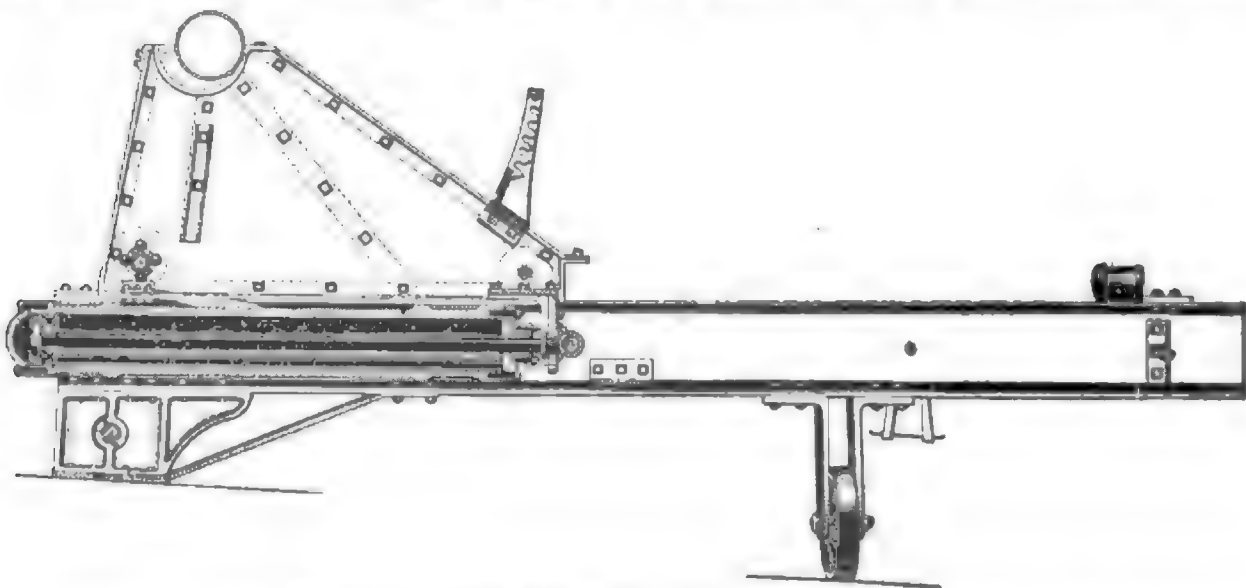


FIG. 12. U. S. IRON BARBETTE CARRIAGE FOR 8-INCH RIFLE.

Altered from carriage for 10-inch smoothbore, and used for the 8-inch converted muzzle-loading rifles. This carriage has eccentric wheels travelling on the chassis and a hydraulic recoil brake.

battery. On land heavy carriages had I-beam chassis, and top carriages like the above. Friction of top carriage on chassis rails as well as the inclination checked recoil. Eccentric axles allowed recoil on friction and return on rollers. As the power of guns increased, recoil had to be further controlled. Between 1870 and 1880 various frictional devices were used. One or more bands of iron fastened to chassis were gripped by plates on top carriages pressed tightly on them.

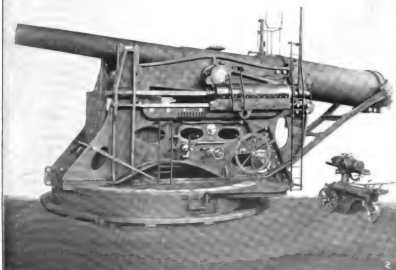
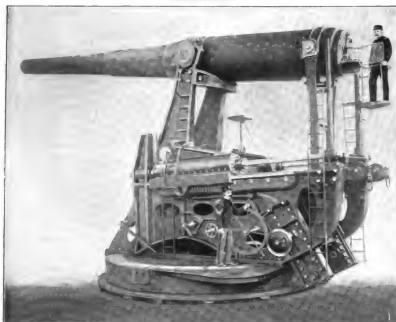
The earliest hydraulic cylinders (about 1876) had pistons either pulled out or pushed in by recoil, the oil flowing around the piston in the

by a pinion working in a circular rack in the foundation and operated by gearing.

In barbette carriages the gun is generally mounted on trunnions directly in the top carriage, which slides to the rear (restrained by a hydraulic brake) on the chassis rails. These incline upward slightly, to make the gun run into battery again. This type is mostly used in land forts for heavy guns. See illustration of 8-inch Breech-loading Rifle on Plate of COAST ARTILLERY.

The essential feature of carriages for use in casemates or turrets is that the opening in the wall or armor necessary for them to

ORDNANCE



U. S. ARMY DISAPPEARING CARRIAGE, MODEL 1896, FOR 12-INCH BREECH-LOADING RIFLE (Buffington-Crozier Design).
 1. In firing position. 2. In loading position.

fire through with the desired horizontal and vertical angles of train shall be as small as possible. The former was provided for up to very recent time by placing the pintle or point of revolution at the front end of the carriage, or even in the wall, and connected with the carriage by a metal rod called the tongue. In turrets, land or naval, it is customary to rotate the turret, gun and all, and thus eliminate all horizontal movement of the gun with respect to the opening or embrasure. To reduce the embrasure vertically the gun is lifted or lowered by two hydraulic presses, or other power, the muzzle being stationary. The necessity for such carriages for land service has decreased with the abandonment of masonry forts, but exists in naval mounts, whether in turrets or not, and in land turrets (as yet few in use).

DISAPPEARING CARRIAGES. In the United States disappearing carriage for seacoast guns (the Crozier-Buffington) the gun's trunnions rest in the upper ends of two levers which have an axle at their centres resting in a top carriage and pins at their lower ends supporting a counterweight in vertical guides. The motion of the gun's trunnions in recoil is a resultant of the horizontal motion of the gun-levers' centre and the vertical motion of their lower ends—therefore an ellipse. The breech is held up at the proper height by a rod pivoted at bottom in a slide raised or lowered to change elevation. In recoil, therefore, the breech moves in a circular arc. The gun's muzzle moves to the rear almost horizontally until it clears the parapet—then sharply downward. In the loading position, the breech (the most exposed part) is protected from fire over the parapet of less than 7° angle of fall. The motion of the top carriage is controlled by a constant resistance hydraulic brake. The recoil is also somewhat absorbed by raising the counterweight, but this is incidental, as the counterweight's function is simply to return the gun to the firing position. Pawls catch on teeth on the counterweight crosshead holding the gun in the recoiled position for loading until released by a lever. Entirely protected from the enemy's fire, the cannoneers load the gun and traverse and elevate by means of hand cranks or electric motors. This may be directed from a distance by telephone, or by one man on the sighting platform—the only one exposed to fire—who, in the later models of carriages, can himself perform the training by electric controllers within reach. This carriage was invented in principle by Gen. A. R. Buffington in 1872, and developed into the present form, about 1890, by Gen. William Crozier (both of the Ordnance Department, United States Army).

The only other disappearing carriage of any importance now in use is the English Elswick carriage, in which the gun levers have fixed pivots at their lower ends and are controlled in rotation by a rod from their centres carrying at its lower end the piston of the hydro-pneumatic cylinder, which by oil flow softens recoil, and by air compression stores up energy to return the gun to the firing position.

MORTAR CARRIAGES. Mortar carriages have the turntable and chassis as in the preceding, but no top carriage. Being for high angle fire and recoiling necessarily downward, springs are necessary for return to firing position. In the United States model of 1896 the mortar rests on the end of a

lever pivoted at its bottom to the turntable and with spring columns and hydraulic buffer beneath. Previous to the adoption of such types as these mortar carriages had been simple iron boxes with trunnion beds. See Plates of COAST ARTILLERY and ARTILLERY.

RAPID-FIRE MOUNTS. Rapid-fire mounts are a development of the last twenty years. They are either recoil or non-recoil. Applied first to small guns (as one-pounders and three-pounders), no recoil was allowed, the mount being made strong enough to transmit the shock of discharge to the deck, which, however, could not stand the shock due to large calibres when so mounted. A non-recoil mount for six-pounders reduces the shock on the deck to about one-sixth. There are other advantages. So recoil mounts are now almost universally used, even for small guns. Such a mount consists of the pedestal bolted to deck or platform, a Y-shaped yoke rotating about a vertical axis in the pedestal and in its upper arms carrying upon trunnions a cradle in which the gun has longitudinal motion. In the under portion of the cradle is the cylinder of a hydraulic brake and either in this cylinder or beside it are spiral spring columns.

Training is done in the small-calibred guns by a shoulder bar with rubber cushion, fastened in non-recoil mounts to the gun or yoke, in recoil mounts to the yoke or cradle. With his shoulder against this bar the gunner points the gun in direction and in elevation almost as a small arm. In guns of over 3-inch calibre it is customary to train by hand wheels within easy reach of the gunner.

Balanced pillar mounts are rapid-fire mounts like the above, but mounted on a vertical cylinder which is balanced by a counterweight and can, when not in action, be lowered to mask the gun and carriage completely behind the parapet.

MOBILE CARRIAGES. Carriages for field guns and howitzers and for siege guns and howitzers differ in detail and size, while the same in principle. Siege carriages are generally high enough to fire over a five-foot or six-foot parapet, and much heavier than field carriages because of the greater energy of recoil and because they do not require so great mobility. They weigh about 5500 pounds, with limber, while field carriages are limited to 4000 pounds, including limber, and three cannoneers and 700 pounds or more of ammunition.

Mortars for field and siege use are generally fired from immobile carriages and transported on wagons. Siege carriages generally require platforms to which they are attached to assist in control of recoil.

A carriage, field or siege, must have two wheels with axletree and a trail giving a third point of support on the ground when firing. The trail also connects with the limber for traveling. Until recently trunnion beds were formed in the front ends of the sides or flasks of the trail and the gun had no recoil relative to the carriage, which ran back on the ground until the energy was absorbed by friction of brake and resistance of ground.

Up to the United States Civil War all mobile carriages were made mostly of wood, although with metal bracings, axletrees, and other parts. At this time iron was recognized as the coming material and was soon adopted. Since 1880 all carriages have been made of iron or steel, now al-

most entirely of the latter. Earlier iron carriages had flasks of plates and angles. The Buffington carriage (United States), of steel pressed with bulb edges, has been in use from 1886 to the present time.

braking and helical springs for returning the gun to the firing position. The carriage is so stable that cannoneers sit on the trail, aiming, etc., during firing. This is the result of careful calculation of the forces in equilibrium during

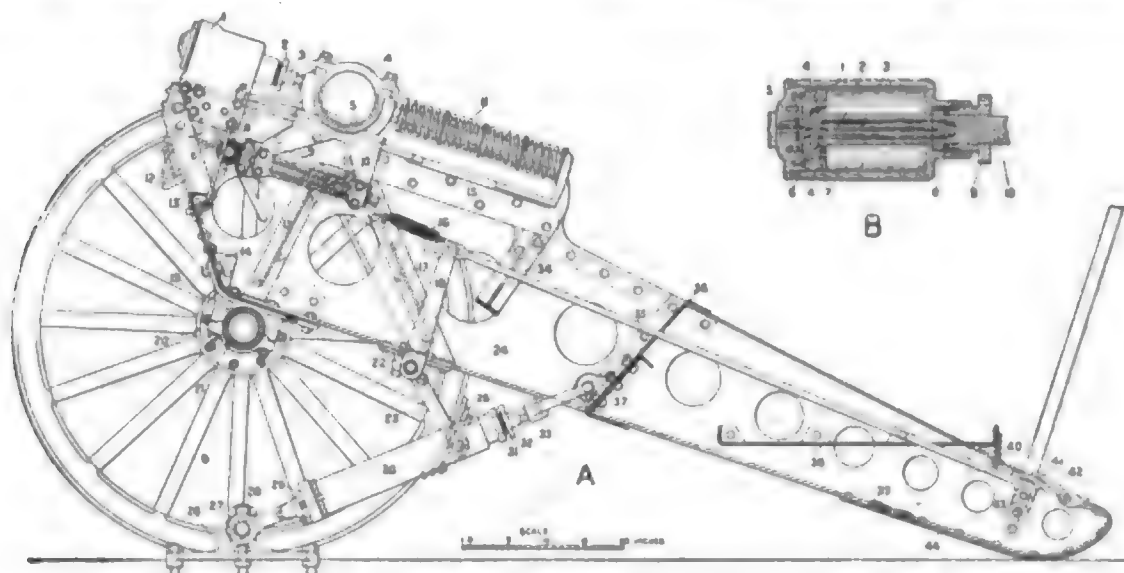


FIG. 13. SEVEN-INCH SIEGE HOWITZER CARRIAGE, UNITED STATES ARMY MODEL, 1899.

A. (Vertical section). 1, recoil cylinder; 2, gland for recoil cylinder; 3, piston; 4, cap-square; 5, trunnion carriage; 6, elevating rod; 7, elevating nut; 8, equalizing pipe; 9, worm buffer; 10, elevating worm; 11, recoil springs; 12, elevating wheel; 13, front transom; 14, handspike, etc., socket; 15, slide rail; 16, brake spring; 17, flask stiffener; 18, brake shaft lever; 19, axle bracket; 20, axle bracket-cap; 21, axle; 22, brake-shaft bearing; 23, brake shaft; 24, flask; 25, brake shoe; 26, pintle plate; 27, 29, cylinder head; 28, pintle nut; 30, brake cylinder; 31, gland; 32, piston; 33, piston eye; 34, stop transom; 35, reach rod; 36, carriage brake transom; 37, brake fastener; 38, foot plate; 39, lunette reinforce; 40, tool chest lock; 41, brake lever socket; 42, brake catch pawl; 43, brake rod crank; 44, trail shoe. B. Recoil cylinder (horizontal section). 1, recoil cylinder; 2, piston; 3, throttling rod; 4, oil passage; 5, front cap; 6, piston; 7, piston liner; 8, follower; 9, gland; 10, piston.

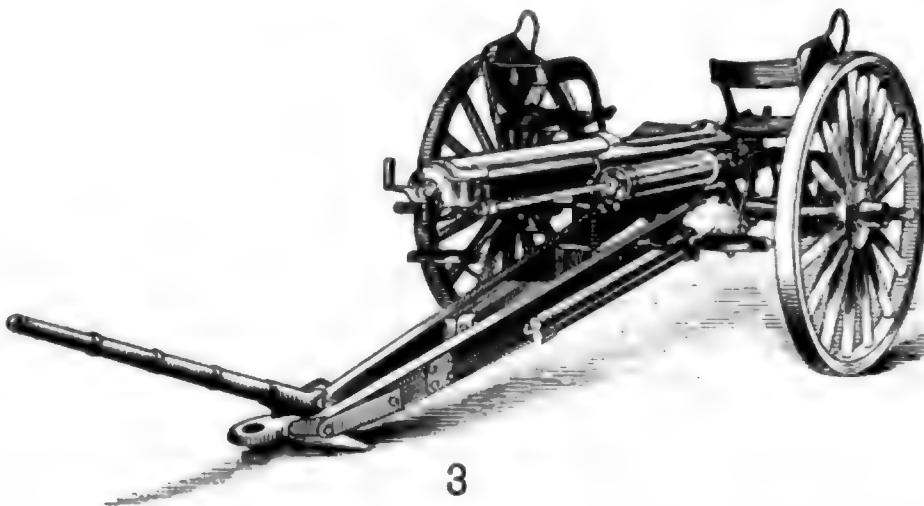
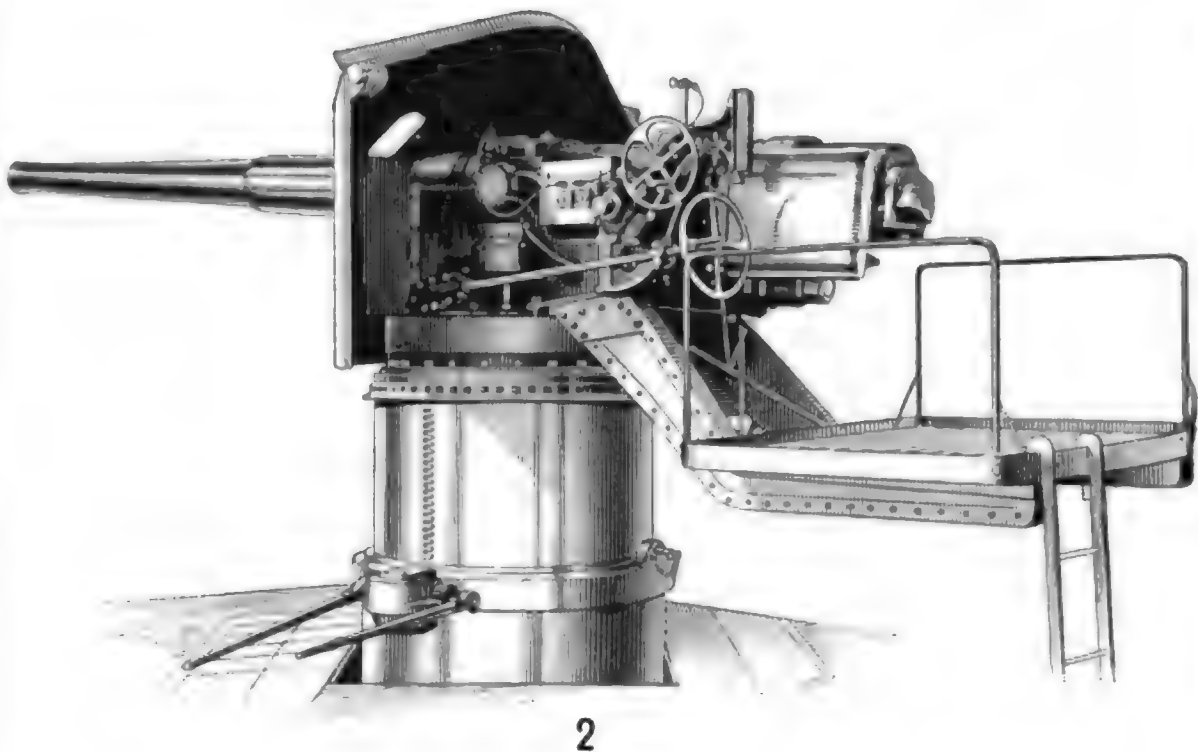
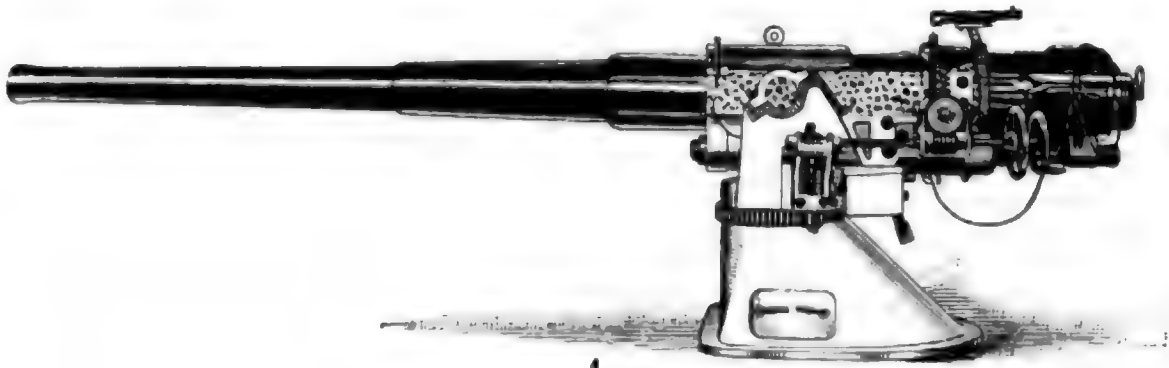
To enable carriages to stand guns of increased power without undue recoil, brakes were devised, set by recoil, and released by running forward. Later, spades were introduced. When power increased so as to work the spade too hard, a short recoil was given the piece upon the carriage, this being first applied to siege, and later to field carriages. This enabled the spade to hold, but resulted in the wheels of the carriage jumping from six to twelve inches from the ground with derangement of aim and loss of rapidity of fire. In the last few years rapidity has been much discussed and sought for in ideal rapid-fire field guns to fire about twenty aimed shots per minute. This result has been nearly attained in a number of recent constructions.

Such a system requires a carriage unmoved by discharge (necessitating about 45-inch recoil of the piece upon it, with automatic return to firing position—quick, but without shock—and a spade to take sure hold of earth); also means for traversing the gun on the carriage and for elevating by cranks within reach of one man at the sights. The Ehrhardt carriage (adopted by England) has the gun on a slide under which is a hydraulic brake or cylinder surrounded by a helical spring. Its trail can be extended for stability. Krupp uses a similar arrangement for recoil springs. The United States conducted in 1902 experiments for selection of a type: testing two carriages made by the Bethlehem Steel Company, one by the Cockerill Company, one by the Vickers-Maxim Company, and several others, including two Ordnance Department designs by Captain Wheeler, one with 8-inch and the other with 46-inch recoil, have been submitted. In the latter the gun recoils through a bronze cradle which holds two cylinders containing oil for

discharge. To prevent jump, the moment of the pull on the piston rod about the spade must not exceed that of the weights about the same point. The guns selected embraced the best points of the Ehrhardt gun, with the improvements and original features of the United States Ordnance Department's models. All parts must be reduced to minimum weight needed for strength, to keep within the limit of weight allowed for draught. See FIELD ARTILLERY.

BIBLIOGRAPHY. Of the many publications on ordnance matters, the reader is referred to the following few as comprehensive and most accessible, viz.: Bruff, *Ordnance and Gunnery* (New York, 1896); Ingersoll, *Text-Book of Ordnance and Gunnery* (United States Naval Academy, 1887, used in the United States Military and Naval academies, respectively); *Annual Reports of the Chiefs of Ordnance, United States Army and Navy* (Washington); *Treatise on Military Carriages*, English War Office (London, 1895); *Treatise on Service Ordnance*, English War Office (ib., 1891). Also numerous official pamphlets and books of instruction, issued by the United States and foreign war departments, advertising matter of private firms, especially Armstrong and Hotchkiss, and the numerous technical periodicals, *Mittheilungen über Gegenstände des artillerie- und Genie-Wesens* (Vienna, bimonthly); *Militär-Wochenblatt* (Berlin, semi-weekly); *Revue d'artillerie* (Paris, monthly); *Revue militaire suisse* (Lausanne, monthly); *Revue de l'armée belge* (Brussels, bimonthly); *Journal of the United States Artillery* (Fort Monroe), etc. See ARTILLERY; GUNS, NAVAL; GUNPOWDER; EXPLOSIVES; MACHINE GUNS; PROJECTILES; RAPID-FIRE GUNS; SIEGE GUNS; COAST ARTILLERY; etc.

ORDNANCE



1. Four-Inch Rapid-fire Gun 50 calibres long on U. S. Navy Pedestal Mount, 1901.
 2. Balanced Pillar Mount for 5-inch Rapid-fire gun, model in use U. S. Army, 1902.

3. U. S. Army Ordnance Department 3-inch Rapid-fire field gun, long recoil carriage, designed by Capt. C. B. Wheeler. Gun shown partially recoiled on carriage, due to discharge.

ORDNANCE DEPARTMENT OF THE U. S. ARMY. One of the divisions of the United States Army, to which is assigned the duty of procuring by purchase or manufacture the ordnance and ordnance supplies required by the army and distributing the same. Accordingly the establishment and maintenance of arsenals, armories, and depots for the manufacture and storage of ordnance are assigned to this department. The regulations define ordnance and ordnance stores as including cannon and artillery carriages and equipments; apparatus and machines for the service and manoeuvre of artillery; small arms, ammunition, and accoutrements; horse equipments and harness for the artillery; tools, machinery, and materials for the ordnance service. This department is under a Chief of Ordnance, who has the rank of brigadier-general while serving in this capacity, and in 1903 there were four colonels, six lieutenant-colonels, twelve majors, twenty-four captains, twenty-four first lieutenants, one ordnance storekeeper with the rank of major, and 110 ordnance sergeants. Previous to the Army Bill of 1901, the officers in the Ordnance Department held permanent appointments, but this act provided that line officers should be detailed to the Ordnance Department by the President for a period of four years. Before an officer can be so assigned he must first pass a rigorous examination in which his professional qualifications are thoroughly tested. The officers, in addition to a thorough scientific military training, must possess a thorough knowledge of mechanical engineering in general and especially in its application to the various engines of war. This department has always maintained a high standard and many important inventions have been made by its members. In fact, the larger and more important guns constructed in the United States have been designed and constructed by the officers of this department at army arsenals instead of at the shops of private corporations, as is the case in most European countries. See **ORDNANCE**; **ORDNANCE ESTABLISHMENTS**.

ORDNANCE ESTABLISHMENTS. The United States maintains two Government gun factories, one at Watervliet, N. Y., for the army, and one at the Navy Yard, Washington, D. C., for the naval guns. Carriages for naval guns are made at Washington Navy Yard, and those for the army at the Watertown Arsenal, Watertown, Mass., and Rock Island (Ill.) Arsenal. Small arms for the army and navy are made at the Army Armory at Springfield, Mass., and ammunition therefor at Frankford Arsenal, near Philadelphia, Pa. The last mentioned arsenal makes also all fuzes, primers, sights, etc. Rock Island Arsenal, above mentioned, makes, in addition to mobile gun carriages, harness and other equipments used in the army. Material of war is fired and tested at the proving grounds at Sandy Hook, N. J. (Army) and Indian Head, Md. (Navy). There are various ordnance repositories, arsenals, armories, etc. (See **ARSENAL**.) Heavy gun carriages have been made for the United States by the Bethlehem and Midvale Steel companies, which firms also supply all the steel forgings for cannon. Bethlehem has also made 8-inch, 10-inch, and 12-inch modern built-up cannon. Other American firms also have made heavy gun carriages, 12-inch mortars, and smaller guns,

projectiles, etc. Explosives are furnished principally by the DuPont, the Lallin-Rand, and the California Powder companies. Revolvers, machine guns, etc., are furnished principally by Colt, and Smith & Wesson. In Europe the principal Government ordnance factories are at Woolwich Arsenal (England), Bourges and Puteaux (France), Turin and Naples (Italy), Alexandrowsk and Aboukhoff (Russia), Seville and Trubia (Spain). European nations depend principally for ordnance on private manufacturers, of which the most prominent are: Friedrich Krupp, at Essen, Germany; Sir W. G. Armstrong, Whitworth & Co., Ltd., Newcastle-on-Tyne, England, and Italy; Vickers Sons & Maxim Co., Ltd., England; Schneider et Cie, le Creusot and Saint Chamond, France; Hotchkiss et Cie, Saint Denis, France; and the Skodawerke, Pilsen, Austria. Proving grounds are located at Havre and Harfleur, France; Spezia, Italy; and Essen, Germany.

ORDONNANCE DE LA MARINE, ôr'dô-nâns' de là mârên'. A naval code of admiralty law, in 5 books, issued by Louis XIV. of France, at Fontainebleau, in August, 1681. Book i. deals with the organization of admiralty jurisprudence; book ii. with the contractual relations between masters and seamen; book iii. with the entire subject of marine contracts, covering such topics as charter-party, affreightment, insurance, average, jettison, etc.; also privateering and letters of marque and reprisal; book iv. with the administration of the customs; book v. with fisheries. Consult *Ordonnance de Louis XIV. . . . Touchant la marine* (Paris, 1681).

ORDOVICIAN (from Lat. *Ordovices*, name of an ancient British tribe of North Wales), or **LOWER SILURIAN SYSTEM**. A division of geologic time following the Cambrian and preceding the Upper Silurian or Silurian proper. The Ordovician comprises rocks originally classed by Murchison as the lower portion of his Silurian system. It was considered to be of sufficient importance to be classed as a separate division by Lapworth in 1879, who proposed for it the term Ordovician. The type section of the American Ordovician is found in New York State, and consequently the names of many of the subdivisions are locality terms used in New York. It is as follows:

Ordovician	Trenton	Hudson (Chelenuatl Utica Trenton
	Canadian	Chazy Beekmantown, (Caleferous).

The Ordovician rocks are chiefly limestones, with the exception of the upper and lower members, which may be very shaly, indeed the Hudson River shales form a very prominent series of rocks in the Appalachian States. The Trenton rocks are widely distributed over the continent. The Ordovician strata are often found fringing the Archæan areas, being sometimes separated from them by but a thin strip of Cambrian. Thus there are belts of Ordovician rocks around the New York Adirondacks; from central New York westward to Wisconsin and Minnesota; along the line of the Appalachians on the eastern and sometimes on the western slope from Vermont to Alabama; around the V-shaped Archæan or Lauren-

tian of Canada; and in the Central States, in Ohio, Kentucky, Indiana, and Tennessee. Ordovician rocks are also known in the Uinta, Wasatch, and Rocky Mountains. In Europe the Ordovician rocks form a large area extending from Iceland into Russia. They are of considerable thickness in Great Britain and Wales. Additional areas are found in Bohemia, Germany, France, Portugal, Spain, and Northern Africa.

In neither North America nor Europe do we find any marked break between the Cambrian and Ordovician systems, but the faunal changes are well shown. There was during the Ordovician times a great interior sea over the United States, and the coastal States were also under water, but in the southwest much dry land was known. At the close of the Ordovician there were great disturbances. The mountains along the New York-New England border were formed and gave rise to the so-called Taconic ranges and the Green Mountains. Much faulting and folding accompanied the uplift. There was also developed a line of uplift in Ohio, Kentucky, and Tennessee, which domed the rocks up into a low, broad anticline known as the Cincinnati arch.

The life of the Ordovician, while being in advance of the Cambrian time, was not of a high order. Many seaweeds have been found, and cryptogams probably existed, though only scanty remains had been found. Being land plants, their preservation would be doubtful in marine sediments. Foraminifera and Radiolaria were abundant, as were also the sponges. In the Hudson River slates graptolites were very common. Among the corals were many representatives of the *Tetracoralla*, and also large cup corals like *Streptelasma*, while *Columnaria* was a common compound one. Cystidean crinoids are numerous, and many starfishes and even sea-urchins are known. The trilobites were very well developed, but the genera were largely different from those of Cambrian age. The brachiopods were represented by many well-known genera, especially *Orthis*, and many groups of mollusca existed. *Pleurotomaria* among the gastropods, *Orthoceras* among the cephalopods were numerous. Fishes were the only representatives of the vertebrates, and of these were found armored ostracoderms in the Ordovician sandstones of Colorado. Fish teeth are known in the European Ordovician.

Among the useful minerals of the Ordovician are great quantities of building stone, including limestone and marble. In Ohio and Indiana great supplies of petroleum (q.v.) and natural gas occur in the rocks of the Cincinnati arch. Zinc and lead ores are mined in southeastern Missouri and the Upper Mississippi Valley in Wisconsin, Iowa, and Illinois. Along the contact between the Cambrian and Silurian in rocks in many parts of the Appalachians there are found deposits of limonite ores, many of which are mined.

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ical Survey Report for 1899 (Trenton, 1900); White, "The Original Trenton Rocks," in *American Journal of Science*, 4th series, vol. ii. (New Haven, 1896); Ruedeman, "Hudson River Beds Near Albany and Their Taxonomic Equivalents," in *Bulletin Geological Society of America*, vol. xii. (Rochester, 1900); Winchell and Ulrich, "The Lower Silurian Deposits of the Upper Mississippi," in *Minnesota Geology and Natural History Survey, Palæontology*, vol. iii. (Minneapolis, 1897). See GEOLOGY.

ORDWAY, JOHN MORSE (1823—). An American chemist and educator. He was born at Amesbury, was apprenticed to an apothecary (1836-38), and graduated from Dartmouth College in 1844. He was a member of the faculty of Grand River College, Trenton, Mo., from 1850 to 1857, and thereafter held superintendencies in a chemical factory at Johnston, R. I., and in a print works in Manchester, N. H. After several years as consulting chemist, Ordway, in 1869, became professor of metallurgy and industrial chemistry in the Massachusetts Institute of Technology. In 1884 he was appointed professor of applied chemistry in Tulane University, New Orleans, where he reorganized the biological department, and in 1891 became head of the department of engineering. His original work includes valuable research on lubricating oils and on non-conducting coverings for steam-pipes.

ORE (AS. *ār*, *ær*, ore, brass, copper, bronze, Goth. *ais*, OHG. *ēr*, brass; connected with Lat. *æs*, copper ore, bronze, Skt. *ayas*, metal). A mineral mass containing one or more metals in sufficient quantity and purity to warrant its exploitation. In a mineralogical sense all metallic minerals are ores, but technically the term is limited to those rocks or minerals that can be mined and treated at a profit; thus, menaccanite (a mixture of iron and titanium oxides) is classed by mineralogists as an iron ore, although, owing to its composition, it is not utilized as such in metallurgy. An ore may contain metal in the native state, as most gold ores, or the metal may be chemically combined with other elements, as is illustrated by iron ores and most of the other commercial ores. See ORE DEPOSITS.

ÖREBRO, *œ're-brü* or *œ're-brŭ*. A seaport of Sweden, situated at the entrance of the Svartå-Elf into the Hjelmar Lake, 135 miles west of Stockholm (Map: Sweden, F 7). Part of the town is built on an island in the river, and contains the old castle, now a museum. The church and the town hall are the most notable buildings. The town has manufactures of machinery, tobacco, matches, and chemicals. These industrial products, together with the minerals obtained from the neighboring silver, copper, and iron mines, are conveyed to Göteborg and Stockholm by means of the extensive system of canals which connects the lakes of the interior with the maritime ports. Population, in 1890, 14,547; in 1900, 22,013. At the Diet of Orebro, held in 1529, Lutheranism was established as the State religion of Sweden.

ORE DEPOSITS. The name applied to deposits or accumulations of metalliferous minerals or ores found in the earth's crust. The term ore includes those portions of the ore body in which the metallic minerals form a sufficiently large proportion to make their extraction profitable; aside from these there are often quantities of

associated non-metallic minerals forming masses containing little or no metal, which are termed the gangue. The metallic mineral of the ore is sometimes in the native or metallic form, but more commonly it is an oxide, sulphide, sulphate, carbonate, silicate, or some other salt of the metallic element. A deposit may contain the ores of one or several metals, and there may also be several compounds of the same metal in any one deposit. Gold, platinum, and tin are usually found in the native condition, while copper, lead, and zinc commonly exist as sulphides and iron as oxides. The common gangue minerals are quartz, calcite, barite, dolomite, fluorite, hornblende, feldspar, etc. They may sometimes be so evenly mixed with the metallic minerals that it is necessary to crush the ore and separate the two by mechanical or magnetic methods, while at other times the gangue forms horres (q.v.) which can be easily separated or avoided in mining. Ore deposits vary greatly in form, size, and geological position as well as in their mode of origin.

ORIGIN. The fact that the deposits occur as masses of greater or less concentration may be explained in two ways: that they have been formed contemporaneously with the inclosing rock, or that they have been formed by a process of concentration at a later date. The former theory involves a consideration of ore occurrences in both igneous and sedimentary rocks. If the ore in an igneous rock were formed at the same time as the rock, it would indicate a crystallization of metallic minerals from the igneous magma during cooling, and this in some cases is true. If the ores of sedimentary rocks were of contemporaneous origin, then the deposit must be a bedded one, conforming to the strata of the rock; this supposition requires the presence of metalliferous minerals in and their deposition from sea water. While certain metallic elements are found in the waters of the ocean, their quantity is extremely small and not to be compared with the amount which may be found in disseminated or concentrated form in sedimentary and igneous rocks. Some economic geologists have assigned a contemporaneous origin to certain ores found in sedimentary strata, but the majority at the present day believe that most ore deposits have been formed by the process of concentration. That metallic minerals are widely distributed, although in small quantities, in both igneous and sedimentary rocks, has been shown by the researches of Sandberger and others, and the quantity of them found in igneous rocks is slightly greater than that occurring in sediments. Since, however, the sediments were originally derived from the igneous rocks, it follows that the latter must be the original source of the minerals. Where ores have resulted by a natural process of concentration, their accumulation requires the presence of disseminated metals in the earth's crust, the existence of a solvent and carrier, and the presence in most cases of cavities in which precipitation of the ore occurs. The first point has already been referred to. As regards the second, it is found that the analyses of many spring and mine waters have shown the presence of metallic elements in solution, including gold, silver, copper, zinc, lead, and mercury. Indeed, some of these metals are actually being deposited in some hot springs at the present day; Weed has described a spring in Montana which carries gold and has deposited its burden of auriferous

quartz on the plants near its mouth. That there is a wide circulation of meteoric water in the rocks of the earth's crust has been quite clearly shown by the work of Van Hise. The return of this water to the surface may occur along fissures or other openings which it can easily follow. That these circulating meteoric waters may play an important rôle in the concentration of many

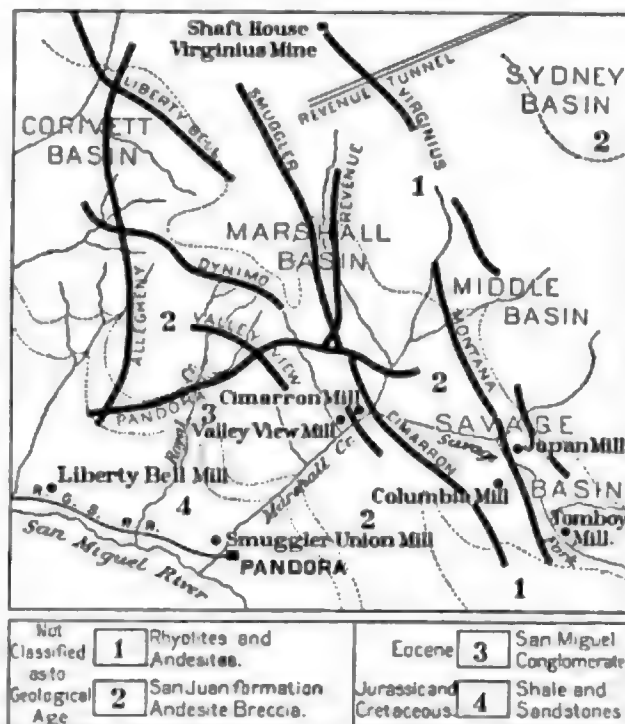


FIG. 1. GEOLOGICAL SKETCH MAP OF THE TELLURIDE DISTRICT, COLORADO.

ores is no doubt true, and some geologists even consider that most ores have been formed in this manner. On the other hand, it has been pointed out that most ore deposits are closely associated with igneous rocks, and in some cases with hot springs, and that therefore the former have served to open the way for heated waters and vapors whose solvent power is much greater than that of cold water. The advocates of the meteoric circulation theory believe that the waters have penetrated to the lower depths of the crust or barysphere, where metallic particles are considered to be abundant, and brought them toward the surface, where they were deposited. Those who consider the presence of igneous rocks to be an important factor in ore deposition also believe that the minerals may in some cases have been brought from a great depth in solution in the waters given off by the igneous magma, but that in some instances the igneous intrusion itself may have been the source of the minerals.

While all minerals are slightly soluble in cold water, this solvent power may be greatly increased by heat, pressure, and the presence of alkaline salts or other compounds. The metals may thus be leached out of the rock at some depth and out of contact with the air. When the solutions approach the surface or enter a cavity, the load of dissolved minerals is deposited either wholly or in part, as a consequence of cooling of the ore-bearing solution, decrease in pressure, and in some cases of the oxidizing effect of the atmosphere which converts certain soluble salts into an insoluble form. Iron compounds, for example, may go into solution in the form of carbonate, but on exposure to the air the latter

is rapidly changed to limonite, the hydrous oxide, which is insoluble. Since many ore deposits are formed in cavities, the question arises to what depth in the earth's crust cavities may extend. Investigations of Van Hise have pointed out that there can be recognized in the earth's crust two physico-chemical zones. In the upper one, which is close to the surface, the temperature and pressure in the rock are not great. In the lower zone, which is at some depth below the surface, both temperature and pressure are great, and consequently chemical reactions take place. This lower zone Van Hise divides into three parts, namely: an upper zone of fracture, in which the rocks are broken up by movements along the surface of the zones, but no movement in the zone itself; an intermediate zone of fracture and flowage; and a lower zone of flowage, in which a mashing or kneading action takes place, which involves every particle of rock. Within the last mentioned zone it would not be possible, therefore, for any cavities to exist, and Van Hise has figured out that in round numbers the maximum depths at which cavities can exist varies from 1625 feet in shales to 32,500 feet in firm granites.

The cavities in which the ores are precipitated have been formed in several different ways. The small ones, when existing in sedimentary rocks, are probably due to the presence of pores between the grains, or in the case of igneous rocks are gas cavities. More extensive ones may be caused by solution, especially in limestones, where caves are often formed by the solvent action of water, by contraction upon cooling or drying, which divides the rock along joint planes, or by folding or faulting of the strata, which may open fissures of considerable depth and length. The presence of cavities is not, however, necessary for the deposition of ore, since the conditions which are sometimes favorable to its precipitation may also favor the solution of other minerals, and thus the particles of a common rock may be slowly dissolved while ore is precipitated in its place. This process, which is known as replacement or metasomatism, is not uncommon, and often involves a large mass of rock, some deposits being formed wholly in this manner. The boundary of a deposit formed chiefly in a cavity may sometimes be indefinite because replacement of the walls by ore has taken place.

FORM. Ore deposits vary greatly in their form, and this character has sometimes been used as the basis of classification. Certain forms are so numerous as to deserve special mention.

Veins are filled fissures sometimes extending vertically, but more often inclined toward the horizontal. They have commonly been filled by deposition from solution, and in this respect differ from dikes (q.v.). In the true fissure-vein the ore deposit, which is tubular in form, shows a banded structure due to the deposition of successive layers on the walls of the cavity. These layers or bands may represent different ores or consist of alternating layers of ore and gangue. At times, especially when the fissure is very narrow, the ore-bearing solutions may not only have filled the fissure, but have penetrated the wall rock as well, either filling the pores, or more often replacing portions of it, and then there will be a gradation from vein matter to the wall rock. Where the fissure is extremely narrow the ore

owes its presence almost entirely to replacement; such veins lack a banded structure, being thereby distinguished from those formed by filling alone. If the vein is inclined the lower wall is spoken of as the foot-wall, and the upper one as the hanging wall. Veins often split, narrow (pinch), or widen (swell), and change their direction. In passing through hard, massive rocks like quartzite, the vein fissure is apt to be clean-cut, but where the fissure passes through soft rock like shale or some dikes it may split up into a number

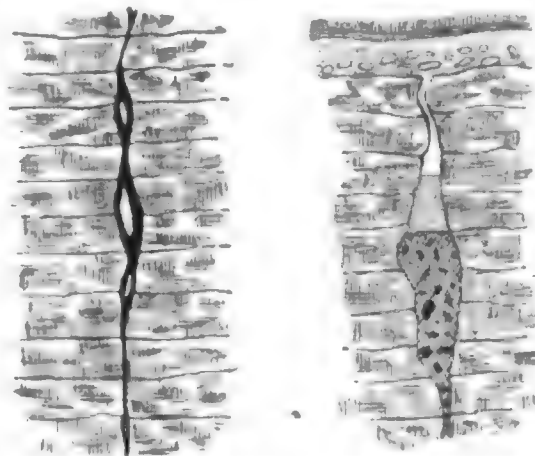


FIG. 2. SECTIONS OF GASH VEINS, FRESH AND DISINTEGRATED.
The heavy black shading indicates galena.

of small stringers. A parallel series of closely spaced veins is termed a *lode*. Veins may often intersect, and of two which cross each other one may be of a later date and follow a fault plane which has broken and displaced the earlier one. The ore in such cases is apt to be much richer at the point of intersection. Even in a single vein the ore may follow certain streaks which are termed *shutes*, or again it may be restricted to pockets of great richness, which are known as *bonanzas*. Of the different gangue minerals found in veins, quartz is the commonest;

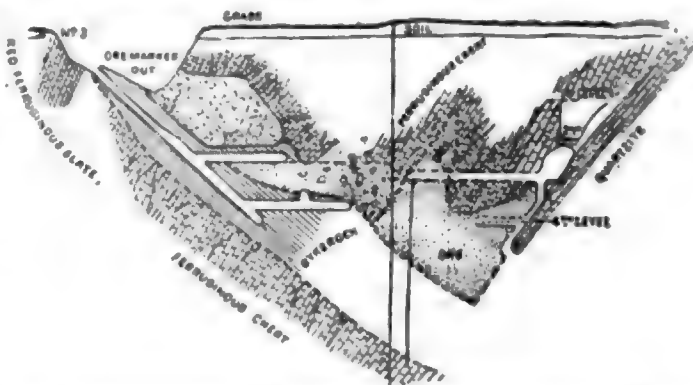


FIG. 3. CROSS-SECTION OF COLBY MINE, PENOSKE-GOGEBIC DISTRICT, MICHIGAN.

in some regions, as California, quartz veins are extremely abundant and often carry considerable gold. Since the quartz is commonly resistant to the weather, the wall rocks may often decompose and wash away, leaving the outcrop of the vein extending as a ledge or ridge along the surface. Veins vary in width from a few inches to several hundred feet and their outcrop or apex (q.v.) is sometimes traceable for a long distance. *Gash veins* are a special type of local extent, formed by the enlargement of joint fissures.

The manner in which fissure veins have been filled, and the source of the metals which they

contain, has been a subject of prolonged discussion among economic geologists. Some have argued for the theory of lateral secretion, considering that the waters which carried the

tion of the theory of lateral secretion, the idea having been first brought forward in studying the deposits of Leadville, Colo.

The term *impregnation* is applied to those deposits which have been formed by the deposition of ore in minute cavities of porous rock or in the crevices of a breccia. *Ore channels* are deposits formed along some path of easy access to the mineral solutions, as along the boundary between two kinds of rock. *Bedded deposits* are formed parallel to the stratification of sedimentary rocks. *Contact deposits*, as now defined, represent ore bodies formed along the contact of a mass of igneous and sedimentary rock, the ore having been derived wholly or in part from the intrusive masses. *Chamber deposits* include those formed in caves of solution. *Placer deposits* include a series of gravel deposits of sedimentary origin. These are widely distributed, especially in the Western States, and are a common source of gold, platinum, and sometimes tin.

WEATHERING. Most ore deposits have been changed superficially by weathering, the depth of this alteration varying from a few feet to several hundred; in the Rocky Mountains, 300 to 400 feet is not uncommon, and 1000 feet is extreme; in Chile a depth of 1500 has been recorded. Where the ore body contains iron-bearing minerals the oxidation of these may stain it heavily with limonite, and to this the name of *goossan* is often applied. At some localities the leaching out of the other minerals has naturally resulted in the concentration of the iron contents, so that the *goossan* can be worked as an ore of the latter mineral, while below the zone of weathering the de-



FIG. 4. THE JUMBO VEIN FAULTED BY A CROSS-VEIN.

metals had dissolved them from the immediate walls of the fissure on either side of the vein. Others combat this view and claim that the solu-

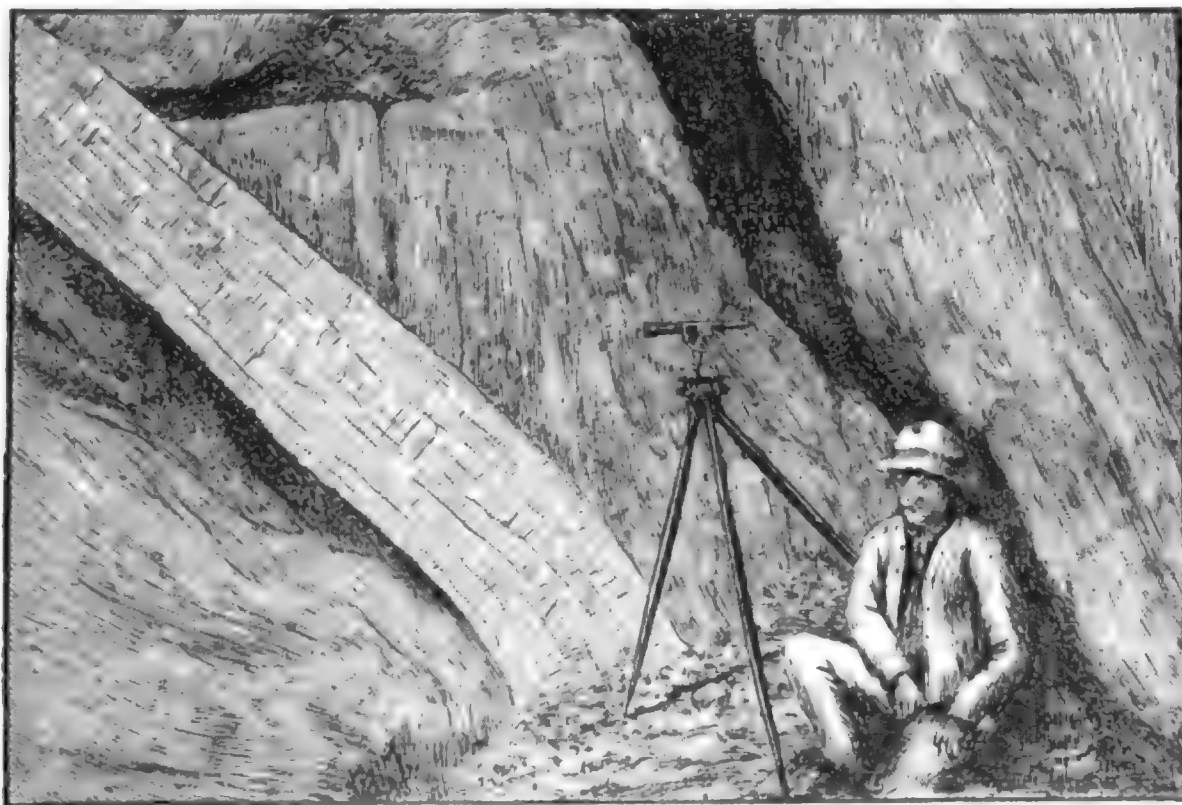


FIG. 5. GOLD QUARTZ VEIN IN MARYLAND MINE, GRASS VALLEY, CALIFORNIA, SITUATED ON 1450-FOOT LEVEL, 2½ FEET THICK AND VERY RICH.

tions had brought the metals from below and followed the fissure upward. This is known as the theory of ascension. The views held by most geologists at the present day are an amplifica-

posit supplies a different type of ore, namely, that which originally predominated in it. The changes caused by weathering are both physical and chemical, or the same as would occur in all

rocks, the difference being that the metallic minerals are more easily affected. The physical changes involve a disintegration of the mass. The chemical effects include processes of oxidation, hydration, and solution. Sulphides are changed to sulphates and chlorides, oxides to carbonates and silicates. One result of this change is to convert many insoluble compounds into soluble ones; and these latter are taken up by percolating waters, carried to a lower depth and there deposited, in some cases producing a *zone of local enrichment* at the water-line, that is, at the boundary of the gossan, or oxidized, and the unaltered portion of the ore body.

VALUE. The quantity of metal necessary to make mining operations profitable depends largely on the character of the ore. Lake Superior copper ores contain as little as 0.65 per cent. of native copper; and many copper sulphide ores running as low as 2 or 3 per cent. metallic copper are successfully worked. Many low-grade lead and zinc ores are profitably worked because their gold and silver contents more than pay the cost of metallurgical treatment. Gold ores alone, running as low as \$2 to \$3 per ton, can be successfully worked under favorable conditions. In nearly every case the metallic contents of the ore is increased by mechanical concentration or by roasting (in the case of sulphides), or both, before the ore is smelted.

CLASSIFICATION. Numerous attempts have been made to develop a suitable classification of ore deposits, and the schemes suggested have been based either on the form, mineral contents, or mode of origin of the ore body. The first is perhaps the most practical from the miners' standpoint. The second is undesirable because several kinds of ore may often be found in the same ore body. The third is probably the most scientific, and is of value to the mining geologist and mining engineer, as it serves as a guide toward judging the possible extent or irregularity of the ore masses under consideration. The classification proposed by W. H. Weed, which is given below, includes the most recent discoveries and ideas on the origin of ore deposits. This classification is based entirely on the origin of the ore mass.

GENETIC CLASSIFICATION OF ORE DEPOSITS.

- I. Igneous (magmatic segregations).
 - A. Siliceous: Aplitic masses, quartz veins of Alaska, etc.
 - B. Basic: Peripheral masses and dikes.
- II. Pneumatolytic Deposits (deposited by igneous emanations; the gases being above the critical point).
 - A. Contact metamorphic deposits (characterized by gangue of garnet, epidote, actinolite, calcite, and other lime-alumina silicates).
 - B. Veins. (Closely allied to magmatic veins and to Division IV.)
- III. Fumarole Deposits (metallic oxides, etc., in clefts in lavas, of no commercial importance).
- IV. Gas-Aqueous Deposits (igneous emanations mingled with ground waters).
 - A. Filling Deposits: Fissure veins, impregnations of porous rock, and cementation deposits.
 - B. Replacement Deposits: Veins, stocks,

chimneys, etc., formed by replacement of wall rock.

V. Deposits from meteoric waters.

A. Underground: Veins and replacements.

B. Surficial: Bog ores, gold placers, etc.

Igneous ore deposits constituting the first division are those in which the metallic minerals have crystallized directly from the igneous magma during cooling. Such deposits may occur in dikes, or on the periphery of igneous masses; the collecting or gathering of the ore particles being the result sometimes of mutual attraction or again of convection currents set up during cooling. In pneumatolytic deposits it is considered that the conditions bear out the statement that the igneous mass during its intrusion and cooling may give off both metallic minerals, siliceous compounds, and gases. Thus at San José, Tamaulipas, Mexico, a great laccolithic mass of andesitic rock has penetrated a Cretaceous limestone, the latter being a nearly pure carbonate of lime, and yet in the contact zones are found garnet, magnetite, pyrite, and chalcopryite, all (except the garnet) containing matter foreign to the limestone. All of these must therefore have been emissions from the igneous magma. The gas-aqueous deposits include those which have been deposited from a mixture of water and steam, probably under pressure and at a high temperature. They may either fill true fissures or porous deposits, or replace the wall rock lining a narrow fissure. The last class recognized is the result of meteoric circulation, the waters carrying the ore particles to points of concentration; this may occur either underground or on the surface.

DISTRIBUTION. Ore deposits are not confined to any particular geological horizon, although the mechanically formed and some of the surficial ones are commonly of Pleistocene and less often Tertiary age. In the United States ore deposits are widely distributed, but, owing to their frequent association with igneous rocks, they predominate in the Cordilleran region, Black Hills, and the Appalachians, where igneous activity has been most pronounced. In other areas their accumulation seems to be chiefly the result of meteoric waters. Gold and silver ores are chiefly restricted to fissure veins, and hence predominate in the Cordilleran region, although additional vein deposits of gold are known in the Black Hills, Southern Appalachians, and Alaska.

Copper ores are known in large deposits in Keweenaw Point, Mich., Bisbee, Ariz., and Butte, Mont. The Paleozoic limestones of Missouri, and the region covering the contact point of Iowa, Illinois, and Wisconsin, contain both lead and zinc, and large zinc deposits are mined in the Cambrian limestones of northwestern New Jersey. The hematite iron ores of the Lake Superior region are the largest deposits in the world, but others are known in the Silurian of the Appalachian region, and the metamorphic rocks of the Highland region. For further details regarding the distribution of ore deposits, see GOLD, SILVER, COPPER, etc., also the paragraphs on mining, under the different countries.

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York, 1895); Fuchs and De Launay, *Traité des gites minéraux et métallifères* (Paris, 1893); Beck, *Lehrbuch der Lagerstättenkunde* (Berlin, 1900); Von Cotta, *Ore deposits*, trans. by Prime (New York, 1870). Works dealing chiefly with genesis of ore deposits: Crosby, "A Classification of Economic Geological Deposits Based on Origin and Original Structure," in the *American Geologist* (Minneapolis, 1899); Emmons, "The Structural Relations of Ore Deposits," in the *Transactions of American Institute of Mining Engineers*, vol. xvi. (New York, 1886); Emmons, "The Genesis of Certain Ore Deposits," *ibid.*, vol. xv. (ib., 1885); Groddeck, *Die Lehre von den Lagerstätten der Erze* (Leipzig, 1879); Kemp, "An Outline of the Views Held To-Day on the Origin of Ores," in *The Mineral Industry*, vol. iv. (New York, 1895); Posepny, "The Genesis of Ore Deposits," in the *Transactions of the American Institute of Mining Engineers* (ib., 1893); Vogt, "The Formation of Eruptive Ore Deposits," in *The Mineral Industry*, vol. iv. (ib., 1895); Vogt, "Ueber die relative Verbreitung der Elemente, besonders der Schwermetalle, und über die Concentration des fein vertheilten Metallgehaltes zur Erzlagerstätten," in the *Zeitschrift für praktische Geologie* (Berlin, 1898-99); Penrose, "The Superficial Alteration of Ore Deposits," in *Journal of Geology*, vol. ii. (Chicago, 1894), an excellent general article; Weed, "Contact Metamorphic and Other Ore Deposits Near Igneous Contacts," and "Vein Enrichment by Ascending Alkaline Waters," in *Engineering and Mining Journal*, vol. lxxiv. (New York, 1902). Also many articles in the *Transactions of the American Institute of Mining Engineers* (New York, 1900-02).

ORE DRESSING. The preparation of ore for the smelter by mechanical means, whereby the valuable minerals are concentrated into smaller bulk and weight by the separation of the waste, or whereby two valuable minerals are separated from each other. The object of ore dressing is to save handling so much barren or waste material in the subsequent metallurgical process of extraction. Ore dressing may be divided into two processes—crushing and separation. Crushing detaches the valuable minerals from the waste, but as they are still mixed in the resulting powder there has to be a further process of separation.

CRUSHING. Preliminary breaking of the ore is done by blasting in the mine, but crushing proper is performed on the surface. The crushing process may stop short at the production of coarse fragments, or it may be continued to the production of a fine powder by grinding. The various machines used for crushing and grinding ores are described in the article on GRINDING AND CRUSHING MACHINERY. The selection of the particular machines used depends upon the character of the ore and the method of extraction adopted. *Rolls* are the standard machines for crushing all brittle ores in preparation for concentration except where fine crushing is required. *Steam stamps* are the standard crushers for ores containing native copper. *Gravity stamps* are used most extensively for fine crushing, but various forms of *ball mills* are beginning to compete with them for this work. Generally the preliminary crushing is done by jaw or gyratory crushers, and from them the material passes to

rolls or stamps. It is an advantage in most cases to crush first to a coarse size, then to separate as much of the waste as possible, and then to re crush the residue and again separate the waste. The sizes to be crushed and the number of repetitions vary for different ores.

SEPARATION. Having the ore crushed, the succeeding process is to separate the valuable ore from the waste. Some of the principal apparatus and methods for performing this operation are as follows: *Preliminary washers* are used to disintegrate and float adhering clay or fine stuff from the coarse particles, which is done by using running water aided by some stirring device. *Sieves* and *screens* are used for separating the coarse from the fine particles of the ore; they may be classified as: (1) stationary screens, (a) grizzlies or bar screens, (b) gravel screens of wire cloth, (c) perforated plate screens; and (2) moving screens, (a) oscillating bar screens, (b) plain shaking screens or riddles, and (c) revolving screens or trommels. *Classifiers* are devices for obtaining a series of products of diminishing size by means of currents of water. The most common form consists of a channel connecting a series of pockets. Water is supplied to each pocket so as to form an upward current, the force of the current in each pocket after the first being less than that in the preceding pocket. The effect produced is that grains which are heavy enough to settle against the upward current in each pocket can do so, while the lighter grains are carried on to succeeding pockets until they strike one where the current is mild enough to permit them to settle.

Hand picking is the process of separating the waste from the valuable ore by picking it out by hand. This work is usually done on 'tables.' There are five classes of picking tables in use: (1) stationary horizontal tables; (2) stationary sloping chutes; (3) shaking tables; (4) belt, rope, or plate conveyors; and (5) revolving circular tables. *Hydraulic jigs* operate through the action of two currents of water, an upward and downward, alternating with each other in quick succession, upon a bed of sand supported by a screen. The screen may be pushed up and down in a tank of water to bring about the necessary current action or it may be stationary and the water given a reciprocating motion. In either case the effect is to separate the crushed material in layers according to the specific gravity of the particles.

Vanners consist essentially of an endless belt which is shaken rapidly either sidewise or endwise and which has a continuous slow motion up-hill. The ore is fed onto the belt in the form of wet pulp. The agitation makes the ore bed so loose that particles of higher specific gravity rise to the upper layer. The travel of the belt draws the heavy minerals to the head end, while the water washes the light minerals down to the tail. *Bumping tables* operate much as do vanners, the bumping action separating the particles according to specific gravity and shaking the heavier particles to one side of the table while the water current carries the lighter particles to the other side. *Film sizing tables* depend upon the relative transporting power of a film of water flowing on a quiet surface to act upon the powdered ore. As is well known, a film of water flowing over a quiet surface has an upper current which moves faster than the lower current, whose water is re-

tarded by friction; the heavier grains remain at rest in the slow bottom current, while the lighter grains are carried away by the quick top current. *Magnetic separators* utilize the action of an air current to separate particles of low specific gravity from those of higher specific gravity. For a comprehensive discussion of the methods and machinery used in crushing and separating ores, see Richard, *Ore Dressing* (New York, 1900); and for an annual record of current progress in this art, see the annual volumes of the *Mineral Industry* (New York).

OREGON (named from the *Oregon*, now the Columbia River, probably an American Indian name). A western State of the United States, lying on the Pacific Slope, between latitudes 42° and 46° 18' N., and between longitudes 116° 33' and 124° 25' W. It is bounded on the north by the State of Washington, on the east by Idaho, on the south by Nevada and California, and on the west by the Pacific Ocean. Its extreme length from east to west is 396 miles, and from north to south 300 miles. Its area is 96,030 square miles, of which 94,560 square miles, or 60,518,400 acres, are land surface. It ranks seventh in size among the States.

TOPOGRAPHY. The salient features of the topography are the two mountain ranges extending parallel with the coast through the western part of the State, and the great inland plateau in the east. The coast is rocky and abrupt, and runs in an almost straight line north and south, with no very prominent inlets or headlands. There are, however, besides the wide mouth of the Columbia River on the north boundary, several small bays or harbors, such as Tillamook, Winchester, and Coos bays, all of which are landlocked, with narrow entrances. Near the southern boundary the coast runs out in an obtuse angle ending in Cape Blanco. The land rises immediately from the coast to the crest of the Coast Range, which is about 20 miles inland, and has a height of 1000 to 4000 feet. It is heavily forested, and though of irregular outline, with many transverse valleys, it is unbroken, save in two or three places, throughout the length of the State. The Cascade Mountains run parallel with the Coast Range about 120 miles from the coast. They are the prolongation of the Sierra Nevada, rise to an average height of over 6000 feet, and are crowned by a line of extinct volcanic cones, several of which are over 9000 feet high, while Mount Hood, the culminating point near the northern boundary, has an altitude of 11,225 feet. Like the Coast Range, the Cascades are heavily forested, and their summits are covered with snow. Between the two ranges extends a broad valley, divided by several spurs and cross ranges, and becoming rough and mountainous in the south, while the northern half forms the rolling prairie valley of the Willamette. The region lying east of the Cascades covers two-thirds of the area of the State, and consists of an elevated plateau. The southern half of this belongs to the Great American Basin, though its floor has an elevation of 5000 feet, rising to 6000 feet in the southeast. Several of the longitudinal Basin Ranges of Nevada extend into this plateau, and large areas are covered with lava flows. The northern half slopes northward toward the valley of the Columbia River. It is more undulating than the southern plateau, and is traversed in

the northeast by the Blue Mountains, an irregular chain rising to a height of 7000 feet, and sending out side spurs flanked by deep valleys. Some of the rivers in this region have cut deep cañons, especially the Snake River on the northeastern boundary, whose cañon almost rivals that of the Colorado.

HYDROGRAPHY. The Columbia River forms, with an interruption at the Falls of the Dalles, a large, navigable waterway for 300 miles along the northern boundary. Its chief tributaries in the State are the Willamette west of the Cascades, and on the eastern plateau the Deschutes, John Day, and Umatilla, whose branches form a considerable network of minor streams. The Snake River, which joins the Columbia in Washington, forms about one-half of the eastern boundary, and its chief tributary, the Owyhee, runs inside the boundary along the remaining half. The streams flowing directly into the ocean are mostly short, but two of them, the Umpqua and the Rogue, rise on the Cascades and break through the Coast Range. On the interior plateau there are a number of streams running into lakes which have no outlet. There are a number of lakes of considerable size in the south-central portion, the largest of which are Goose Lake, which lies partly in California; Klamath Lake, at the base of the Cascades, 30 miles long; and Malheur Lake, on the eastern plateau, 22 miles long.

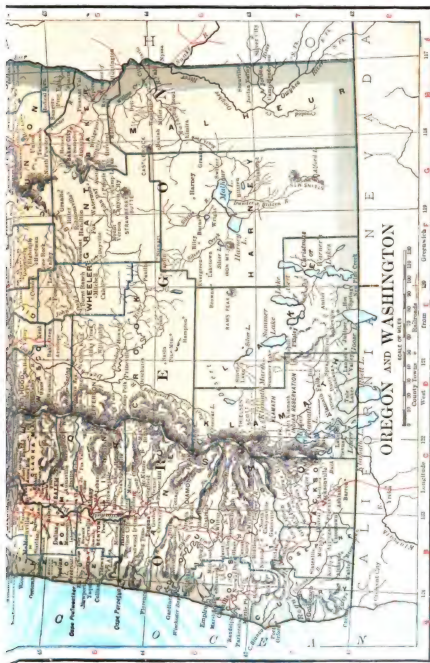
CLIMATE. In few places is the influence of topography on climate more apparent than in Oregon. The winds from the ocean are deprived of nearly all their moisture by the Coast and Cascade ranges, which also bar out the tempering influence of the sea, so that the portion west of the Cascades has a moist and equable insular climate, while east of the mountains the climate is dry and continental, with great extremes. On the coast the sea tempers the summer heat, and the warm Japan Current reduces the cold of winter, while cold winds from the northeast are barred out by the mountains. Here the mean temperature for January is 42.2°, and for July 62.3°, while great extremes are rare. On the eastern plateau the mean temperature is 29.6° for January and 66.9° for July, while the extremes fall below zero every winter, sometimes nearly 30° below, and rise above 100° every summer, the maximum record being 119°. In regard to rainfall there is a still greater difference between the two regions. In the west the rainfall is abundant, and in some places excessive. West of the Coast Range it averages 89.6 inches, in the Willamette Valley it is 50.8 inches, while in Tillamook County it is nearly 140 inches. On the eastern plateau it is insufficient for the needs of agriculture, being on the average 12.7 inches, and in the south-central portion only 6.5 inches. More than three-fourths of the rainfall of the State occurs in the wet season from October to March. Thunderstorms are rare in Oregon, and never severe, while hurricanes are unknown.

SOIL AND VEGETATION. The soil on the highlands and plateau consists of decomposed lava, and in the valleys it is a rich black alluvial deposit. With the exception of some extensive tracts of sand and of volcanic ashes and pumice in the east, the soil is everywhere of great fertility, and even in the east capable of yielding heavy crops when irrigated. The eastern plateau, however, consists largely of arid plains covered

AREA AND POPULATION OF OREGON BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Baker.....	H 5	Baker City.....	2,275	6,764	15,567
Benton.....	B 5	Corvallis.....	677	8,650	6,706
Clackamas.....	C 4	Oregon City.....	1,861	15,233	19,658
Clatsop.....	B 4	Astoria.....	820	10,016	12,705
Columbia.....	B 1	St. Helen.....	677	5,191	6,257
Coos.....	A 11	Coquille.....	1,578	8,874	10,324
Crook.....	D 5	Prineville.....	7,756	3,244	3,904
Curry.....	A 7	Goldbeach.....	1,454	1,709	1,888
Douglas.....	B 6	Roseburg.....	4,861	11,864	14,565
Gilliam.....	E 4	Condon.....	1,123	3,000	3,201
Grant.....	F 5	Canyon City.....	4,560	5,040	5,948
Harney.....	F 6	Burns.....	9,086	2,559	2,508
Jackson.....	C 7	Jacksonville.....	2,721	11,455	13,698
Josephine.....	B 7	Grants Pass.....	1,684	4,878	7,517
Klamath.....	D 6	Klamath Falls.....	5,854	2,444	3,970
Lake.....	F 7	Lakeview.....	7,834	2,604	2,847
Lane.....	B 6	Eugene.....	4,380	15,198	19,604
Lincoln.....	B 5	Toledo.....	1,008	.....	3,575
Linn.....	C 5	Albany.....	2,311	16,206	18,003
Malheur.....	H 6	Vale.....	9,784	2,601	4,203
Marion.....	C 5	Salem.....	1,179	22,934	27,713
Morrow.....	F 4	Heppner.....	2,021	4,205	4,151
Multnomah.....	C 4	Portland.....	429	74,884	108,167
Polk.....	B 4	Dallas.....	701	7,858	9,923
Sherman.....	F 4	Moro.....	736	1,792	3,477
Tillamook.....	B 4	Tillamook.....	1,119	2,932	4,471
Umatilla.....	G 4	Pendleton.....	3,116	13,381	18,049
Union.....	G 4	Union.....	3,146	12,044	16,070
Wallowa.....	H 4	Enterprise.....	2,784	3,661	5,538
Wasco.....	D 4	The Dalles.....	2,962	9,183	13,199
Washington.....	B 4	Hillsboro.....	715	11,972	14,467
Wheeler.....	E 5	Fossil.....	1,746	2,443
Yamhill.....	B 4	McMinnville.....	711	10,692	13,420





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AREA AND POPULATION OF WASHINGTON BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Adams	G 3	Ritzville	1,606	2,098	4,840
Asotin	H 3	Asotin	631	1,580	3,366
Chehalis	A 2	Montesano	1,968	9,249	15,124
Chelan	E 2	Wenatchee	3,070	.	3,931
Clallam	A 1	Port Angeles	1,807	2,771	5,003
Clarke	C 4	Vancouver	646	11,709	13,419
Columbia	H 3	Dayton	876	6,709	7,128
Cowlitz	B 3	Kalama	1,145	5,917	7,877
Douglas	F 3	Waterville	4,768	3,161	4,926
Ferry	G 1	Republic	2,313	.....	4,562
Franklin	G 3	Pasco	1,251	696	486
Garfield	H 3	Pomeroy	725	3,897	3,918
Island	C 1	Coupeville	298	1,787	1,870
Jefferson	A 2	Port Townsend	1,765	8,398	5,712
King	D 2	Seattle	2,051	63,989	110,053
Kitsap	C 2	Port Orchard	407	4,624	6,767
Kittitas	E 2	Ellensburg	2,414	8,777	9,704
Klickitat	E 4	Goldendale	2,079	5,167	6,407
Lewis	B 3	Chehalis	2,336	11,499	15,157
Lincoln	G 2	Davenport	2,299	9,312	11,969
Mason	B 2	Shelton	993	2,826	3,810
Okanogan	E 1	Concomully	5,318	1,467	4,689
Pacific	B 3	Southbend	925	4,358	5,983
Pierce	C 2	Tacoma	1,354	50,940	53,515
San Juan	B 1	Friday Harbour	187	2,072	2,628
Skagit	C 1	Mount Vernon	1,874	8,747	14,272
Skamania	C 1	Stevenson	1,743	774	1,688
Snohomish	C 1	Everett	1,651	8,514	23,950
Spokane	H 2	Spokane	1,777	37,187	57,542
Stevens	G 1	Colville	3,945	4,341	10,543
Thurston	B 3	Olympia	763	9,675	9,927
Wahkiakum	B 3	Cathlamet	273	2,526	2,419
Walla Walla	G 3	Walla Walla	1,277	12,224	18,680
Whatcom	D 1	New Whatcom	2,226	18,591	24,116
Whitman	H 2	Colfax	2,105	19,109	25,360
Yakima	D 3	North Yakima	5,784	4,429	13,462

with sage-brush, or with extensive salt marshes. The northern table-lands are covered with bunch-grasses suitable for grazing, and here are some junipers and pines. Western Oregon still contains one of the heaviest timber belts in the world. The entire western slope of the Cascades is covered with a belt of forest 20 miles wide, and the Coast Range is also densely forested. In the valleys are found cottonwoods, maple, ash, alder, dogwood, and wild cherry. There are seven species of oak, and the fragrant Oregon myrtle (*Orcodaphne Californica*) is a common tree. The coniferæ, however, predominate in the large forests, and include pines, spruces, firs, hemlocks, cedars, junipers, larch, and yew. Some characteristic species are the Oregon yellow pine (*Pinus ponderosa*), the Western arbor-vitæ (*Thuja gigantea*), the *Picea nobilis*, and the Oregon yew (*Taxus brevifolia*). For *Fauna*, see this section under UNITED STATES.

GEOLOGY. The most remarkable feature of the geological history of Oregon is the enormous volcanic eruption which took place principally in Miocene time, one of the most extensive lava flows in the world. The Cascade Mountains are entirely composed of lava and basaltic rocks, and a lava-sheet 1000 feet thick or more covers the whole eastern two-thirds of the State, together with large parts of Washington and Idaho. Some parts are much weathered and dissected, while others are more recent and smooth. The underlying rock formations are generally shown only where the rivers have cut through the lava. In the Snake River cañon in the northeast the rocks are ancient metamorphic granites, gneisses and mica-slate, while the Cascades are underlaid throughout with Cretaceous rocks covered for some distance (beneath the lava) with Eocene and Miocene strata. In the southwestern valley there is a belt of slates and serpentine, but the Coast Range is mainly an anticlinal whose surface consists of Tertiary sandstone.

MINERALOGY AND MINING. Oregon has a great wealth and variety of mineral resources, and, curiously enough, some of the richest mineral deposits are found in the valleys. Thus in the serpentine belt in the southwest there are lodes of chrome iron, copper, magnetite, and nickel. The nickel ore exists as a green hydrated nickel-magnesia silicate filling large irregular cavities in the serpentine. The deposit of this is supposed to be very extensive. Limonite, or brown hematite iron ore, is found in the Willamette region, and quartz veins bearing gold and silver occur in the slate belts east of the serpentine as well as in the Cascades and in eastern Oregon, where there are also deposits of zinc and cinnabar. Beds of lignite exist in the Cretaceous and perhaps in the Tertiary strata of the Coast Range, and the sandstones of the latter, as well as the limestones in the south and the volcanic rocks, furnish inexhaustible supplies of building stone. Other minerals found are mercury, platinum, iridium, lead, and antimony, as well as clay, salt, and alkali deposits. Gold is the only mineral extensively mined. It is produced chiefly in the Blue Mountain region in the northeastern part of the State. The annual output has latterly exceeded \$1,000,000 in value, reaching \$1,694,700 in 1900. Small quantities of silver, borax, and coal are mined, the coal being of the lignite variety.

FISHERIES. Salmon fishing and canning is

one of the most important industries, and is unequaled by any other State. It began in 1866, and the value of the annual product since 1870 has fluctuated around \$2,000,000, the maximum being reached in 1883. Over 5000 people, including many Chinese, have been employed most of this period. For a time reckless overfishing threatened exhaustion of the supply, but the enforcement of laws and the establishment of hatcheries have averted this danger. Sturgeon, halibut, oysters, and other varieties of fish are caught in less quantities. The erection of refrigerating and freezing plants and the increased use of refrigerator cars have made possible greater shipments of fresh fish and have thus tended to lessen the amount of the canned product.

AGRICULTURE. The different sections of the State, varying so distinctly in climate, topography, and soil, naturally vary in agricultural development. In the river valleys west of the Cascades almost every variety of crop common to the temperate zone is produced in great abundance. The Willamette Valley especially is noted for its great productivity. East of the Cascades, in the Columbia Valley, the rainfall is generally sufficient to justify the raising of some of the more hardy crops, the favorable years producing enough to cover the loss in the years of drought. Irrigation is possible in parts of this region and is being resorted to with success. Save in the centre of Oregon there are numerous rivers throughout the eastern half of the State which afford an extensive water supply that could be utilized for irrigation. But these sources have as yet been very little developed, owing largely to the remoteness from lines of transportation and markets. The irrigated area in the State increased from 177,944 acres in 1889 to 388,310 acres in 1899. Almost the whole of this is watered from streams, scarcely any from reservoirs or wells. The largest irrigated area is that north of Malheur and Harney lakes in Harney County. Simple methods are employed in irrigation, and the average cost of it per acre is low. In 1900 only 16.6 per cent. of the land area was included in farms. Of this 33 per cent. was improved. The average size of farms decreased until 1880, since when, owing to the large additions made to ranges in the eastern part of the State, the average size has grown larger. It has, however, continued to decrease in the western counties.

The two leading crops are wheat and hay. The area devoted to wheat doubled between 1880 and 1900, the increase being almost wholly in the northeast counties, where one-half the crop is now grown. During the same period the acreage of hay and forage gained over threefold. Oats are grown principally in the Willamette Valley, and barley in the northeast counties. Oats have a large acreage. On account of the coolness of the nights, corn does not thrive, and but little is grown. Potatoes produce abundantly and are an important crop. Sugar beets are raised in Union County. The State ranks second in the production of hops, their culture being confined principally to the Willamette Valley. The region between the Cascade and Coast ranges, particularly Jackson and Douglas counties, has become noted for the production of fruit. The number of plum and prune trees in 1900 (2,517,523) was ten times that of 1890 and is only exceeded in California. The number of apple trees

(2,825,808) more than doubled in the same period. Other fruits grown include almost every variety common to the temperate zone.

The following table of acreages is self-explanatory:

CROP	1900	1890
Wheat.....	873,379	553,052
Hay and forage.....	731,823	467,061
Oats.....	201,306	218,736
Barley.....	60,375	37,722
Corn.....	16,902	12,101
Potatoes.....	30,035	17,965
Hops.....	15,434	3,130

STOCK-RAISING. Horses, cattle, swine, and sheep are raised in numbers greater than is required to supply the home market. Large sections of the eastern portion of the State are fit only for grazing, and there are many large ranches in this region. The natural grasses cure on the ground and supply nutritive pasturage all the year. With the exception of 1860-70, each decade since 1850 has exhibited an increase in the number of every kind of domestic animal. The most significant increase from 1890 to 1900 was in cattle. The production of wool in that decade gained 83.8 per cent., while the average weight of fleeces increased from 6.3 pounds to 8.6 pounds, the latter record not being exceeded in any State. The following is a table of the leading holdings of stock:

	1900	1890
Dairy cows.....	122,447	114,156
Other cattle.....	577,856	407,492
Horses.....	287,932	224,952
Mules and asses.....	7,751	4,946
Sheep.....	1,961,355	1,780,312
Swine.....	281,406	208,259

FOREST AND FOREST PRODUCTS. The forests of Oregon are scarcely exceeded in extent and value by those of any other State. Except for limited districts already cleared, almost the whole of the region included between the Coast Range and the western slope of the Cascades is covered with forests, as is also a considerable portion of the eastern slope of the Cascades and the northeastern part of the State. The total woodland area has been estimated (1900) at 54,300 square miles, or 57 per cent. of the area of the State. Lane County has more timber than any other county, but is greatly exceeded by the corresponding area contained in the four counties in the northwest corner of the State. The coast forests are famous for their great density and the enormous growth attained by certain species of trees. Stands of 100,000 feet per acre for entire townships have been reported. The Douglas fir (red fir), which is one of the prevailing species of this section, sometimes attains a height of 300 feet. The average diameter of these trees cut is from 60 to 72 inches. Bridge timbers 110 feet in length and free from knots and other imperfections are obtained from these firs. The great strength of these timbers makes them very valuable for bridge use and also for spars or for framings for buildings. This species produces more commercial timber to the acre than any other tree on the continent. It is estimated that over five sevenths of the timber is of this variety. The lumber product is constantly increasing in

amount and value, the product for 1900 being worth \$10,352,167. The pines and cedars are the most important species, both being large trees, and highly prized for finishing. The lumber cut in 1900 was estimated at 776,978,000 feet, as compared with 470,146,000 in 1890. The increase in value was proportionate. The remoteness of the region from the large lumber markets necessitates heavy freight expenditure and has tended to minimize the price of the product, and therefore limit its exploitation. The United States Government has recently set off over 4,500,000 acres as a forest reserve.

MANUFACTURES. The manufacturing facilities are excellent. The natural resources include a supply of coal for fuel, and an abundant water power is attainable at The Dalles, Cascade Locks, and Oregon City. In the decade 1880-1890 there was for the first time a large development in the manufacturing industry, but the increase was only slight in the succeeding decade. In 1900 the value of manufactured products was \$46,000,000, and 17,236 wage-earners, or 4.2 per cent. of the population, were then engaged in the industry. The forests are the most important source of raw materials, and the agricultural products rank second. The flouring and grist mill output amounted in 1900 to \$6,364,000, being nearly a third greater than in 1890. The slaughtering and meat-packing output in the same year was valued at \$1,638,480. Among other industries are the manufacture of woolen goods, canning and preserving of fish, car construction, and ship and boat building, including one establishment for the building of iron and steel vessels. About one-half of the total manufactured product of the State is accredited to Portland.

TRANSPORTATION AND COMMERCE. The Pacific Ocean, the Columbia River, and Snake River provide three sides of the State with the advantages of water communication. Along the coast there are nine inlets which offer harbor facilities. Most of the streams flowing into the Pacific are navigable for short distances. Large ocean-going vessels pass up the Columbia as far as Portland. Since the construction of a canal at Cascade Locks, river steamers can go as far as The Dalles, above which point the stream is again navigable. The Snake River is navigable beyond the point where it leaves the boundary. The Willamette, with the aid of canals, is navigable to Eugene, 150 miles from Portland. The developed portions of the State are adequately supplied with railroads, but the great arid region east of the Cascades is wholly without railroad accommodations, save in the northeastern corner. Oregon shows a remarkably low mileage, there being but 1.71 miles of railroad for every 100 square miles of territory. The total mileage was 1631 in 1899, or 43.59 miles for every 10,000 inhabitants. The Union Pacific and the Southern Pacific lines own the greater portion. The former, following the course of the Columbia, crosses the extreme northern portion of the State from east to west. The latter, following the course of the Willamette, crosses the western portion of the State from north to south. In the greater portion of eastern Oregon wagon roads are the only means of communication.

The State has United States customs districts and ports of entry: for southwestern Oregon, at Coos Bay, the headquarters of the coal and lumber trade in that section; for the Columbia

River, at Astoria; and for the Willamette, at Portland. The commercial importance of the water route is second only to that of the Mississippi. The commerce upon the Columbia and Willamette rivers has assumed great magnitude, due to the regular lines of steamers connecting with railways and canals around the falls. Smaller boats and rafting contribute largely to swell its volume.

Previous to 1868; the exports were mainly to the Sandwich Islands, Puget Sound, and San Francisco, and gold dust and ores formed three-fourths of the shipments. Since then the exports have reached almost every part of the globe, and consist largely of wheat and timber products. The foreign commerce of the State from 1890 to 1900 fluctuated between \$5,000,000 and \$15,000,000, about three-fourths being exports. The largest export countries were Great Britain, China, and Japan. The British East Indies and Japan supplied most of the imports. The State has a large interstate trade by rail and water, and a considerable portion of its products is distributed through San Francisco.

BANKS. The Constitution of 1857 forbade any banks of issue, and also the incorporation of any banks by the Legislature. A private banking business was established in Portland in 1859. The First National Bank of Portland opened in 1865, being the oldest national bank west of the Rocky Mountains. The banking business remains unregulated. Since there is no banking law banks, incorporated or private, are formed under the general corporation law, which limits the liability of the stockholders. Due to this condition, the national banks, being the more secure institutions, have preference over the State banks in popular confidence. The aggregate banking interests remained very insignificant until 1885, when there were only four State and nine national banks. Then came a sudden growth, and in 1894 there were more than forty banks. After the depression of 1893-95 the number somewhat declined. The condition of the banks in 1902 is shown in the following table:

	National Banks	State Banks	Private Banks
Number of banks.....	30	18	5
Capital.....	\$2,420,000	\$956,000	\$50,000
Surplus.....	520,000	142,000	18,000
Cash, etc.....	2,586,000	334,000	21,000
Deposits.....	16,692,000	5,093,000	356,000
Loans.....	9,386,000	3,084,000	227,000

GOVERNMENT. The Constitution under which Oregon entered Statehood still continues in force. It was adopted by a vote of the people of the Territory in November, 1857. To amend it the amendment must pass two successive Legislatures and be approved by popular vote. While amendments agreed to by one Legislature are awaiting final decision, no other amendment can be proposed.

The Constitution authorizes any male citizen of the United States, twenty-one years old, and six months a resident of the State, to be a voter, and any like foreigner who shall declare his intention to become a citizen one year before an election and shall have been a resident of the State for six months. Oregon sends two members to the National House of Representatives.

LEGISLATIVE. The Legislature consists of a

Senate of not exceeding 30 members, elected for a term of four years, and a House of Representatives of not exceeding 60 members, elected for two years. The apportionment is by counties or groupings of contiguous counties, and is made every fifth year, a State census being taken every year ending in 5. General elections are held biennially on the first Monday of June of even years, and the Legislature convenes on the second Monday of the following September. The members of either House receive, besides mileage, \$3 a day, but are limited to a \$120 allowance for any session. Extra sessions are limited to 20 days' duration. Bills may originate in either House, except revenue bills, which must originate in the House of Representatives. In 1902 an initiative and referendum clause was added. By this, 8 per cent. of the voters may demand the submission of a law to the vote of the people, and 5 per cent. may demand that any law passed by the Legislature shall be submitted for popular approval.

EXECUTIVE. The Governor's term of office is four years, and he is not eligible to this office more than eight years in any period of twelve. He has the right of veto, but his veto may be overridden by a two-thirds vote of each House. The people elect a Secretary of State (who is Auditor and Comptroller), and a State Treasurer, the term of office of each being four years. The former succeeds to the Governorship in case it becomes vacant. A State printer and a superintendent of public instruction are elected every four years.

JUDICIAL. There is a Supreme Court of five judges, which number may be increased to seven. They have appellate jurisdiction, and are elected for six years. There are five circuit courts, presided over by one of the judges of the Supreme Court, having civil and criminal jurisdiction, and appellate jurisdiction from the county courts. There are county courts with one judge, elected for four years, who is also judge of probate. The Circuit Court judges are elected one-third every two years. There are also a United States District Court, and for Oregon, California, and Nevada, a United States Circuit Court. One or more justices of the peace are elected in every township or mining district, and municipal courts may be created. Judges of the Supreme Court can be removed by the Governor upon the joint resolution of two-thirds of the Legislature. The grand jury consists of seven men chosen by lot, five of whom must concur to find an indictment. Grand juries may be modified or abolished by the Legislature.

LOCAL GOVERNMENT. Each county elects a clerk and a sheriff, who serve for two years. Attorneys are elected by districts composed of one or more counties. The Legislative Assembly may provide for the election of two commissioners to sit with the county judge when transacting county business in any or all the counties, or may provide a separate board for transacting such business. Other local officers may be provided for by law. Special laws may be enacted for municipal purposes.

OTHER PROVISIONS.—The registration of voters is not required. New ballot laws, based on the Australian system, were adopted in 1891. The legal rate of interest is 8 per cent.; allowed by contract, 10 per cent. Women may practice law in Oregon, and a wife has sole control of property

owned by her at marriage or subsequently acquired. Chinamen are not allowed to hold real estate or work mining claims.

FINANCES. The Constitution prohibits the Legislature from contracting any State debt exceeding \$50,000, or assuming the debt of any county, town, or corporation, except for purposes of war or to suppress an insurrection. Debts to the amount of \$237,000 were contracted in 1864 in order to pay bounties to soldiers and for relief of discharged soldiers and officers. The bonds were rapidly redeemed and in 1870 only \$90,000 were outstanding. In that year the Legislature authorized the issue of \$200,000 for construction of a canal, to be redeemed from the proceeds of the sale of public lands. The Indian wars of 1874 and 1878 further increased the debt by about \$175,000. Another debt was the 'indorsed and unpaid' warrants issued in 1873-75 and bearing 10 per cent. for construction of wagon roads and other purposes. These high interest bearing warrants were necessary because of the constitutional provision against bonds. Altogether about \$350,000 of these warrants were issued. By 1878 the public debt amounted to \$651,595; but the bonds and warrants were rapidly redeemed through a special tax on property. In 1886 the debt was reduced to \$53,632 in bonds and warrants, which were advertised for but not presented for redemption. In 1903 the State had no funded debt except bonds to the amount of \$2365 never presented and probably lost. The income of the State is derived mainly from a State tax and sale of public lands. In 1901 the total receipts were \$1,772,808, of which 38 per cent. came from the State tax and 45 per cent. from sale of lands and payments on old sale-contracts and interest on the loans. The expenditures were \$1,889,134, of which more than 50 per cent. went for educational purposes. Notwithstanding the deficit, the balance in the treasury on September 30, 1902, was \$1,137,575.

POPULATION. The population by decades was as follows: 1850, 13,294; 1860, 52,465; 1870, 90,923; 1880, 174,768; 1890, 313,767; 1900, 413,536. Oregon ranks 35th in population, and is exceeded by both of the other Pacific Coast States. The increase from 1890 to 1900 was 30.4, as compared with 20.7 for the United States. Over half of the population is located in the Willamette Valley. In 1900 the foreign-born numbered 65,748; Chinese, 10,397; and Indians taxed, 4951. The male sex exceeded the female by 52,000. The five places having a population exceeding 4000 each, contained together 27.6 per cent. of the population.

The Indians are collected largely on five reservations, namely, Grande Ronde, Klamath, Siletz, Umatilla, and Warm Springs. A limited amount of agriculture and stock-raising is carried on upon each of the reservations.

CITIES. In 1900 Portland had 90,426 inhabitants; Astoria, 8381; and Baker City, 6663. Salem is the capital.

RELIGION. The leading denominations numerically are the Roman Catholic, Methodist Episcopal, Baptist, Disciples of Christ, Presbyterian, Congregational, Methodist Episcopal (South), Protestant Episcopal, and United Brethren.

EDUCATION. In 1900 only 3.3 per cent. of the population ten years of age and over were illiterate. The State Board of Education consists of the Governor, Secretary of State, and a

superintendent of instruction. County superintendents are elected biennially, and officers of district boards every three years. Women are eligible to the office of school director, and widows with children to educate and owning taxable property in the district may vote in school meetings. Congress in 1848 gave Oregon sections 16 and 36 of all the public domain (3,387,520 acres) for public schools, 26 townships (500,000 acres) for a State university, and 90,000 acres for an agricultural college. From the proceeds of the sales of a portion of these lands an irreducible fund of \$3,500,000 has been secured. The sparse settlement of a large part of the State makes the maintenance of schools difficult in many places. The Oregon law does not provide for district high schools, and rural communities are therefore without the advantages of secondary education. The length of school term, 123.9 days, is considerably below the average for the whole country. In 1899 there were 101,900 children between the ages of five and eighteen; the number enrolled was 88,485; the average attendance was 61,234. The public high schools numbered 15, and the private secondary schools 19. There are State normal schools at Monmouth, Drain, Ashland, Weston, and Gold Beach. The University of Oregon at Eugene was established in 1872. Pacific University and Tualatin Academy at Forest Grove are under Congregational control; Willamette University, Salem, is Methodist Episcopal; McMinnville College, McMinnville, Baptist; Portland University, University Park, Methodist Episcopal; Pacific College, Newberg, is a Friends' institution; Philomath College, Philomath, a United Brethren; Corvallis College, Corvallis, Methodist Episcopal. Blue Mountain University is located at Lagrange. The State Agricultural College is at Corvallis. Willamette University gives instruction in law, and the University of Oregon has a law department at Portland, where also is situated the medical department of Willamette University. There is a successful Indian training school at Chemawa.

CHARITABLE AND PENAL INSTITUTIONS. There is a soldiers' home located at Roseburg, but the other State charitable institutions, in accordance with the requirements of the State Constitution, are located at the State capital. They are as follows: School for Deaf Mutes; Insane Asylum; School for the Blind; Boys' Reform School; and the State Penitentiary.

HISTORY. The accounts of the early exploration of the western Pacific coast are conflicting and unreliable. The Spanish explorer Ferrello possibly reached latitude 42°, the southern boundary of Oregon, in 1543, and the English flag was carried fifty or sixty miles north of this point in 1579 by Sir Francis Drake. The Spaniards Vizcaino and Aguilar reached 42° or just beyond in 1603. The fear of a Russian advance led Charles III. of Spain to order further explorations, and Perez in 1774 reached 55°, and on his return anchored in what has been identified by some as Nootka Sound. The next year Heceta, with Perez as second in command, observed the mouth of the Columbia, and a party landed at the modern Port Grenville, where several were killed by the Indians. One of the ships reached 58°. The English navigator Captain Cook in 1778 landed at Nootka Sound, which he so named. This English claim to possession was disputed by

the Spaniards in 1789, but Spain was forced to agree to give up exclusive claim to the region. (See *Nootka Sound*.) The French navigator Lapérouse in 1786 sailed along the coast from 58° 37' southward. The American claim began with the visit of J. Kendrick and Robert Gray, sent out by Boston merchants to seek for furs. The winter of 1788-89 was spent at Nootka. In 1791 Captain Gray returned, and on May 11, 1792, entered the mouth of the river Saint Roque, which he renamed the Columbia, from his ship. Another English expedition under Vancouver examined the coast in 1793. Fur traders entered the country in 1793, and in 1811 the Pacific Fur Company founded Astoria at the mouth of the Columbia. (See *ASTOR, JOHN JACOB*.) This was captured by the British, December 12, 1813, and renamed Fort George. It was restored to the United States in 1818, but abandoned by the owners. In 1824-25 Fort Vancouver was founded by John McLaughlin, chief factor of the United Hudson's Bay and Northwest Fur Companies, and he was practically Governor for many years.

The American claim rested upon the Louisiana Purchase in 1803 (the Spanish claim), and the discoveries of Captain Gray in 1792. From these grew the claim to all country drained by the Columbia. In 1805-06 Lewis and Clark explored much of the country. The northwestern boundary between the United States and Canada was fixed by the Convention of 1818 as the line of 49° from the Lake of the Woods to the Rocky Mountains. West of this point the territory was to be open to both parties, the United States and Canada, for ten years without prejudice to claims of either. (See *NORTHWEST BOUNDARY DISPUTE*.) By the Convention of 1827, ratified in 1828, joint occupation was continued indefinitely, but might be terminated by either party on twelve months' notice. The British were willing to concede 49° to the Columbia River, thence down it to the mouth, thus taking in a greater part of the present State of Washington, while the American claim, as before stated, was for all of the basin of the Columbia River, practically 42°-52°. The Oregon question occupied much of the attention of Congress after 1820, and the sentiment for demanding 'all of Oregon' grew. By the negotiations with Russia (1824-25) that country agreed to make no settlements south of 54° 40', and the idea gained ground that this was the proper northern boundary. Immigration to the territory had begun in 1832; the Methodists founded a mission under Jason Lee in 1834, and the Presbyterians under Marcus Whitman in 1836. Every year after 1838 numbers of immigrants crossed the Rockies, and by 1845 the American population numbered nearly 3000. The settlement of the northeastern boundary had been unsatisfactory, and in 1844 a popular rallying cry of the Democrats was "Fifty-four forty, or fight." Several Senators favored war, but others held that the best method of gaining possession was by actual settlement, in which the Americans were far surpassing the British, who were hardly represented except by the trappers of the Hudson's Bay Company. It was finally agreed in 1846 that the boundary should be 49° to the channel between Vancouver and the mainland, thence down the middle of this channel, through the Straits of San Juan de Fuca to the sea. The story that Marcus Whitman (q.v.) in 1843 prevented the exchange of the

northern part of the territory for fishing stations in Newfoundland is unfounded.

The American inhabitants in 1843 met and organized a Territorial government under an executive council. A Governor was chosen in 1845 and served until the organization of the region as a Territory of the United States. Oregon Territory, including the present Washington and much of Idaho, was organized on August 14, 1848, though the Governor did not arrive until the next year. The increase of population caused the inhabitants to hold a convention at Salem, August-September, 1857, which formed a State constitution and asked for admission. This instrument prohibited slavery, but forbade any free negro or mulatto "to come, reside, or be in the State, or hold real estate, or make any contract, or maintain any suit." The State was admitted February 14, 1859, with the present boundaries. Indian troubles were frequent from early times. In 1847 Whitman and twelve companions were massacred. There was constant trouble during the Civil War, and the Shoshone War (1866-68) and the Modoc War (1864-73) were serious. (See *MODOC*; *SHOSHONE*.) All Indians are now confined within narrow reservations, or have been removed to Indian Territory. The Constitution has been seldom amended. The 'anti-negro' clause still stands, though, of course, inoperative. The State has been successful in securing large appropriations for improvement of rivers and harbors from the National Government. The Cascade Locks on the Columbia were the largest in the world when completed in 1896. The State has given its electoral vote for the Republican ticket except in 1868, and one vote in 1892, though usually by small majorities. In 1876 it was found that one of the Republican electors held a Federal office, and was consequently ineligible. The Democratic Governor issued a certificate to the leading minority candidate, but the two Republican electors filled the vacancy, and their position was sustained by the Electoral Commission (q.v.). In 1892 the Democrats indorsed one Populist elector, and the vote that year was: Republican, 3; Populist, 1. Political squabbles have been frequent, and in 1897 the Lower House of the Legislature refused to organize on account of a contest for United States Senator.

GOVERNORS OF OREGON.

PROVISIONAL.

George Abernethy..... 1845-49

TERRITORIAL.

Joseph Lane..... 1849-50
Knitzing Pritchett (acting)..... 1850
John P. Gaines..... 1850-52
Joseph Lane..... 1853
George L. Curry..... 1853
John W. Davis..... 1853-54
George L. Curry..... 1854-59

STATE.

John Whitaker..... Democrat..... 1859-62
Addison C. Gibbs..... Republican..... 1862-66
George L. Woods..... "..... 1866-70
Lafayette Grover..... Democrat..... 1870-77
S. F. Chadwick (acting)..... "..... 1877-78
William W. Thayer..... "..... 1878-82
Zenas F. Moody..... Republican..... 1882-87
Sylvester Pennoyer..... Democrat-Populist..... 1887-95
William P. Lord..... Republican..... 1895-99
Theodor T. Geer..... "..... 1899-1903
George E. Chamberlain..... Democrat..... 1903-

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OREGON. A city and the county-seat of Ogle County, Ill., 99 miles west of Chicago; on the Rock River, and on the Chicago, Burlington and Quincy Railroad (Map: Illinois, C 2). It has a public library with over 2400 volumes. Good water power is furnished by the river; and there are manufactures of pianos, street sprinklers, flour, foundry and machine-shop products, etc. Oregon is an attractive summer resort. Population, in 1890, 1566; in 1900, 1577.

OREGON, UNIVERSITY OF. A coeducational State institution at Eugene, Ore., founded in 1872 and opened in 1876. It forms an integral part of the public system of the State. It comprises the University Academy; the College of Literature, Science, and the Arts, with a school of commerce, and courses in law, journalism, and teaching; the College of Science and Engineering, with courses preparatory to medicine and dentistry; the School of Music; the Graduate School; and the schools of law and medicine, the last two at Portland. Admission to the university is based on examination or on certificates from accredited schools. The university had in 1902 an attendance of 470, 71 instructors, and a library of 15,500 volumes. The productive funds amounted to \$200,000, and the income to \$59,700.

OREGON BROOK-TROUT. The common brook-trout of the tributaries of the lower Columbia, and of coastwise streams of Oregon and Washington, a variety (*Masoni*) of the rainbow trout (q.v.). The Dolly Varden trout of the same region is sometimes called the Oregon charr.

OREGON CITY. The county-seat of Clackamas County, Ore., 15 miles south-southeast of Portland; on the Willamette River, and on the Southern Pacific Railroad (Map: Oregon, C 4). It is developing as an industrial centre, its manufactures, which include paper and pulp, woolen goods, flour, lumber, soap, etc., being promoted by the immense water power derived from the falls of the Willamette, 40 feet in height, which are utilized also as a source of electrical power. The city is at the head of deep-water navigation on the river, but vessels pass above the falls by means of a system of locks. There are municipal water-works. Population, in 1890, 3062; in 1900, 3494.

OREGON QUESTION. The name given in American history to the dispute between the United States and Great Britain over the delimitation of their possessions on the Northwest coast, leading to the determination of the present boundary. See OREGON, paragraph *History*; NORTHWEST BOUNDARY DISPUTE.

OREGON RIVER. A river in North America. See COLUMBIA RIVER.

OREGON ROBIN. A thrush (*Merula nœvia*) of the Columbia River Valley and northward, which is closely related to the Eastern robin (*Merula migratoria*), but very different in colors. It is dark bluish slate above, and orange-brown below, with a line of black from the bill backward below the eye and along the side of the neck, whence it curves forward into a broad, crescentic band across the breast. The bird breeds in British Columbia and Alaska, makes a strong nest in bushes, and lays eggs colored light greenish blue, and distinctly marked and spotted with blackish brown. It has a sweet song.

OREGON SNOWBIRD. A junco (*Junco Oregonus*) common in the Northwestern United States and Canada. It differs from the common Eastern junco (q.v.) in the blacker and more sharply defined hue of the head and neck, the absence of dark color under the wings, and the square patch of rufous brown on the upper part of the back. As in other juncos, white feathers appear in the tail. The male of this species has the second tail feather mostly white and the third partly so near the tip. The adult female's plumage differs from that of the male in being prevaillingly brown.

OREGON STURGEON. The white sturgeon of the Pacific Coast. See STURGEON.

OREGON TRAIL, THE. A narrative of travel by Francis Parkman (1849). It is the account of a trip to the far West which he made in 1846, and first appeared in the *Knickerbocker Magazine* in 1849 as "The California and Oregon Trail."

O'REILLY, Count ALEXANDER (c.1722-1794). An Irish soldier in the Spanish service. At an early age he went to Spain, where he entered the military service. After serving in Italy against the Austrians he entered their service in 1757, and fought in two campaigns against the Prussians. In 1759 he entered the French Army, but soon afterwards was induced to return to Spain, and in the campaign of 1762 against Portugal earned promotion to the rank of brigadier-general. He was made major-general, and was appointed Governor of Havana. There he rebuilt the fortifications which had been demolished by the British. In 1769, appointed Governor of Louisiana and sent with a large force to reduce the rebellious French colonists, he arrested and tried the leaders of the revolution, and had some of them shot, but having thus demonstrated his master's power, he then devoted himself to winning the affections of the colonists by the affability of his demeanor and the liberality of his policy. In 1770 he returned to Spain, where he was made Governor of Madrid. On the death of General Ricardos he was appointed commander of one of the armies operating against the French, and died while on his way to the frontier.

O'REILLY, JOHN BOYLE (1844-90). An Irish-American poet and journalist, born at Dowth Castle, county Meath, Ireland, June 28, 1844. He studied at a private school, learned to set type, and became a newspaper reporter. At the age of eighteen he went to London as an agent of the Fenian Society, and in 1865 enlisted in

the British Army for the purpose of inducing Irish soldiers to revolt. He was detected in 1866, tried for high treason, and sentenced to be shot, but the sentence was commuted to penal servitude for twenty years. In April, 1867, with the help of the Rev. Patrick McCabe, he escaped in a boat from Bunbury, West Australia, was rescued by the *Gazelle*, an American whaler, and carried to the United States in November, 1869. He settled in Boston, and devoted himself to literary work and public activity. In 1870 he became editor of the *Pilot* and remained in that position till his death at Hull, Mass., August 10, 1890. He was the founder of the Papyrus Club of Boston, and was highly esteemed, especially by men of his own race, for his talents, social qualities, and his loyalty to the Fenians. His verse includes *Songs of the Southern Seas and Other Poems* (1873); *Songs, Legends, and Ballads* (1878); *Statues in the Block and Other Poems* (1881); *America* (1882); *In Bohemia* (1886). Volumes of prose are: *Moondyne; A Story from the Under World* (1879), a tale of penal life; *The Irish Question* (1886); *The Ethics of Boxing and Manly Sport* (1888); and *Stories and Sketches* (1888). Consult the *Life of John Boyle O'Reilly* (Boston, 1891), by James Jeffrey Roche.

O'REILLY, MILES. The pseudonym of the American soldier and poet Charles Graham Halpine (q.v.).

OREJONE, ō'rā-hō'nā (Sp., Big Ear). A name applied by the Spaniards to several unrelated tribes on account of their custom of stretching or distending the ear by heavy pendants. The principal tribe thus known, properly called *Coto*, ranges between the Putumayo and Napo rivers, in territory claimed both by Ecuador and Colombia. They are naked savages of repulsive appearance and fierce disposition, although carrying on some trade in hammocks and poison. Their huts are without doors, entrance being effected from the roof. They use stone hatchets and poisoned arrows, and stretch their ears, by the insertion of wooden plugs in the lobes, until they hang down to their shoulders. Their language is said to be related to the Ticuna.

Another tribe of the same name was described by the missionary Nicolas in 1739 as living in the ancient Province of Santa Marta, now the province of Magdalena, Colombia. They called themselves *Tomoco*. They were also fierce and brutal savages, going entirely naked, with bodies anointed with gum, and their long hair hanging loosely, sometimes crowned with feather turbans. Both men and women wore gold pendants in their ears and noses. They cultivated corn, but depended chiefly upon hunting for subsistence, using poisoned arrows. They were also accused of cannibalism. They were bitterly hostile to the Spaniards, very few of them having ever been brought under mission influence, and have probably long since disappeared.

OREL, ār-yōl'. A government of Central Russia, bounded by the governments of Smolensk, Kaluga, and Tula on the north, Voronezh on the east, Voronezh and Kursk on the south, and Tchernigov on the west (Map: Russia, E 4). Area, 18,060 square miles. It has a somewhat hilly surface intersected by numerous ravines and river valleys and sloping generally toward

the west. The chief rivers are the Don (with its tributary the Sosna), the Oka, and the Desna.

The climate is moderate, the temperature averaging 45° F. at Orel, the capital. In the eastern part, where there is an abundance of black soil, agriculture is the principal occupation, and yields considerable quantities of grain for export and hemp for manufacturing. In the west the soil is generally sandy and sterile, and agriculture is only of secondary importance. Thousands of the peasants of that section annually go for a season of work to Saint Petersburg and Moscow, and especially to the southern parts of Russia. Stock-raising is important, and the Orel horses are classed among the best in Russia. In the forest regions timber, tar, and pitch are produced. The house industry is but slightly developed. The chief manufactures are iron rails, glass, oil, flour, hemp products, etc. Population, in 1897, 2,054,749, chiefly Great Russians.

OREL. The capital of the government of the same name in Central Russia, situated on the Oka, at its confluence with the Orlik, 238 miles south of Moscow, and at the junction of three railway lines (Map: Russia, E 4). It is built mostly of wood. It contains three gymnasia, a *Realschule*, a corps of cadets, a theological seminary, and a meteorological station. The chief products are candles, ropes, oil, and flour. The town was founded in 1564 as a frontier fortress against the Crimean Tatars. Population, in 1897, 69,858.

O'RELL' MAX. A name assumed by Paul Blouet (1848-1903). A French satirist. He served in the Franco-German War (1870), went to England as a newspaper correspondent in 1872, and taught French at Saint Paul's School (1876-84), using experiences gathered then, and during a visit to the United States, for *John Bull and His Island* (1883); *John Bull's Daughters* (1884); *Friend MacDonald* (1887); *Jonathan and His Continent* (1889); *A Frenchman in America* (1891); *English Pharisees and French Crocodiles* (1892); *John Bull and Co.* (1894); and similar books that have had a wider circulation among English peoples than in France. His writings are humorous and often truthful, but as studies of nations they are marked by no very careful investigation nor depth of thought.

ORELLANA, ō'rā-lyā'nā, FRANCISCO (?-1545?). The discoverer of the course of the Amazon River. He was born in Trujillo, Spain, the native place of Pizarro, and came to Peru in 1535. In 1537 he had a share in the founding of Guayaquil. In 1540 he accompanied Gonzalez Pizarro as second in command on an expedition across the Andes into the country beyond, which was reported to abound in gold, silver, and cinnamon. After many hardships and misfortunes the expedition reached the junction of the Coca and the Napo rivers. Their supplies being exhausted, Orellana with 50 men was ordered to sail down the Napo in search of provisions and signs of treasure. He descended the stream to its junction with the Amazon, but instead of returning proceeded down the great river in a vessel which he constructed for the purpose. The voyage to the mouth of the Amazon lasted nearly eight months and Orellana's party underwent severe privations. Many deaths occurred

from skirmishes with the natives, and mutinies broke out among the crew, which only the commander's firmness quelled. Orellana reached the coast in August, 1541. From the mouth of the river he sailed to the island of Cubagua, in Venezuela, and thence to Spain, carrying glowing accounts of the El Dorado, and embellishing his story with descriptions of a marvelous race of female warriors, of whom the natives, as he understood them, had told him, and who were named from the classical analogy, Amazons. Gold there was in such plenty that the roofs of the temples were made of that metal. The King of Spain granted Orellana extensive possessions and a commission to colonize El Dorado. He set out with four ships and 400 men in May, 1544, but lost one ship and 150 men before reaching Tenerife. He arrived at the mouth of the Amazon, but his fleet was wrecked, and he died shortly after of malarial fever. An account of Orellana's first voyage was written by Caspar de Carvajal (q.v.).

ORELLI, ô-rêl'îê, KASPAR (1787-1849). A classical scholar, born at Zurich. He studied in the *Carolinum* at Zurich, and in 1806 was ordained as a clergyman. He spent some years as a pastor at Bergamo; and while there, published, in 1810, two parts of a work entitled *Beiträge zur Geschichte der italienischen Poesie*. In 1814 he became a teacher in the cantonal school at Chur; in 1819 professor of eloquence and hermeneutics in Zurich; and after the foundation of the Zurich High School, in which he took an active part, he was one of its chief instructors. Orelli edited many classical authors with great learning, taste, and acute discrimination; in particular, his editions of Horace (Zurich, 1837-38), Tacitus (Zurich, 1846-47), and Cicero (Zurich, 1826-31) deserve mention; also an *Onomasticon Tullianum* (Zurich, 1836-38), executed in association with Baiter, and an *Inscriptionum Latinarum Selectarum Collectio* (2 vols., Zurich, 1828; 3d vol. with indices, by Henzen, ib., 1856). There is a fourth edition of Orelli's *Horace*, with a lexicon (Berlin, 1886-92).

ORENBURG, ôr'en-bôorg'. A government of Russia partly in Europe and partly in Asia, and bounded by the Government of Perm on the north, Tobolsk and Turgai on the east, Uralsk on the south, and Samara and Ufa on the west (Map: Russia, J 4). Area, about 73,900 square miles. It is mountainous in the centre and the north, being traversed by the Ural Mountains (q.v.) and their offshoots. It slopes toward the west, south, and east. The eastern and southern parts have the character of a steppe. The region belongs mainly to the basins of the Ural and Tobol. Lakes are very numerous, and some of them contain extensive deposits of salt.

The climate is healthful, but somewhat dry, in the southeast. The average annual temperature at Orenburg, the capital, is 38.5° F. Orenburg is noted for its mineral deposits, which include gold, silver, copper, iron, platinum, and salt. Coal has also been discovered near Iletsik in the south. Gold, copper, iron, and salt are obtained on a large scale, the first being found mainly in the eastern slopes of the Ural chain. The mountainous region in the centre is well wooded, while the eastern steppe is mostly barren. The natural conditions are favorable for agriculture, but the

soil has been to some extent exhausted by the wasteful methods which usually characterize agriculture in new countries. About three-sevenths of the total area of the district belongs to the Orenburg Cossacks, the original Russian settlers of the region, who are still maintained on a military basis and are very prosperous.

Stock-raising is extensive, especially among the Bashkirs. Animals and animal products are among the leading exports. The Bashkirs are particularly known for their kumiss, which forms an essential item in their diet. Manufacturing industries are as yet undeveloped. The best known products of the house industry are various felt products, and the 'Orenburg shawls,' prepared from goats' wool and largely exported. There is an extensive trade carried on with the Kirghiz of the steppes. Population, in 1897, 1,609,388, only about 70 per cent. Russians. The remainder are Bashkirs and other Mohammedans.

ORENBURG. The capital of the Government of Orenburg, in Eastern Russia, on the right bank of the Ural, 988 miles by rail southeast of Moscow (Map: Russia, J 4). It is a well-built city with an old fortress, an arsenal, two gymnasias, a corps of cadets, a seminary for priests and for teachers, a theatre, and a museum. In the extensive municipal abattoir great numbers of cattle are slaughtered annually for export purposes. A little over a mile from the city is the 'barter house'—an extensive bazaar in the shape of a fortress where herds of cattle are brought from the East and exchanged for manufactured articles. The barter trade, which was formerly very extensive, has decreased considerably since the construction of the Trans-Caspian Railway. Orenburg exports large quantities of frozen meat, tallow, hides and skins, butter, cheese, wool, and other animal products. The town was founded at the confluence of the Or with the Ural in 1735 and removed to its present site in 1742. It withstood a siege by Pugatcheff in 1773. Population, in 1897, 72,740, including 13,000 Mohammedans.

ORENSE, ô-rên'sâ (Lat. *Aquæ Urentes*, hot springs). The capital of the Province of Orense, in Galicia, Northwestern Spain (Map: Spain, B 1). It is situated on the left bank of the Miño, in a mountain valley having a cloudy and stormy climate. The river is here crossed by a fine bridge of seven arches built in 1230, but the town itself has few features of interest. It has a Gothic cathedral, which is hemmed in by houses and narrow streets. The high school occupies a handsome building, and there are, besides, a seminary, a normal school, and the provincial library. The town manufactures leather and chocolate, and there are flour mills and iron foundries. At the foot of the hill on which the town lies are the hot springs of Las Burgas. Population, in 1887, 14,168; in 1900, 15,258.

O'REODAPHNE (Neo-Lat., from Gk. ὄρος, *oros*, mountain + δάφνη, *daphnê*, laurel). A genus of trees (now called *Ocotea*) of the natural order Lauraceæ, sometimes called mountain laurel. The fruit is succulent, partly immersed in the deep thick calyx. *Ocotea opifera* is a native of the lower Amazon countries. A volatile oil obtained from the bark is used as a liniment, and when kept for a short time deposits a great quantity of camphor. *Ocotea cupularis*

(*Mespilodaphne cupularis* of some botanists) is a very large tree with strong-scented wood, the bark of which yields the cinnamon of Mauritius. It grows also in Réunion and Madagascar. *Ocotea falcata*, a native of the Canaries, has wood (til-wood) of a most disagreeable odor. *Ocotea bullata*, found at the Cape of Good Hope, is also similarly remarkable and is locally called stink-wood. It is hard, durable, beautiful, takes an excellent polish, and is used in ship-building.

O'REODON (Neo-Lat., from Gk. ὄρος, *oros*, mountain + ὀδούς, *odous*, tooth). An extinct artiodactyl ungulate mammal, fossil remains of which are found in such great abundance in the Oreodon beds as to indicate that these animals roamed in extensive herds over the grassy plains of Colorado, the Dakotas, Nebraska, and Wyoming during Miocene times. The animal was of the size of the modern peccary, with four hoofed toes on each foot, and a very long slender tail. Leidy called it a 'ruminating hog.' An allied genus, *Eporeodon*, twice the size of *Oreodon*, is found in the Miocene deposits of the Pacific Coast, and other ancestral forms are found in the Eocene beds.

ORESTES, ὀ-rēs'tēs (Lat., from Gk. ὀρέστης). In Greek legend, a son of Agamemnon and Clytemnestra. According to the *Odyssey*, he was sent from Mycenæ by his mother when she yielded to the seductions of Ægisthus. Brought up at Athens, he returned eight years after the murder of his father by Ægisthus, slew the murderer, and recovered the kingdom. The death of Clytemnestra is implied, but there is no allusion to her murder by her son. In the later poets, apparently through the influence of Stesichorus, this became the prominent feature of the story, which was then closely connected with the worship of the Delphian Apollo, as a purifier from the guilt of blood. The theme was treated by the three great tragedians, by Æschylus in the *Orestes* trilogy, by Sophocles in the *Electra*, by Euripides in the *Electra*, *Orestes*, and *Iphigenia Among the Taurians*. The versions vary in the details according to the dramatic ideas which influenced the writers. After the murder of Agamemnon, Ægisthus and Clytemnestra ruled over Mycenæ, or Argos, without opposition. Electra, sister of Orestes, was harshly treated because she still mourned her father and longed for vengeance on his murderers. Orestes in Phocis hesitated to return until ordered by Apollo to revenge his father. He therefore went to the palace, revealed himself to Electra, by a stratagem secured admission and slew his mother, Clytemnestra, and her paramour. He then sought purification at Delphi, and in one version found it. Another story told how the Erinyes (or Furies) pursued the matricide, and even Apollo could not help him, but sent him to Athens, where Athena established the high court of the Areopagus to hear the case. Orestes was acquitted by a tie vote, and the Furies were appeased by the establishment of their worship as the Eumenides at Athens. Euripides added the story that after the trial Orestes was freed only by voyaging to the Tauric Chersonese for the image of Artemis, thus freeing his sister Iphigenia (q.v.). The *Orestes* of Euripides has a unique version of a trial at Argos and condemnation. After his release from the Furies Orestes reigned at Argos or Sparta, and married Hermione,

daughter of Menelaus, after killing at Delphi Neoptolemus, son of Achilles, who also claimed her hand. Scenes from this legend are common on vases and sarcophagi.

ORESTES AND ELECTRA. (1) The title commonly given to a marble group in the Villa Ludovisi, Rome. It is the work of the sculptor Menelaus and probably represents Theseus and Æthra, or Telemachus and Penelope. (2) An affecting group in the Museo Nazionale, Naples. It is in the archaic style revived by Pasiteles toward the end of the Roman Republic.

O'REUS (Lat., from Gk. Ὀρεῖς). A later name for the ancient Eubæan city Histiaia (q.v.).

OREXIN (from Gk. ὀρεξίς, *orexis*, desire, appetite, from ὀρέγειν, *oregein*, to reach out, desire). A derivative of chinoline, chemically phenyl-di-hydro-quinazoline-hydrochlorate. It is a grayish, odorless, crystalline powder, with a bitter, pungent taste. It is soluble in water and in alcohol. It is used to increase the appetite by increasing the secretion of gastric juice, and should not be employed if there is actual disease of the stomach.

ORFE (from Lat. *orphus*, from Gk. ὀρφῆς, sort of perch). A golden variety of the ide, bred for keeping in aquariums. See IDE.

ORFEO ED EURIDICE, ōr-fā'ō ēd ā'y-rē-dā-chā. The title of an opera by Gluck, with libretto by Calsabigi. It was presented in 1762 in Vienna and in 1774 in Paris with a French libretto by Moline.

ORFILA, ōr-fā'lā', MATTHIEU JOSEPH BONAVENTURE (1787-1853). A French chemist, physician, and toxicologist. He was born at Mahon, in Minorca, and studied medicine at Valencia and Barcelona, receiving the degree of doctor of medicine in 1811. He immediately began a private course of lectures on chemistry, botany, and anatomy, and soon became a well-known and successful practitioner. In 1813 he published a treatise on poisons which materially increased his fame; in 1816 he became Court physician; in 1819 he was created a citizen of France, and became professor of medical jurisprudence; in 1823 he was transferred to the chair of chemistry, to which was added in 1831 the deanship of the faculty. From 1834 he was a member of the council of public instruction. He organized a clinical hospital, founded a new botanical garden, and a museum of comparative anatomy, which is now known by his name. He died in Paris. Orfila is regarded as the founder of the science of toxicology, and his great work on the subject, *Traité des poisons tirés des règnes minéral, végétal et animal*, or *Toxicologie générale* (Paris, 1813), gained him world-wide recognition. His other works are: *Eléments de chimie appliqués à la médecine* (1817; 8th ed. 1851); *Traité de médecine légale* (1823-25; 4th ed. 1847); *Mémoires sur plusieurs questions medico-légales* (Paris, 1839); and *Recherches sur l'empoisonnement par l'acide arsenicux*, etc. (ib., 1841).

ORFORD, Sir ROBERT WALPOLE, First Earl of. An English statesman. See WALPOLE, Sir ROBERT, First Earl of Orford.

ORGAN (AS. *organe*, *organa*, from Lat. *organum*, from Gk. ὄργανον, instrument, organ; connected with ἔργον, *ergon*, work, Av. *varež*, to work, Goth. *ga-wairki*, OHG. *werch*, *werah*,

Ger. *Werk*, AS. *weorc*, Eng. *work*). In biology, any part of a plant or animal that has a definite work to perform for the good of the whole being. In the possession of organs living creatures differ from mineral substances; consequently the former are called 'organisms,' and are said to be composed of organic matter, whereas the latter are inorganic. Even in the lowliest one-celled creatures organs make their appearance. The nucleus may be regarded as the first or oldest organ in organisms. The cytoplasm as well as nucleoplasm must, however, be regarded as composed of a complex of primitive organs which we cannot indeed see, but with whose behavior we are acquainted. These are the 'biophores' or microsomes. In some of these organs, also called 'organoids,' seems to reside the control of the nutrition; in others that of locomotion; in others that of sensation. Visible structures are also developed, such as a foamwork and often cilia. Thus even in its most primitive form protoplasm is already possessed of many organs; it is *organized*. Of the origin of the most primitive organism, of the source of this fortunate concurrence of mutually operating organs, we are totally ignorant.

Although even the simplest protoplasm is organized, organization becomes more complex in the higher forms. The organs become more numerous and have different ranks. There are the organs of gross anatomy, such as the eye, the stomach, heart, and the limbs, tissues, etc., which are complexes of organs of a lower rank, and are in turn made up of the unit organs—the cells. All cells have the organized structure of protoplasm. The essence of organization is division of labor. In a great factory each worker does a single stage of the work, so that if one drops out the work of the others is stopped. In such a factory, therefore, extreme division of labor is found, on the whole, to be immensely advantageous to the amount and quality of the work done; so in the organism. Important is the fact that, despite the extreme division of labor in the organism, the whole rules over the parts. So that even if an organ fails to perform its function completely, the organism may still survive through a regulative capacity in the rest of the organism.

UNDEVELOPED AND VESTIGIAL ORGANS. There are certain organs in nearly all animals which attain little development—some seem, indeed, to be retrogressively developing. This retrogression may take place in the development of the individual or of the race, and seems to be due to disuse. The organs that are becoming degenerate in the race appear in a more or less rudimentary condition even in the embryonic life of the individual. They may later disappear in the individual development or long persist as vestigial and apparently useless structures. Organs occasionally occur which are imperfect, incomplete in structure, as a result of faulty or arrested development. Thus rare cases of persistent gill-slits occur in man, the two halves of the upper lip fail to fuse, or the heart is imperfect in construction. See **DISUSE**.

CORRELATION OF ORGANS. Certain organs of the body are physiologically or morphologically so interdependent that any change in the one brings about certain changes in the others. Such close relations between organs we call correlation. For example, such a relation exists be-

tween the length of the right and left arms, and between the length of the arm and the stature.

SYMMETRY OF ORGANS. Throughout all the animal kingdom, an external bilateral symmetry of organs very generally prevails in the two sides of the body. These similar sides are called 'antimeres.' This is the case in man and in all vertebrates. In the internal organs of the higher vertebrates, on the other hand, the two sides of the body present great diversities in the circulating, digestive, and other systems. This asymmetry has evolved from the symmetrical condition characteristic of the lower vertebrates. Even the external organs of the higher vertebrates, although similar on the two sides, are very imperfectly so. In the two hands, for example, the blood-vessels, nerves, and finger-points of one differ from those of the other. In Mollusca bilateral symmetry sometimes exists, and is sometimes entirely lost, the one side remaining relatively undeveloped. In the Arthropoda the symmetry is in general as perfect as in vertebrates, and in the internal structure even more so. In the Echinodermata and Cœlenterata radial symmetry prevails, i.e. there are more than two similar antimeres (usually five) grouped around a chief axis. In sea-anemones there are usually five of these antimeres; in Hydromedusæ four. In the vegetable kingdom a radial symmetry appears in the regular distribution of sepals, petals, stamens, etc., around the centre of the flower; and also in the arrangement of organs around the chief axis of the plant. See **HOMOLOGY**; **HOMOPLASY**; **MORPHOLOGY**.

ORGAN. A wind instrument of powerful dimensions, whose earliest history cannot be exactly traced, though it is safe to assume that its predecessors were the bagpipes and Pan's pipes. The *organum hydraulicum* of Ctesibius, a native of Alexandria (c.250 B.C.), has been described by his pupil, Heron, also of Alexandria, from whom it would appear that organs were made in Greece and Italy with wind generated by bellows (air pumps), and also by means of water pressure. There is also extant a description (Greek) of an organ belonging to Julian the Apostate (fourth century A.D.), and there are other examples from Cassiodorus and Saint Augustine. Further data are obtained from ancient reliefs, representations, and accounts which would seem to indicate that the instrument was known in the West even before the Emperor Constantine (Copronymos) sent a gift of one to King Pepin in 757. These early instruments were naturally imperfect, rarely possessing more than from eight to fifteen pipes; while the keyboard consisted of small upright plates made of wood which the performer pressed upon. The sound of the pipe continued until the key plate was restored to its former position. The organ is said to have been first employed in the church during the time of Pope Vitalian I. (c.666 A.D.). Pepin placed the Constantine organ in the Church of Saint Corneille at Compiègne, and Charlemagne had one made at Aix-la-Chapelle, a model of the one at Compiègne. Caliph Harun al-Rashid presented Charlemagne with an organ built by Giafur, an Arab. In Europe at this period the organ-builders of Venice were considered the best, but in the following century both the French and the Germans made rapid strides. The great organ in Winchester

Cathedral, described by the monk Wulstan, was the first instrument of importance erected in England. It is described as having been operated by "two brethren of concordant spirit," and its tone is said to have "reverberated and echoed in every direction so that no one was able to draw near and hear the sound, but had to stop with his hands his gaping ears." Among the Anglo-Saxons of the tenth century the title 'Bumbulum' was applied to the organ. Up to this time the instrument was worked by means of slides, which, according as they were opened or closed, admitted wind to the pipes.

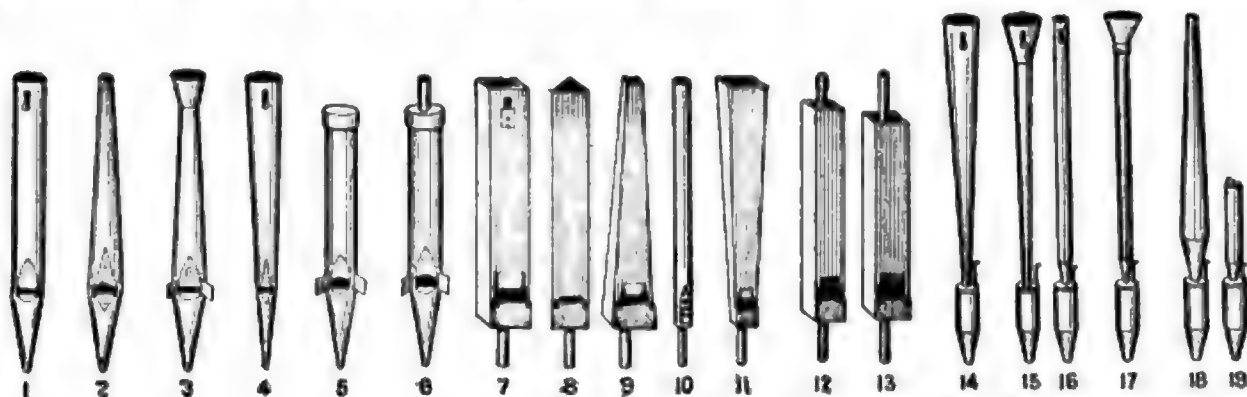
The modern keyboard (q.v.) grew out of the levers of this period, which have been well described as resembling those used by a railway signal switchman. The organ already mentioned at Winchester is said to have had four hundred pipes and two claviers, each of which had twenty keys (the compass of the Guido monochord), and also had ten pipes for each key, which were further reinforced in the octave and double octave. The special development of the twelfth century seems to have been the division into registers of the pipe-work, which, with its complicated mechanism, caused a great increase in the size of the instrument and made necessary such large keys that they had to be struck with the fists or elbows. The introduction of reed pipes occurred in the fifteenth century, subsequent to the invention of pedals in Germany about 1350. Improvements were also made in the keyboard so that fingers could be used instead of fists. Organ-building now became a regular trade. The father of the modern organ-building craft, so far as any authoritative account is concerned, was Albert van Os, who flourished in the first half of the twelfth century, and who is supposed to have been the inventor of pedals, although the idea is also attributed to Ludwig van Valbeke, of Brabant, and also to a German named Bernhard. Van Os built the celebrated organ of Saint Nicholas Church at Utrecht. From this time also dates the influence of the organist on the builder, for improved instruments made possible the skillful organist, and his reflex influence discovered and developed further improvements and possibilities in the instrument. Coming to the time of Bach, we find the organ the most thoroughly developed and possibly the most important musical instrument of the period. Saxony, which may be described as the birthplace of the magnificent instrument of to-day, boasts of over two hundred organ-builders between 1350 and 1780, including such world-famous workmen as the Silbermanns, Hildebrand, Gabler, Sommer, and Herbst. The difference between the French and the German systems had an important bearing on the development of the various pipes. The French gave the reeds to the instrument, while the Germans invented the Gamba family and brought the small wooden pipe tone to great perfection. The next great and comparatively recent discovery was a method for equalizing the wind pressure, by the introduction of inverted ribs in the upper reservoirs of the bellows, an improvement which made possible a constant wind pressure and consequently an evenness of tone which had hitherto been unattainable. The 'hauptwerk' and 'oberwerk' of Germany correspond to the 'great' of the modern English and American organ; and similarly the 'brustwerk' is the equivalent of

the English 'swell.' The 'ruckpositiv' corresponded to the English 'choir' or 'chair' organ. A distinctive feature of the German organs was their 'echo' organ, which contained stops reduplicating either the whole or the upper portion of some of the stops on the main organ. As they were built in an inclosed box, they produced the effect of distance. An English maker, Abraham Jordan, invented the simple contrivance of shutters about 1720, an invention which increased the tone of the echo stops and was practically the first real 'swell.' Other countries were somewhat slow to avail themselves of the English invention, for, according to Burney, no trace of it could be found anywhere on the Continent except in the Michelkirche at Homberg, and even there it was so small as to be almost ineffective. In France the disposition of the stops in classes seems to have been the same as in Germany, Holland, and England. The organ of Saint Roch (1750) had four manuals, of which the great and choir communicated by means of a spring. The third manual was for the reed stops, and the fourth or upper for the echoes. The spring of communication was the predecessor of the modern coupler. Coming down to the nineteenth century, we find the efforts of the builders directed to still further improvements in the wind apparatus and the keyboard. An Englishman, C. S. Barker (1806-79), noticed that in the great organ at York Minster several pounds' pressure was necessary to force down any single key. In the search for a remedy the principle of the hydraulic press occurred to him, with the result that he devised a movement or mechanism by which the action was set in motion by the expansive power of compressed air, so that the key, instead of being a lever which had to move a complicated mechanism of back falls, rollers, springs, etc., became a valve lever whose only function was to admit or cut off a small quantity of air in order to obtain a result greater than had been possible before. Barker offered his discovery to the celebrated builders, Messrs. Hill, of London, when they were at work on the organ in the Birmingham Town Hall, but they rejected it. The equally celebrated Parisian builder, Cavaille-Coll, was next approached, and promptly applied it to the organ of Saint Denis. Thus the three great inventions of the swell, the bellows, and the pneumatic lever belong to the English school of organ-building.

THE MODERN ORGAN. The modern organ is ordinarily several organs in one, the number varying according to the size of the complete instrument. In a large organ the order of claviers would be as follows: echo organ, solo organ, swell organ, great organ, choir organ, and pedal organ. The *great organ* contains the pipes of largest scale and most powerful tone, and does not ordinarily contain any soft stops unless the manual is required to serve as a choir as well as a great organ. The *swell organ* is that part of the instrument which is inclosed in a box. The pipes are usually of smaller scale than are those of the great organ, and where there are only two manuals, it usually includes several soft and fancy registers, and also the majority of the reed stops. The *choir organ* is used for soft accompaniment, and is made up largely of flute-tone stops, with possibly one or two reed stops. In the best organs they are inclosed in a swell box which opens on all four sides. The

solo organ contains the orchestral stops, some or all of which may be inclosed in a swell box. The *echo organ* is made up of stops of small scale and of delicately soft tone. They are sometimes included in the swell box of the swell organ, even though they have a separate manual. Where this is done, however, it is usual to inclose them in a box which must be not less than three inches in thickness. The *pedal organ*, as its name implies, belongs to the pedalboard and consists of ranks of pipes which practically

the former, they are cylindrical in form, and when of the latter material, they are either rectangular, triangular, or cylindrical. The pitch and quality of the tone depends on the length and general character of the flue pipe. Metal flue pipes may be either open cylindrical, conical, conical with bell at the top, conical inverted, stopped cylindrical, or half-stopped cylindrical. Wood pipes are either open four-sided, or rectangular; three-sided or triangular; pyramidal; inverted pyramidal; turned cylin-



TYPICAL ORGAN PIPES.

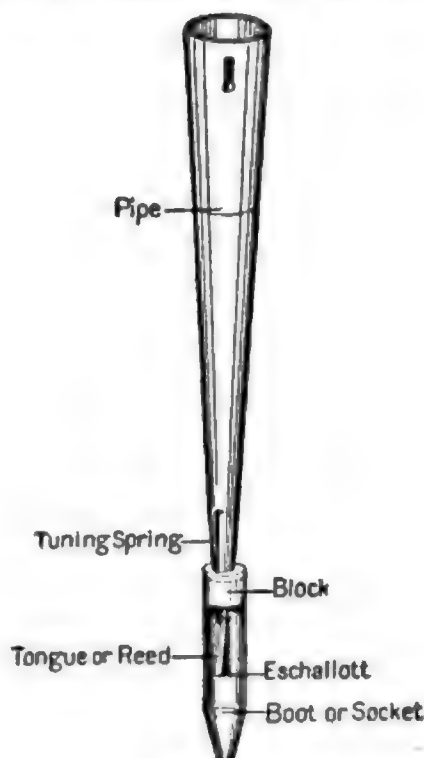
1, open cylindrical metal flue pipe; 2, conical metal flue pipe; 3, conical metal flue pipe with bell; 4, inverted metal flue pipe; 5, stopped cylindrical metal flue pipe; 6, half stopped cylindrical metal flue pipe; 7, rectangular wood pipe; 8, triangular wood pipe; 9, pyramidal wood pipe; 10, cylindrical wood pipe; 11, inverted pyramidal wood pipe; 12, stopped rectangular wood pipe; 13, one-half rectangular reed metal pipe; 14, inverted conical reed metal pipe; 15, bell-topped inverted reed metal pipe; 16, cylindrical reed metal pipe; 17, cylindrical reed metal pipe with bell top; 18, conical reed metal pipe; 19, cylindrical half-stop reed metal pipe.

are a continuation of the manuals. They are of more powerful tone, however, and are so designed as to afford a suitable bass or contrast to any stop upon the manuals.

THE STOPS. Each stop includes a number of pipes which follow each other chromatically and extend over the entire keyboard or some portion of it. Each set of pipes consists of tubes producing the same quality of tone throughout; thus the German term *Stimme* (voice) for stop is singularly appropriate. Stops are classified as (a) complete stops, (b) incomplete stops, (c) short stops, (d) divided stops, (e) compound stops. Complete stops extend the entire length of the keyboard; incomplete stops do not do so. Short stops are those which cannot be completed by any other stop. Divided stops are those which divide the manual compass between them. Compound stops have two or more pipes to a note. (See MIXTURES.) The tone qualities of the pipes of an organ may be classified as follows: The *organ tone*, which is best represented by the English 16-foot and 8-foot open diapason octave works; the German 16-foot, 8-foot, and 4-foot principle; and the French 16-foot, 8-foot *montre*, and 4 foot *presant*; the *flute* tone by the 16-foot *bourdon*, 8-foot stopped diapason, *Gedeckt*, *Melodia*, *Clarabella*, and the 8-foot and 4-foot flutes; the string tone by the 16-foot pedal violone, *contra gamba*, 8-foot violin, *cello*, *gamba*, *keraulophon*, *salicional*, *viol d'amour*; the reed tone by the trumpet, *oboe*, *bassoon*, *clarinet*, *vox humana*, *trombone*, etc. The structure of organ pipes consists of two general classes, viz. flue and reed pipes. The former derive their name from the method by which their tone is produced, i.e. the passing of air from the foot of the pipe through a flue, or narrow opening, across the mouth of the pipe. Such pipes are made of metal and wood. If of

dricial; stopped rectangular; and half-stopped rectangular.

Reed pipes are of two kinds—the striking or impinging reed, in which the vibrator strikes against the reed or metal tube inserted in the block of metal which fits into the boot of the



REED PIPE.

pipe, and the free reed which in vibrating passes in and out of the opening freely and without touching or striking. This latter species, however, is seldom used. With the impinging reed the vibrating portion of the tongue may be lengthened or shortened, and made to vibrate

slower or faster by raising or lowering the tuning spring, and thus bringing it to the desired pitch. In the case of the free reed, the tongue vibrates in the opening on the face of the eschallott. Sometimes the tuning is regulated by thumb-knots on a threaded wire. Reed pipes are either of metal or wood; in the former case their shape is either inverted conical, the same surmounted with a bell, cylindrical, the same surmounted with a bell, conical, or cylindrical half stopped. With the lowest toned reeds the pipes are usually of wood, four-sided, and in some organs are thirty-two feet in length. Free reed pipes have their bodies usually made of wood. The peculiar quality of the reed tone is largely caused by the presence of harmonics, and is due chiefly to the curve of the tongue, and the scaling and length of the tube. As in the case of flues, reed pipes are occasionally made of double or half length. It was stated earlier in this article that the reeds were peculiarly French and that the Germans were strongly inclined to the flues. Locher speaks of this as nationally characteristic, and gives the two following examples: The Münster organ in Ulm (Walcker), as compared to the organ of the Trocadéro Palace, Paris (Cavaillé-Coll); and the organ of Saint Johanniskirche, Stuttgart (Weigle), as compared to the Münster organ, Geneva (Merklin). An ancient family name for such reed stops as the Geigenregal and the Jung-Fernregal is 'Regals,' which is still sometimes used.

The parts of the organ naturally fall into three divisions: the pipework, the mechanism for blowing (bellows, channels, wind chest, etc.), and the mechanism by which the wind is utilized. The pipes are arranged according to the stops to which they answer. Each pipe gives but one sound, so that the number of pipes must equal the number of sounds required, and if there is but one stop on the organ, there would have to be as many pipes as there are keys on the clavier. The pipes of each register are so placed that they can all at the same time be connected or shut off together by the action of the stop. The pulling out of a stop admits the wind to the chest, so that it is only necessary to press the key, which in its turn opens a small valve, to voice the pipe belonging to that key. The various manuals are connected together by couplers, manual and pedal. The frame ordinarily unites the manuals with the great organ, but in all large organs and the most recent small organs the manuals may be coupled among themselves; besides these there are the octave couplers, which unite every key with that of the upper or under octave, or both, in which latter case it is generally called the double-octave coupler. This coupler produces an exceedingly full tone. When we speak of *pneumatic action* we mean the mechanism which is used to operate the pallets and stops and their moving mechanism, the motive power being compressed air or atmospheric pressure rushing in to fill the vacuum. In every case the motor is a bellows, i.e. a device for generating wind, and of an extensible or collapsible design. Motors may be either near the keyboard transmitting their power in the desired direction by means of a long tracker, or they may be situated near the part upon which they act, in which case they are governed by other small motors situated

near the keys and connected with the large motors by small tubes of indefinite length. In the first instance the transmission of power is by trackers, but in the last instance it is by what is called tubular pneumatics. In the tubular pneumatic system the position of the motors inside of the wind chest enables the pressure of the wind, when the key is at rest, to have access also to the interior of the motor, so that the top is balanced by the pressure of the wind within and without. The ordinary pneumatic lever action may be said to work on the principle of the inflation of a feeder or motor. In this action the pressure of wind, or the size of the motor, must be so arranged as to be of sufficient power to draw the action attached to that portion of the motor which is free to move when the inflation takes place. While this action is exceedingly useful for large instruments, in which the complicated mechanism makes the touch too heavy for comfortable playing, it nevertheless lacks the exact precision of attack, and is fatal to correct phrasing and touch, in that there is no sharp edge to the cessation of tone. Tubular pneumatics, on the other hand, have been found to give a very prompt tone in pedal work, owing to the fact that the pallets instead of being hinged may open and close in parallel motion. If well made, this action will not easily get out of order, besides which it appeals to the player in that it lends itself easily to octave work. Its expense, however, is a serious item, owing to the weight and cost of the tubing and necessary apparatus. Electro-pneumatic actions, which are, as their name implies, a combination of electrics and pneumatics, have thus far satisfied all requirements except perhaps that of absolute reliability, although the advocates of the principle assert that that fault has been overcome. In this action a tiny disk valve is opened by electricity and admits the heavy pressure wind to the pneumatic movement near the pallet. The console or key-board, through the various mechanical and electrical actions, may be placed in any position convenient to the player, quite independent of the location of the instrument. Numerous mechanical aids to registration are also important features of the modern organ.

Bellows of the simplest form are constructed after the manner of the smith's bellows, i.e. pump work. A distinction is made between horizontal and diagonal bellows. Of whatever shape or form they are but one thing is necessary, that they be ample for the full organ. Automatic organ-blowing engines or apparatuses are now common, the manufacture of which is a trade by itself. The rule has been laid down that a water pressure of at least thirty-five pounds to the square inch is necessary for blowing by water. In this method two pairs of bellows are required, one pair (which is for the exclusive operation of the engine) having square rising feeders and an ordinary waste valve, and the other pair being specially provided with feeders so that in case of failure of the water or engine the bellows may be blown by hand. Electric and gas engines are not quite so economical, and suffer in comparison with water power from the fact that the electric engine is subject to disarrangement, and the gas engine is somewhat noisy by reason of the explosions.

Soundboards and wind chests are required to be of sufficient length and width to give the pipes plenty of speaking room. The wind chest is an air-tight box or chamber having channels above the valves or pallets, one for each note. In connection with the wind chest or soundboard is the slider. When the performer draws a stop the holes in the slide correspond to the holes in the table and upper board, and thus enable the wind to pass from the channels to the pipes. When the stop is returned, the slide is moved so that the holes do not correspond, and the plain surface closes the channels to the pipes. Valve pallets are about an inch in thickness and from eleven to sixteen inches in length. All the spaces between the lower edges of the partitions of the soundboard except those which the valves cover are packed with filling, and each valve is maintained in its place by a steel spring. When the valve is opened to admit the wind to a pipe it is pulled down about half an inch at one end, while the other end is held in place by a pin. The valves in the wind chests are worked by a mechanism which is connected with the keys.

The *key action* deals with the entire process of causing a pipe to speak, the simplest method of which perhaps is the lever or fan frame movement when the wind chest is built on semitonal principles; upright rods (*stickers*) are placed upon the inside ends of the keys, the tops of these are inserted in one end of the levers which are arranged perpendicularly over each respective key, the other ends converging under the pull-down wires of the wind chest. Should these wires be some distance from the keys, tracker action is used. Trackers are thin strips of wood capable of sustaining weight longitudinally; should the trackers be very long, guides are provided for their support. Thus when the key is depressed it causes an almost instantaneous action whereby the wind is permitted to reach the pipe and cause it to speak. The compass on an organ manual is usually from C^c to G or A, although it is better extended to C, as is sometimes done, thus completing the five octaves. This latter is especially desirable where the pedal organ ranges from C^{cc} to F (30 notes). The names of the more important stops will be found discussed under their own titles. See also HARMONIUM; MELODEON; VOICING; TEMPERAMENT; TREMULANT; TUNING.

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aux grandes orgues (Paris, 1890); and for a bibliography of the organ, consult *Notes and Queries* (London, 1890).

ORGAN-BIRD. The name of two different song-birds, whose clear warbling notes suggest the tones of an organ. One is a wren (*Cyphorhinus cantans*) of the Amazon Valley; the other a piping crow (q.v.) of Tasmania (*Gymnorhina hyperleuca*).

ORGANIC BASES. See ALKALOIDS; AMINES; and PTOMAINES.

ORGANIC CHEMISTRY. The chemistry of the compounds of carbon. See CARBON COMPOUNDS.

ORGANIC SENSATIONS. "Sensations adequately stimulated by changes in the condition of the bodily organs—muscles, joints, etc. In every case, the adequate stimulus consists of a change in the condition of the particular organ, and the organ itself is the peripheral seat of origin of the nervous excitation which is thus set up." (Kölpe.) The only difference, then, between the 'sensations of special sense' and the organic sensations is that the organs of the former are stimulated from without, by some movement-process in the external world, while the latter are aroused by a bodily process within the organ itself. The distinction is convenient for purposes of classification, but has no psychological importance, since the sensations of the 'five senses' also presuppose a change in their organ; the 'stimulus' makes its impression on the brain by way of a bodily process in eye, ear, etc. Indeed, that there is no difference of kind between the two classes of sensations is shown by the attitude of popular psychology, which sometimes speaks of the 'five senses,' as if there were no more, but sometimes also adds a sixth sense, the 'muscle sense' (q.v.), to the five external senses.

The organic sensations, so far as they are known, fall into six principal groups. (1) We have, first, the group of 'kinæsthetic' sensations, the sensations which are excited by movements and similar stimuli (weight, resistance, position, etc.), and which furnish us with our bodily (non-visual) knowledge of the movement and position of the members. The specific quality of *muscular* sensation is a dull, dead pressure; that of *tendinous* sensation is strain; and that of *articular* sensation, the sensation set up by the rubbing or jamming of the joint surfaces, is a sharp pressure, which appears to be identical with the pressure obtained from the pressure-spots of the cutis. (See CUTANEOUS SENSATION.) These qualities have been identified, in the complex experiences within which they normally occur, partly by the laboratory method of elimination, and partly by the investigation of pathological cases. We can, e.g. by keeping the member unmoved and etherizing the skin, stimulate the muscle alone; or again, by etherizing the skin and muscle, stimulate the joint alone; or again, by passing a strong induction current through the joint, practically rule out the articular sensations. Since our sensitivity for lifted weights remains but little impaired when the sensations from skin and muscle are thus ruled out, we refer this function to the tendinous strain sensation, which remains clear in consciousness. Since a similar elimination does not affect our judgments of position and movement, while elimination of the joint sensations renders them

extremely uncertain, we refer these functions, in the same way, to the articular surfaces. On the pathological side, we find normal judgment of the position of the limbs compatible with anæsthesia of the external skin and muscles; whereas if the whole limb is insensitive there is no knowledge of its movement or place. Moreover, patients of the first class give the most accurate judgments of position and movement if the articular surfaces are closely pressed together.

(2) Of great importance in the economy of the organism are the alimentary organic sensations. These are three in number: the sensation of *hunger*, from the stomach; that of *thirst*, from the pharynx; and that of *nausea*, from the œsophagus. The adequate stimulus to hunger appears to consist in the drying and folding of the gastric mucous membrane, the lining of the 'wall' of the stomach, though hunger may be relieved by the injection of food into the large intestine. Thirst is set up by the drying of the pharyngeal mucous membrane, and may be relieved (though not permanently) by painting the back of the throat with a weak solution, e.g. of citric acid. The stimulus to nausea is, perhaps, the antiperistaltic movement of the œsophagus, which, in extreme form, passes over into the vomiting reflex. The experience of nausea usually includes sensations of taste, smell, and dizziness (see 6 below), so that the isolation of its specific quality is extremely difficult.

(3) There seems to be no doubt that *circulatory* sensations, stimulated by changed conditions of blood movement and blood supply, appear in certain organic complexes, though we cannot identify them with any degree of accuracy, or do more than guess at the conditions of their origin. Itching, tingling, formication, pins and needles, creeping, tickling, feverishness, etc., are the complexes in question. The sensation of cutaneous warmth that follows upon the pain of a smart blow upon the palm of the hand is possibly referable to circulatory sensations, though it may also be a true temperature sensation.

(4) Much the same thing must be said of the *respiratory* sensations. There seems to be a specific breathing quality in such experiences as panting, stuffiness, a bracing air, 'second wind,' breathlessness, etc.; and the lungs contain sensory nerve-endings. But of the number and nature of the respiratory qualities we are still ignorant.

(5) No systematic study has so far been made of *sexual* sensation. The sensation of lust is presumably the same in both sexes. We know, however, nothing in detail of its terminal organs, and little of its distribution over the organs of sex.

(6) The sensation of *dizziness* or giddiness is mediated by the semicircular canals of the internal ear, which are supplied by the vestibular branch of the auditory nerve. (See EAR.) The semicircular canals and vestibule constitute an organ which assists us, reflexly, to maintain our equilibrium and to orientate ourselves in space. Under certain conditions (for which see STATIC SENSE), in which there is disturbance or derangement of our space perceptions and relations, they serve as a sense-organ; and the sensation of dizziness, unpleasant as it is, plays a useful part as a warning of spatial disorientation.

The above list gives the full tale of organic

qualities, so far as known, with the single exception of pain (q.v.). It is characteristic of the group that the sensations do not form closed systems of varied content, as do those of the most highly developed senses, sight and hearing, but stand out singly, as do the qualities of cutaneous and gustatory sensation in the external or 'special sense' group. Whether further analysis will bring with it a greater differentiation, so that there will prove to be a number of hunger qualities, a number of qualities of 'oppressed breathing,' etc., we cannot say; but such a result is improbable. Neither is it probable that qualities once separate have now fused, or that certain qualities have lapsed altogether. The organic sensations are processes of very ancient origin, which (like the sensations of pressure, temperature, and taste) have persisted with relatively little change as the organism has grown in complexity. They play an important part in systematic psychology. They form the constant background of the psychological self, and thus contribute largely toward the 'unity' or centralization of consciousness; they furnish the commonest sense-basis of the feelings; and they functionate in a surprisingly definite and authoritative way in recognition and reproduction (q.v.).

It may be added that 'efferent' or 'innervation' sensations, in all probability, do not exist. The 'effort' that we put forth in lifting a heavy object is derived from memories, images, of previous liftings, and is not a new sensation accompanying the innervation of the arm muscles.

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ORGANISM. A living being, plant or animal, of which the essential constituent is protoplasm (q.v.; also ORGAN). The world of organisms or the 'organic world' is opposed to the mineral world—to lifeless things. There may be a degree of organization in a mineral, but it is a non-living, inorganic substance. An organism is a living being more or less differentiated into parts or organs, each with the peculiar formation.

ORGAN MOUNTAINS. The highest portion of the Brazilian Coast Range or Serra do Mar (q.v.).

ORGANOGRAPHY (from Gk. ὄργανον, *organon*, organ + -γραφία, *graphia*, writing, from γράφειν, *graphein*, to write). That division of biology which treats of the origin and cause of form. See LEAF; STEM; ROOT.

ORGANO-METALLIC COMPOUNDS. An interesting group of chemical compounds, in which organic radicles, such as methyl, CH₃, ethyl, C₂H₅, etc., are united to metals. Zinc-ethyl, which is a good example of the class, is obtained by digesting granulated zinc with ethyl iodide, C₂H₅I, at a temperature of about 260° F., for several hours. It is thus obtained in the form of a colorless, transparent, mobile liquid, which

strongly refracts light, has a powerful, rather disagreeable odor, and is considerably heavier than water. Its boiling-point is 118°C . (244.4°F). Chemically, it is very unstable, and when exposed to the air it takes fire spontaneously; it must, therefore, be handled with care and kept in vessels filled with carbonic acid gas. The properties of the other organo-metallic compounds of zinc, such as zinc-methyl, $\text{Zn}(\text{CH}_3)_2$, zinc-propyl, $\text{Zn}(\text{C}_2\text{H}_5)_2$, etc., are similar to those of zinc-ethyl, and so are the methods of preparing them. Among the corresponding compounds of lead must be mentioned lead tetra-ethyl, $\text{Pb}(\text{C}_2\text{H}_5)_4$, and lead tri-ethyl, which probably corresponds to the molecular formula $\text{Pb}_2(\text{C}_2\text{H}_5)_6$. The former of these may be obtained by the action of lead chloride on zinc-ethyl, the latter by the action of an alloy of 1 part of sodium and 3 parts of lead on ethyl iodide. It will be seen that while in its most stable inorganic compounds lead is divalent, in its organic compounds it is quadrivalent; in the case of its tetra-ethyl compound this is evident; but the tri-ethyl, too, probably has the constitution $(\text{C}_2\text{H}_5)_3\text{Pb}-\text{Pb}(\text{C}_2\text{H}_5)_3$, and hence contains lead in the quadrivalent state. Other metals capable of forming organic compounds include mercury, magnesium, cadmium, aluminum, thallium, and probably also sodium and potassium. In the case of metals whose atoms possess more than unit valency, compounds have been obtained in whose molecules a metallic atom is combined at the same time with organic radicles and with halogen atoms (like chlorine or iodine) or hydroxyl groups (OH). Thus the compound known as mercury-ethyl chloride has the formula $\text{C}_2\text{H}_5\text{HgCl}$, mercury-methyl iodide has the formula CH_3HgI , lead-trimethyl hydroxide has the formula $\text{Pb}(\text{CH}_3)_3\text{OH}$, etc. The hydroxyl-compounds, like that just mentioned, are strongly basic—about as strong, in fact, as caustic soda or caustic potash.

The organo-metallic compounds are useful in the synthetic preparation of a number of organic substances. They were discovered by Frankland, and it was while studying these compounds that Frankland first conceived the idea of valency, which has since formed the most important part of the atomic theory.

ORGANON (Lat., from Gk. *ὄργανον*, instrument). The title under which the later Peripatetics included Aristotle's writings on the general subject of logic, as concerned with reasoning, the chief instrument of investigation.

ORGANOTHERAPY (from Gk. *ὄργανον*, organ + *θεραπεία*, *therapeia*, attendance, medical treatment, from *θεραπεύειν*, *therapeuein*, to attend, treat). The use of animal glands, or extracts made from them, as medicines. In his Hunterian lecture for 1902 in London, Davies claims that the use of animal remedial preparations dates from B.C. 1500. An enormous number of preparations of extracts from the human body and from animals is mentioned by William Salmon, in his work published in 1677. Modern organotherapy, however, dates from the lectures of Brown-Séquard in 1869. He advanced the hypothesis, "all glands of the body, whether they are excretory canals or not, give to the blood useful principles, the absence of which is felt when the glands are extirpated or destroyed by disease." Recent experiments confirm this view, and substantiate the claim of Brown-Séquard

(q.v.). Besides spermatozoa, the testicles secrete a fluid which when absorbed into the system acts as a nerve stimulant and tonic. Brown-Séquard's 'elixir' is an extract of lambs' testicles. When administered hypodermically it produces an increase of hæmoglobin, an improvement in the cardiac force, exaltation of the vascular tone, and greater mental activity. Extravagant hopes were indulged by Brown-Séquard, and by some of his disciples, for testicular extract; and as the claims made were little short of ridiculous, his reputation suffered somewhat during the last years of his life. The extract has been employed, however, with varying results in hysteria, neurasthenia, locomotor ataxia, scurvy, marasmus, tuberculosis, epilepsy, and insanity. The active principle of this extract, *spermin*, is a leucomaine, and hence promotes oxidation in the body, probably relieving the nervous system to a certain extent of the results of auto-intoxication. Testicular extracts are variously termed *spermin*, *testaden*, *didymen*, *testine*, *testidin*, *testin*, *orchidin*, etc. Like all the animal medicinal products, testicular extract is prepared in powder and in liquid form. Ovarian extract is similar, though less powerful. It has been used in chlorosis, amenorrhœa following atrophy of the genitals, or after partial or entire extirpation of the ovaries, or during the menopause. It must be used with great caution. It is variously called *ovadin*, *ovraden*, *oöphorin*, and *ovulin*. Thyroid extract is the most useful of all these preparations and is of distinct and definite value and causes no uncertain effects. It is prepared from the thyroid glands of sheep. It has been very successfully employed in psoriasis, eczema, lupus, sporadic cretinism, goitre, myxœdema, uterine fibroma, and obesity. It is named *thyroidin*, *thyroprotein*, *iodothylin*, *thyraden*, etc.

Thymus extract, prepared from the thymus glands of young sheep or pigs, has been successfully used in exophthalmic goitre and most of the conditions that are benefited by thyroid extract, except obesity. Suprarenal extract is prepared from the suprarenal (or adrenal) glands. It has been moderately successful in Addison's disease, diabetes insipidus, and neurasthenia. In certain other conditions brilliant results have followed its use. It is a valuable vaso-constrictor and cardiac tonic, and it has some value in certain heart diseases. When applied locally it is a powerful astringent, and its most important use is in checking hemorrhage, accomplishing this result whether administered internally or applied locally. It is called *supradin* or *suprarenaden*, and a fluid extract of the suprarenals is termed *opo-suprarenalin*. A specially active preparation of the capsules made by Dr. Fraenkel is called *sphygmogenia*. The active principle of the capsules has been extracted by Takamine, by whom it has been named *adrenalin*. This preparation appears to be the most reliable and of most even strength of the preparations of the glands on the market. An extract prepared from the pituitary of the sheep has been used in a few instances by Marinesco, who claims success in the treatment of acromegaly (q.v.) with this agent. Preparations of the prostate gland of the bull have been used in cases of hypertrophy of the prostate in man. In dry form this extract is termed *prostata*. It is little known.

The term organotherapy has been expanded to

include the use of extracts prepared from various organs of the body, as well as the glands mentioned, in acquiescence with the extension by D'Arsonval of Brown-Séquard's hypothesis, as stated. While this use of the term is as deplorable as the ideas of D'Arsonval, for convenience sake it must be adopted. We find, therefore, extracts of the brain (cerebrin) recommended in neurasthenia, chorea, various psychoses, and conditions in which agoraphobia is present (see *INSANITY*); extracts of the kidney (renes, opo-renin, succus renalis) recommended in nephritis; spleen extract (linadin, nuclein, eurythol, neucleohiston) recommended in the treatment of anæmia, myxœdema, rickets, enlarged spleen, typhoid fever, goitre, leucocythæmia, and Hodgkin's disease; as well as musculine, extracted from the muscle of the ox; mammæ, extracted from the udder of the cow; and pulmonin, extracted from the lungs of calves. Most of these extracts from organs are apparently inert, some are useless. Nuclein alone seems really valuable. To the list should be added bone-marrow extract, which is a valuable preparation of the red marrow of bones, and chiefly made from the ribs and femur heads of calves. It is very successful in the treatment of anæmia and chlorosis.

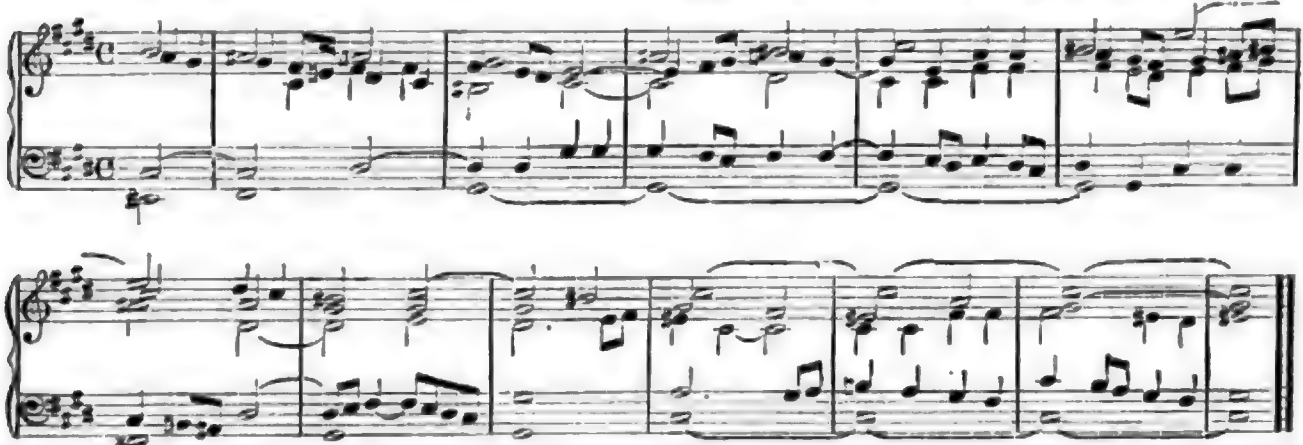
ORGAN-POINT. A long sustained tone in one voice while the other voices proceed in in-

tion of an organ-point in the bass are: (1) That the sustained note shall be either the tonic or dominant; (2) that it shall begin and end on a strong beat and form an essential part of the harmony of the beginning and closing chords. During the organ-point the other voices may proceed through any chords. Of course modulation of any length is excluded. An organ-point is generally introduced just before the end of a composition. Bach and Handel end many of their fugues on an organ-point. The following from the Scherzo of Beethoven's Ninth Symphony is an organ-point on the tonic:



In Fugue No. 4 from part I. of the *Well-tempered Clavichord* Bach introduces an organ-point on the dominant before the close which he constructs over an organ-point on the tonic, at the same time giving a holding note to the soprano.

A double organ-point on both tonic and dominant is often found in modern compositions, especially in those of a pastoral character. A fine example is found in the first movement of Beet-



dependent harmonies. The name is derived from *organicus punctus*, which in the twelfth century, the time of the *organum* (q.v.), was a long sustained note of indefinite duration generally held by the tenor (whence the name of the voice), over which the other voices executed a florid counterpoint. Organ-point is also called *pedal-point*, because the pedal of the organ is best

hoven's Pastoral Symphony (beginning at bar 29). There is also a *figured organ-point*, when the sustained note is varied, sometimes with a single note, sometimes with a group of notes. The following example from Beethoven's Seventh Symphony (Trio of Scherzo) illustrates this:

The longest organ-point that has ever been written consists of 138 bars and occurs at the



suited to sustain those long notes. But for etymological reasons it is best to use the name *organ-point*. The organ-point may occur in any voice. It seldom occurs in the middle voices, more frequently in the soprano, but generally in the bass. The modern tendency is to recognize the organ-point only in the bass; hence the sustaining of a long note in the soprano is called *holding note*. The laws governing the introduc-

beginning of the prelude to Wagner's *Rheingold*. See *HARMONY*.

ORGANUM (Lat., from Gk. *ὄργανον*, instrument, organ). In music, a term used to denote the primitive attempts at polyphony by leading the voices in open fifths. This succession of empty fifths is but a natural and logical step in the evolution of polyphony (q.v.). The first step (and this was already known to the

ancient Greeks) was the doubling of voices in the octave. Music remained at this point until in the latter half of the ninth century a second part was added a fifth below, and soon after a fourth below. Thus it is seen that only the perfect intervals were first used. Since then the evolution of music has been comparatively rapid. See HARMONY.

ORGANZINE (from It. *organzino*, organzine). A silk thread used chiefly for warp, in silk-weaving. It is formed by the union of two or more single threads, which are twisted separately in the same direction and are then doubled and retwisted in the opposite direction. See SILK.

ORGEYEV, ór-gyá'yéf. A district town in the Government of Bessarabia, Russia, situated 28 miles north of Kishinev. There are some ruins of the old Dacian fortress, the site of which is now occupied by the town. Agriculture and gardening are the chief occupations. Population, in 1897, 13,356.

ORGETORIX, ór-jét'ó-riks (?c.62 B.C.). A rich and powerful chief of the Helvetii, whose intrigues are recorded in Cæsar's *Commentaries* (book i.). He wished to possess himself of the chief power in his State, and therefore persuaded the Helvetii to emigrate to Gaul (B.C. 61). In consequence he was summoned to trial, but died, probably by his own hand, before the case could be heard. Consult Cæsar, *De Bello Gallico* (i. 2, 26); and Dion Cassius, xxviii. 31.

ORGIES, ór'jíz (Lat. *orgia*, from Gk. *ὄργια*, secret rites; probably connected with *ἐργον*, *ergon*, work, and ultimately with Eng. *work*). The name given in ancient Greece to the ceremonies connected with the worship of various divinities, particularly the wine god Dionysus or Bacchus. See MYSTERIES.

ORGUINETTE, ór'gè'nèt' (pseudo-French spelling of **organette*, diminutive of *organ*). A mechanical musical instrument, with sets of reeds, and an exhaust bellows, operated by a crank. A perforated strip of paper passes over the ends of the reeds, and the air (forced by the bellows through the perforations and into the reeds) produces certain musical tones. This instrument, in its present form, was developed from the inventions of Seytre, of France (1842), who is acknowledged to be the pioneer in the preparation of music on slotted paper, and Alexander Bain, of Scotland (1847), who obtained a patent for his own application of a sheet of slotted paper, or any flexible material, which acted as a moving valve. In 1848 Charles Dawson, of England, further experimented upon a music sheet similar to those of Seytre and Bain, but with a different arrangement of the air-chest and pipes. A further improvement was made by Pape, of France, in 1851, and also by Fourneaux (1863). In 1867 George Vanduzen used a slotted belt, but it was not until 1877, after the Centennial Exhibition, which seems to have given it an impetus, that Mason J. Mathews adjusted all difficulties; and E. P. Needham, who had also patented an instrument of this kind, and Newman R. Marsh commenced to manufacture organettes.

O'RIAN'A. (1) The daughter of Lisuarte of England, beloved by Amadis of Gaul, and celebrated for her beauty and constancy. Queen

Elizabeth is so called in the madrigals entitled *The Triumphs of Oriana*, collected by Thomas Morley (1603), and the name was given by Ben Jonson to Queen Anne, wife of James I. (2) The heroine of Fletcher's *Wild-Goose Chase*, Farquhar's *The Inconstant*, and Tennyson's ballad *Oriana*.

ORIANI, ó'rè-à'nè, BARNABA (1752-1832). An Italian astronomer, born at Garegnano, near Milan, the son of poor peasants. Astronomy he learned from Lagrange; and in 1802 he was appointed director assistant in the Brera observatory in Milan. After the discovery of Uranus, Oriani showed that it was not a comet, as Herschel had supposed, but a planet. He edited *Effemeridi Astronomiche* (1778-1830), wrote much on astronomy, and made some important contributions to spherical trigonometry. His correspondence with Giuseppe Piazzi was edited by Cacciatore and Schiaparelli (Milan, 1875).

OR'IBA'SIUS (Lat., from *Ὀρίβασιος*, *Oribasios*), OF PERGAMUM (c.325-c.400). The physician and adviser of the Emperor Julian the Apostate. After the death of Julian, Oribasius was banished by Valentinian and Valens, but was recalled about 370. Of his principal work, a medical encyclopædia, *Συναγωγαὶ ἰατρικαὶ*, in 70 books, less than half is preserved. It was written at the request of Julian, and though chiefly a compilation of earlier works, contains some important original matter; valuable explanations of many passages in Galen's works; and extracts from works not extant. In addition to this work, there are preserved Oribasius's abridgment (*Σύνοψις*) of the work, in nine books, and the *Εὐτρόπιστα*, also a medical treatise, in four books. The best edition is by Daremberg (Paris, 6 vols., 1851-76). Oribasius was the first to describe the salivary glands.

ORIBE, ó-rè'bá, MANUEL (c.1802-57). A South American general, President of Uruguay. He was born in Montevideo; entered the patriot army of Rio de la Plata when he was only a boy; and rose to high rank. In 1825 he was prominent in the rising against Brazil. He became Minister of War under Rivera in 1833 and was elected President two years afterwards. Rivera, as leader of the Colorado party, rebelled against Oribe in 1837, and succeeded in deposing him just before the end of his term. Oribe fled to Buenos Ayres, and with the help of Rosas began (1842) the Nine Years' War, an attempt to subjugate Uruguay to foreign rule. The interposition of France and Brazil forced him out of the country. Again in 1855 he led a revolt against Flores and would have made himself President but for the intervention of the Powers.

O'RIBI, or **OU'REBI** (South African name). A small antelope (*Neotragus scoparius*) which is closely allied to the grysbok, and inhabits Southeastern Africa, where it has become rare.

ORIEL COLLEGE. A college at Oxford, England. It was founded by Adam de Brome, Clerk in Chancery and Almoner of Edward II., in 1324, but almost immediately thereafter came into the hands of the King, and was refounded as the College of Saint Mary in Oxford. This in turn gave way to the present name, apparently on account of the society's moving into a house given it by Edward III., about 1328, called *La Oriole*. Oriel College consisted originally of a

provost and 10 fellows. Owing to the fact that the founder's will did not provide for close scholarships, or those confined to a family or district, as was the custom of the time, the open fellowships of Oriel, obtained as they were by competition, attracted many of the best men in the university in later years, and built up a strong and influential group of scholars who gave the college an enviable position in the academic world. After the changes of 1855 the college consisted of a provost, 12 fellows, a number of honorary fellows, college officers, and lecturers, about 15 scholars, 2 Bible clerks, and some 100 or more undergraduates in all. The buildings are picturesque, and the Hall is a very fine room. The college is particularly associated with that group of men who were most actively engaged in the Tractarian movement, Keble, Whately, Newman, Thomas, Arnold, and Pusey. Of other names may be mentioned William Langland (author of *Piers Plowman*), Barclay (author of *The Ship of Fools*), Sir Walter Raleigh, William Prynne, Bishops Butler, Wilberforce, Hampden, White of Selborne, Dean Church, Thomas Hughes, Matthew Arnold, Clough, and Cecil Rhodes. The college presents to 15 livings. See OXFORD UNIVERSITY; TRACTARIANS.

ORIEL WINDOW (OF. *oriol*, from ML. *oriolum*, small room, porch, perhaps from Lat. *aureolus*, golden, from *aureus*, golden, from *aurum*, gold). A projecting window with three or more sides and commonly divided into bays by mullions. It is usually distinguished from a bay window, which projects from the base line of a building, by being applied to windows projecting from an upper story and connected with the flat wall below by some architectural feature such as a corbel or bracket. It is characteristic of late Gothic civil and domestic buildings, especially in France and England, and was not much used in the earlier Middle Ages.

ORIENTAL REGION (Lat *orientalis*, relating to the east, from *oriens*, pres. part. of *oriri*, to rise; connected with Gk. *ὀρίων*, *orionai*, Skt. *ar*, to rise). A primary division in zoogeography, comprising Southeastern Asia and the adjacent islands as far as Wallace's line. (See DISTRIBUTION OF ANIMALS.) This "small, compact, but rich and varied" region, according to Wallace, consists of all India and China, south of the Himalayan highlands; all the Malay Peninsula and islands as far east as Java and Bali, Borneo and the Philippines; and Formosa. It is divided into four subregions: (1) Ceylonese, Southern India and Ceylon; (2) Indian, from about Madras to the foot of the Himalayas; (3) Indo-Chinese, Burma and Southern China; (4) Malayan, the Peninsula of Malacca and the Malay and Philippine Islands. This region possesses about a dozen peculiar families of vertebrates, and more than 200 exclusive genera among mammals and birds alone. Striking examples among these are orang-utans, gibbons, the proboscis monkey (the region is very rich in quadrupeds), the tarsier and certain other lemurs; many bats and insectivores; most of the civets and many cats; the curious panda; two genera of bears; wild cattle, an elephant, and two or more species of rhinoceros. Among the birds, a great variety of small birds do not occur elsewhere; parrots and pigeons abound, and gallinaceous birds are more numerous and varied than any-

where else, the pheasants, jungle-fowls, and other groups being peculiar. In respect to insects, the region is hardly less rich than the Neotropical. The affinities between the Oriental and Ethiopian fauna have impressed naturalists strongly, and some have thought that India ought to be included in the latter region; but the weight of opinion seems to favor retaining the boundaries of the Oriental Region as they were made by Wallace. Consult Wallace, *Tropical Nature* (London, 1878).

ORIENTAL SEMINARIES. The name applied to certain European institutions established for the purpose of training young men for diplomatic and mercantile positions in Oriental countries. In these schools instruction is given, partly by European scholars of acknowledged eminence and partly by native teachers, in the principal languages of Asia, Malaysia, and Africa, and in the geography, history, civil and religious institutions of these countries. Practical instruction in modern European languages is also given, and lectures on law are usually added. With few exceptions they are under direct governmental control. The oldest institution of this sort is the *Kaiserliche-königliche Consular-Akademie* of Vienna, founded by the Austrian Government in 1754 for the education of promising candidates for the diplomatic service. It is under the direction of the Ministry of Foreign Affairs, and embraces both an Oriental and a Western section. In addition to the regular courses of instruction, the students, whose number is limited to twenty-five, are trained in gymnastics, swimming, horsemanship, fencing, and other accomplishments. The *Kaiserliche-königliche öffentliche Lehranstalt für orientalische Sprachen*, established at Vienna in 1851, has a much wider scope and is open to all students looking forward to a career in the East, whether in a public or private capacity. Of similar character is the *Ecole spéciale des langues orientales vivantes* of Paris, founded in 1795, and now under the direction of the Ministry of Education. In this school special attention is paid to the languages spoken in the French colonial possessions in Africa and in the East. In Russia, an Oriental department has, since 1854, been attached to the University of Saint Petersburg, and courses are offered in the principal languages of Asia, including those of China, Korea, and Japan. The great extension, since 1870, of Germany's commercial interests in the East and the development of her colonial policy led to the establishment, in 1887, of the *Seminar für orientalische Sprachen* attached to the University of Berlin. Here the languages of Eastern Africa are taught in addition to those of Western Asia and the far East. In England instruction in modern Oriental languages has long been given at the University of Cambridge, and in London the School of Modern Oriental Languages, now incorporated with the University of London, has been in successful operation for some years. Special attention is paid to the languages spoken in the Indian Empire. The School of Tropical Medicine, founded through the interest of the Hon. Joseph Chamberlain, and the Oriental Faculty of the College of the Propaganda at Rome (see MISSIONS, CHRISTIAN) may also be mentioned in this connection. Several of these institutions issue publications of much value. The

Government of the United States has, as yet, taken no steps toward the establishment of a school for Oriental studies, but instruction in modern Oriental languages is given in some of the leading universities. At the Johns Hopkins University, Baltimore, courses in modern Arabic, Persian, and Turkish have been offered since 1891, and in the languages of the Philippine Islands since 1900. At Columbia University, New York, a chair of Chinese has recently been founded.

ORIENTAL SOCIETY, AMERICAN. One of the oldest learned societies in America, founded September 7, 1842, and chartered under the laws of Massachusetts, with the object of promoting Oriental research in all its branches. It meets annually for the reading and discussion of papers and for the transaction of the general business of the society, and, by the terms of its constitution, at least one meeting in three years must be held in Massachusetts. At each meeting a special session is devoted to papers on the historical study of religions. The society possesses, at Yale University, a library comprising some 5000 volumes and a considerable number of manuscripts, and publishes a journal, issued annually in two parts, which contains many valuable contributions to Oriental philology, history, and archaeology. Among the presidents of the society, which has exercised an important influence on the development of Oriental studies in America, have been the well-known scholars Theodore Dwight Woolsey and James Hadley of Yale, the celebrated Sanskritist W. D. Whitney, the eminent archaeologist William Hayes Ward, of New York, and President Daniel C. Gilman of the Johns Hopkins University and the Carnegie Institution. In 1903 the society had a membership of about 350.

ORIENTATION. Determination of the points of the compass with regard to the observer's position; and in ecclesiastical architecture, the arrangement of a sacred edifice in such manner that its axis may have a particular direction, usually toward the east. In a primitive state of culture, it was felt that especial efficacy attached to prayers made at dawn, and delivered toward the rising sun; hence in building temples, provision was often made for an entrance constructed to allow the first sunbeams to fall on the statue of the god, before which stood the altar. As the sun daily changes his place of appearance, choice might be made of his position at the time of the solstice or equinox. In Greek and Roman temples, although the eastward direction was most usual, exceptions occur, determined by various considerations. Hence the practice passed to Christianity, and it became customary so to arrange churches, especially among Oriental Christians. From the early centuries of the faith, it had been usual in prayer to face the east, and in burial the body was generally laid with the head to the west, so that in the resurrection the person might front the east. Such a practice is by no means peculiar to mediæval Christianity, but is common among savages as well.

ORIENTATION. A term, belonging partly to psychology and partly to physiology, which signifies a normal adjustment of the organism to its spatial environment. We are 'orientated' when we can govern the position of our body

(stand up, sit down) with reference to changing spatial requirements, and when we 'have our bearings' as motor organisms, knowing right from left, and being able to move in any required direction. Orientation thus covers the maintenance of bodily equilibrium and the control of locomotion. The factors that determine it are manifold, and are both sensory (psychological) and reflex (physiological). We may mention sensations of vision, sensations from skin, joints and muscles of limbs and trunk—e.g. sensations from the soles of the feet, from the weight of the trunk pressing the hip sockets—reflexes of the eye muscles (attended in certain circumstances by muscle sensations), tactual and visual reflexes, and above all the sensory and reflex mechanism of the semicircular canals and vestibule of the internal ear. (See **STATIC SENSE**.) As a rule, orientation is unconscious or at best but dimly conscious. Removal or derangement of any important factor, however, brings it definitely to consciousness: the effect of anesthetizing the soles of the feet is very marked, and we all know the difficulty of keeping the head erect when we become drowsy. The governing reflexes may be disturbed by drugs, as in alcoholic intoxication; and in various forms of mental disorder the power of orientation is more or less completely abrogated.

Animals, in orientating themselves, are guided by their senses, and thus have the sense of direction. (See **TROPISM**.) The dog finds his food mainly by the sense of smell, and this more than any other sense leads animals in their quest for food to move from one place to another. The sense of direction may also include the phenomena of migration, and the homing instincts of animals and the wonderful power exercised by savages and hunters in finding their way through a trackless forest or desert.

By means of the sense of touch we direct our attention to any part of our body which may receive a blow or any impression from without. The existence of a muscular sense is denied by Bonnet, who, however, calls in the existence of what he calls 'a sense of segmental attitudes,' which is the faculty we possess of knowing how instantly to orientate any single part of our body in relation to all the others. It is a primitive attribute of the tactile sense.

The tactile sense is the most generalized of all the senses, and tactile organs are to be found in all animals, in the shape of hairs, bristles, tentacles, and feelers of various sorts. The skin is especially sensitive to touch. Many of the lower and blind animals feel their way, as in the case of earthworms, the maggots of flies, and eyeless myriapods. In mollusks Nagel has found that certain eyeless bivalves and snails he experimented with showed a high degree of sensitiveness to light; some species reacted especially to diminution, others to increase of light.

The marginal tentacles of certain medusæ (q.v.), besides being organs of touch, also contain minute calcareous bodies (otoliths); in other medusæ corresponding organs have grown in or become invaginated, forming marginal sense-organs. The otoliths may either be situated at the end of a stalk, or remain free in the cavity containing them, which is called an 'otocyst.' These otocysts are organs of the sense of attitudes and of movements, and they also aid in directing the

movements of the body in approaching their prey or in escaping from their enemies.

Other kinds of organs of orientation which have excited much interest are the 'lateral organs' of salamanders, of which some contain otoliths, while those of the lateral line of fishes open externally or are closed. These organs, which occur only in aquatic animals, are supposed to afford a perception of variations of water pressure, and have by some been thought to be the organs of a sixth sense. They occur on the head and also along the side of the body. Like the marginal organs of medusæ, they tend to be invaginated and to form in their interior a liquid medium in which the movements peculiar to the animal may determine variations in pressure or of true friction between the sensible wall and the refractory liquid mass, by its fluidity and inertia immediately following the movement of the wall. These beatings or vibrations, impinging on the walls of the otocyst and causing movements of the delicately poised otolith, are the functional mode which takes place in the action of the canalicular structures (lateral canals, labyrinth) from which have evolved the ear of fishes and other vertebrates. Instead of a series of sensorial papillæ more or less salient or invaginated, we first find a furrow, then a lateral canal, still in places in communication with the liquid exterior, and along whose wall may be distributed the papillæ of the lateral sense. We actually find in the otocyst of cephalopods furrows which are regarded as the precursors of the canals of the labyrinth of the ear, so that this sort of otocyst may be regarded as the prototype of the labyrinthine structures of vertebrates. But in the latter the organ of the lateral line is greatly developed. Each organ is an ectodermic papilla which has become invaginated and sunk down into the skin, whose growth converts the organ into a closed otocystic vesicle, in whose walls are new ingrowths of secondary papillæ with bent furrows formed like the furrow of the lateral line. These become curved canals comparable to canals of the lateral line, and produce an analytic decomposition of the slightest vibrations between the walls and the contained inert fluid, each furrow, each canal being very sensitive to the vibrations in one direction, and insensible to all the others. The pairs of sensitive cranial nerves sent to the lateral organs are the fifth, seventh, ninth, tenth, then the lateral continues. The eighth pair is wholly supplied to this marvelously differentiated lateral organ, which becomes the labyrinth of the fish's ear. In all the higher vertebrates the labyrinth of the ear consists of three canals, a sagittal, a transversal, and a horizontal one. Bonnet concludes by saying that in man the labyrinth of the ear, i.e. the apparatus of the semi-circular canals, furnishes the notion of attitudes and of variations of attitudes of the head, together with a notion of the swiftness, direction, and duration of these variations. Moreover, it is not sufficient to know from what direction any sound reaches either of one's ears—it is also necessary for one to know the orientation of the two auditory fields, i.e. the position of one's head at this time so as objectively to orientate the origin of the sound.

Some authorities (Crum-Brown, Lloyd Morgan) believe that by means of the semicircular

canals we can appreciate acceleration of rotatory motion, and also acceleration of movements of translation—forward or backward, up or down—while Morgan suggests that otocysts of invertebrates may be regarded as organs for the appreciation of changes of motion, "and the sense of hearing may be a refinement of the sense through which changes of motion are appreciated."

Consult: Bonnier, *L'orientation* (Paris, 1900); Hartmann, *Die Orientierung* (Leipzig, 1902); Loeb, *Comparative Physiology of the Brain*, etc. (New York, 1902); Stratton, "Cutaneous Sensation," in *Psychological Review*, vol. iv. (New York, 1897).

ORIFLAMME, or *ŕ-flām*, or **AURIFLAMME** (Fr., from ML. *auri flamma*, from Lat. *auri flamma*, flame of gold). A banner which originally belonged to the Abbey of Saint Denis, near Paris, and was borne by the counts of Vexin, patrons of that church, but which, after the County of Vexin was united with the French Crown, became the principal banner of the kingdom. It was charged with a saltire wavy, or with rays issuing from the centre crossways. In later times the oriflamme became the insignia of the French infantry. The name seems also to have been given to other flags; according to Nicolas, in his *History of the Battle of Agincourt* (London, 1827), the oriflamme then borne was an oblong red flag split into five parts. It does not seem to have been carried into war later than this battle (1415).

ORIGANUM. An herb. See MARJORAM.

ORIGEN (Lat. *Origenes*, from Gk. *Ὠριγένης*, probably Son of Horus, an Egyptian god), also called **ADAMANTIUS** (c.185-c.254). The most famous Christian writer and teacher of the third century. He was born in Alexandria about the year 185. His parents were Christians, and his father, Leonidas, suffered a martyr's death under Septimius Severus (202). Origen would gladly have died with him had he not been prevented by his mother. The boy was educated at the famous Alexandrian School, where he had Clement as his master. His remarkable abilities were early manifest, and at the age of eighteen he was appointed to succeed Clement as head of the catechetical school. In obedience, as he supposed, to the command of Matthew xix. 12, Origen made himself a eunuch, and his daily life was governed by an extreme asceticism. Leaving Alexandria during the persecution under Caracalla (216), he traveled widely, visiting Jerusalem and Cæsarea, where, at the invitation of the Bishops Alexander and Theoctistus, he lectured on the Scriptures, although he had not been ordained. This called forth a rebuke from Demetrius, Bishop of Alexandria, who summoned him to return home. For several years Origen devoted himself assiduously to teaching and writing, his reputation increasing rapidly. Jerome says that he wrote more books than other men can read, and Epiphanius places their total number at six thousand. Paying another visit to Palestine in 231, Origen was ordained presbyter by Alexander and Theoctistus, which aroused the bitter animosity of Demetrius. Jealousy mingled with other motives in magnifying the suspicions of heresy which some entertained against him, and two synods were held in Alexandria (231 et seq.), at which he was deposed from the priesthood and forbidden to return.

The churches of Palestine, Phœnicia, Arabia, and Achaia refused to recognize his deposition. Henceforward Origen resided in Cæsarea, where he succeeded in raising the school of that place almost to the height of fame which Alexandria had reached. During the persecution of the Emperor Decius (250 et seq.) he was imprisoned and tortured, and although he was released on the death of the Emperor, he died from the effects of his injuries about 254, being then in his seventieth year.

Origen was the greatest theologian and biblical scholar the Church up to that time had produced. He is sometimes called the father of the allegorical method of interpreting the Scriptures, for although the method did not originate with him, yet he, with Clement, perfected its Christian application, and gave it a far larger currency than it had ever had before. He taught the principle of the three-fold sense, corresponding to the three-fold division of man into body, soul, and spirit, which was then so common. As an exegete and student of the text, Origen did far greater service. In his *Hexapla* (q.v.) he presented the Old Testament in the original Hebrew, with a Greek transliteration, and the Greek versions of the Septuagint, Aquila, Symmachus, and Theodotion, all arranged in six parallel columns. His exegetical work was partly in the form of homilies, on both the Old and the New Testament, and partly in that of *Tomoi*, or commentaries in the stricter sense of the term, which covered a wide range. His theology was presented to the world in a treatise entitled *Περὶ Ἀρχῶν*, known to us in its completeness only in a Latin version made by Rufinus and entitled *De Principiis*. Unfortunately, Rufinus felt called upon to alter the text wherever it seemed to him heretical, so that what we have is not a translation, but a modified Latin version. Origen's theological views are further illustrated in his long apologetic work, *Against Celsus*, which is on the whole the most important Greek apology we possess.

Origen's greatest service to Christian doctrine lay in his development of the Logos Christology. In Jesus Christ we learn to know the Incarnate Word (Logos). But from this conception, through speculative thought, we rise to that of the Logos-not-Incarnate, or the Pre-existent Logos, through whom in turn we mount to God Himself, the goal of all theology. To preserve the idea of God as absolute and eternal, whatever is closely related to Him—as the Son is, and as the creation is—must be pictured to our minds *sub specie æternitatis*, from the point of view of eternity or infinity. It is wrong to think of Christ as an emanation from God (the Gnostic doctrine), for that involves succession in time. We should rather think of Him as eternally projected. To illustrate his thought Origen used the metaphor of a torch and its light, or a mass of iron glowing with heat. In this fashion he avoided the two perils of Gnostic emanation, on the one hand, and Monarchian identification, on the other. (See GNOSTICISM; MONARCHIANS.) But while teaching that the Son was eternally begotten, a doctrine which was perpetuated in the dogma of the Trinity, Origen also taught that the Son was subordinate to the Father in power and dignity, and this idea was later used against him, after Arianism (see ARIUS) had appeared

as a threatening heresy. Origen's doctrine of an eternal creation, with periodic cycles of decay and renewal for our world, was not generally accepted by the Church. Nor was his restorationism accepted, according to which all mankind should at last return to a state of innocence and be acceptable unto God, although something like it was afterwards taught by Gregory of Nyssa in the fourth century. The school of Origen, which included Dionysius of Alexandria, Gregory Thaumaturgus, Eusebius of Cæsarea, John of Jerusalem, Jerome (in his early period), and others, was very influential for many years, but in the fourth century it was attacked by Epiphanius, and the Origenists were thenceforward regarded as heretics and combated fiercely.

The best edition of Origen's works is that now in process of publication by the Berlin Academy in *Die griechischen christlichen Schriftsteller der ersten drei Jahrhunderte; Origenes Werke*, vols. i. and ii., edited by Koetschau (Leipzig, 1899). An older edition is by Lommatsch (25 vols., Berlin, 1831-48). An English translation of the most important works is given in the *Ante-Nicene Fathers*, vols. iv. and ix., edited by Roberts and Donaldson (New York, 1887-96). In general, consult: Harnack, *History of Dogma*, vol. ii. (London, 1896); Krüger, *History of Early Christian Literature* (New York, 1897); Fairweather, *Origen and Greek Patristic Theology* (ib., 1901); Rainy, *The Ancient Catholic Church* (ib., 1902).

ORIGINAL PACKAGE (OF., Fr. *original*, *originel*, from Lat. *originalis*, original, from *origo*, origin, from *oriri*, to arise; connected with Gk. *ἀρνύναι*, *ornynai*, Skt. *ar*, to arise). With reference to interstate commerce, the package in which goods are shipped. The term has a special significance arising out of a line of decisions of the United States Supreme Court, deciding questions raised by the attempts of the various States to prohibit or regulate the sale of intoxicating liquors, cigarettes, and other commodities on the ground that they are injurious to public health and morals. The cases in which these questions were raised are known as the 'Original Package Cases.' The 'interstate commerce clause' of the United States Constitution provides that Congress shall have power "to regulate commerce with foreign nations, and among the several States," etc. A State can regulate the domestic manufacture and sale of commodities, under its police power, and, therefore, in the so-called 'prohibition States' the manufacture and sale of intoxicating liquors was practically prohibited. This led to the importation of liquors from other States, and seizures by the State officers. The United States courts held that where an article is imported into one State from another, it does not lose the protection of the interstate commerce clause until it has become intermingled and incorporated into the general mass of property of the former, but in such event it becomes subject to the laws of that State. Further, that while goods remained in the original packages, cases, barrels, etc., in which they had been shipped, and while in the hands of the importer, they had not become so intermingled, and remained subjects of interstate commerce protection. The importance of such decisions lies in the fact that such an interpretation of the law gives ample

opportunity to evade State laws, under the technicality of selling goods in the original packages directly to consumers. Such a sale deprives the goods of the protection above mentioned, but as the goods are thereby placed in the hands of the actual consumer, this is immaterial. After goods in original packages have been sold by the importer, they become subject to the State laws. However, a liberal interpretation of what constitutes an original package enables dealers to import the otherwise prohibited articles and retail them. For example, liquor in bottles has been held to be in original packages. However, if the bottles were inclosed in a case, the latter would be the original package, and the importer could not retail the bottles without conforming to the State laws. An original package was finally defined to be any covering, case, wrapping, or receptacle in which an article is inclosed for transportation.

By an act of Congress, approved August 8, 1890, known as the 'Wilson Law,' it was provided that all intoxicating liquors imported into a State shall on their arrival be subject to the laws and regulations of that State, enacted in the exercise of its police power, in the same manner as if they were produced there, and shall not be exempt by reason of having been introduced there in original packages. The purpose of this law was declared by the United States Supreme Court to be to prevent the sale of liquor in original packages in violation of State laws, and it effected a radical change in the law in this respect. However, a number of decisions have held that such State regulations must be strictly confined to the police powers of the State, such as requiring liquors to be sold within certain hours, etc. A license tax on imported liquors in original packages or otherwise, which seemed to have no other object than to provide revenue for the State, was held void, as being a tax on interstate commerce.

The law as to all other commodities in original packages remains the same as before the above act, and is still of great importance in its bearing upon laws prohibiting the sale of cigarettes, etc. See TRANSPORTATION.

ORIGINAL SIN. The native corruption of man, resulting in universal sin, and itself conceived as partaking of the nature of sin. The period of elaborate discussion of this subject, eventuating in a comprehensive doctrine of sin, fell in the first third of the fifth century; but the elements of the doctrine had been held from the beginning in the Church both of the East and the West. The earliest fathers are full of expressions teaching the universality and persistence of sin, and ascribing it in some indefinite form to a deep-seated origin in the nature of man. An early difference appeared between the Latin and the Greek Church on account of the general emphasis which the latter laid upon the intellectual and the former upon the practical. The Greeks emphasize more the freedom of man, the Latins his practical bondage to evil. It has therefore often been said that the Greeks had no doctrine of original sin; but they teach an original state of righteousness, accept the fact of the fall, and view this as not only bringing man under the dominion of the devil, but as producing a tendency to sin. This tendency arises from the obscuration of the intellect, the

weakness in reference to the good, and the ascendancy of the sensuous nature over the higher powers and faculties, which have resulted from Adam's sin. At the same time, freedom is carefully guarded, and the more so because of the conflict which these early fathers were waging with the Gnostics. (See GNOSTICISM.) Man still has the power to choose the good as well as the evil. Otherwise he would not be responsible. Grace is necessary to repentance, but it is styled an 'assistance.' Origen referred the universality of sin to the self-corruption of all human spirits in a previous state of existence. The Latins, while in general acknowledging the same fundamental truths as the Greeks, throw the emphasis upon the concrete facts of sin and grace. Tertullian approached the later Latin view. The premises of the doctrine lie in his psychology (see TRADUCIANISM) and his doctrine of the original condition of man. Man was created good, but not perfect. By his sin he became corrupt, and this corruption propagates itself by natural generation among his descendants. Hence every child of Adam is impure and subject to death. Grace is no mere 'assistance,' but it is a creative and transforming power. In this general position the Latin fathers of this period generally concur.

The discussion was carried on in the fifth century by Pelagius and Augustine (qq.v.). The main positions of the latter were embodied in the result of the Council of Orange (529), which declared that by the sin of Adam free will has been so perverted and weakened that fallen man is incapable, without the initiative of divine grace, of performing meritorious acts leading to salvation, and hence this doctrine passed into the theology of the Middle Ages. A milder view sprang up immediately, which was termed the 'Semi-Pelagian' (q.v.), which gave the initiative in conversion now to man, and now to God, and hence greatly modified the doctrine of the effect of the fall upon the will. The doctrines of the Semi-Pelagians were condemned at the Council of Valence (530). The Council of Trent (q.v.) defined original sin in substantially the same way as the Council of Orange, but elaborated and expanded it, and its definition is the accepted doctrine of the Roman Catholic Church.

The Reformers adhered to the strict Augustinian doctrine, often surpassing Augustine by their extreme forms of statement. They were deeply impressed with the enormity and pervasiveness of sin, and with the entire dependence of man upon the grace of God for the creation within him of the least tendency toward good. The history of the doctrine presents, therefore, little but the reaffirmation of Augustinian positions, and may be summarized in the result formulated by the Westminster Confession (chap. vi.), which stands here for most of the Reformation creeds. "Our first parents . . . by this sin . . . became dead in sin and wholly defiled in all the faculties and parts of soul and body. . . . The guilt of this sin was imputed and the same death in sin and corrupted nature conveyed to all their posterity. . . . This corruption of nature during this life doth remain in those that are regenerated; and although it be through Christ pardoned and mortified, yet both itself and all the motions thereof are truly and properly sin." Consult the literature under AUGUSTINE; also the Systems of Doctrine,

particularly Charles Hodge, *Systematic Theology* (New York, 1871-73); Landis, *The Doctrine of Original Sin* (Richmond, 1885).

ORIGINAL WRIT. In English legal practice, a writ issued under the great seal, and directed to the sheriff, requiring him to command an alleged wrong-doer to satisfy the complaint of his accuser or to appear in court and answer the complaint. These writs were formerly regarded as the direct mandate of the King (whence the name) issued through his chancellors; but they have been abolished in England, where the statutory process of summons is used to begin all civil actions. In the United States they have never been in use. The term is sometimes improperly given to the first writ or process issued in an action under the modern procedure, which is not an original writ, but a process of the court. See PROCEDURE; WRIT.

ORIGIN OF SPECIES. See DARWIN, CHARLES; NATURAL SELECTION.

ORIGNAL, ó'rè'nyäl' (probably of North American Indian origin). A French-Canadian name for the moose (q.v.).

ORIHUELA, ó'rè-wá'la. A city of South-eastern Spain in the Province of Alicante (Map: Spain, E 3). It is situated 12 miles northeast of Murcia, on the banks of the Segura, in a plain remarkable alike for its beauty and fertility. It is a long and straggling city. Its palm-trees, square towers, and domes give it an Oriental appearance. It contains a small Gothic cathedral and a handsome bishop's palace. The manufactures include silk, linen goods, and hats; flour and oil mills and tanneries are in operation. Population (commune), in 1887, 24,364; 1900, 28,335.

ORILLIA. A town and summer resort of Simcoe County, Ontario, Canada, on the Grand Trunk Railway, at the head of Lake Couchiching (Map: Ontario, D 3). It has manufactures, carries on a thriving trade, and is frequented for its picturesque situation and the good angling the lake affords. It contains the Provincial Lunatic Asylum and has two fine parks. A narrow strait connects Lake Couchiching with Lake Simcoe, and steamers ply on the lakes. Orillia is the seat of a United States consul. Population, in 1891, 4752; in 1901, 4907.

ORIL'LO (Fr., almonds of the ears, from *oreille*, ear, from Lat. *auricula*, diminutive of *auris*, ear). A term in the earlier systems of fortification describing a semicircular projection at the shoulder of a bastion, designed as a screen for guns and men posted on the flank. It is mostly found in the works of Pagan and Speckle. See FORTIFICATION.

ORIN'DA, THE MATCHLESS. The nickname of the English poet Katherine Philips (q.v.).

ORINOCO, ó'rè-nó'kò. The smallest of the three great rivers of South America (Map: Venezuela, D 2). The main stream runs wholly within Venezuelan territory, except for a short distance in its middle course, where it forms the boundary between Venezuela and Colombia. It rises on the Parima uplands near the Brazilian frontier, and flows first northwest to the Colombian boundary, then north into Central Venezuela, and finally eastward until it empties into the Atlantic Ocean through a large delta beginning near the boundary of British Guiana. The total

length of the main stream is 1490 miles. Its course forms a large curve around the edge of the Parima plateau; hence its right banks are generally higher, and the tributaries received from that side smaller, while on the left side are the large plains or *Llanos* (q.v.), and through these are received several tributaries equaling or exceeding the main stream. About 150 miles from its source and 920 feet above sea level the Orinoco branches, sending one-sixth of its volume into the Cassiquiare, which flows into the Rio Negro, an affluent of the Amazon. The remainder flows as a navigable river until it is broken by the romantic Maypures and Atures rapids, 870 miles from its mouth. These rapids are the only serious obstruction in the main stream, which below them flows with a very gentle current over a bed so nearly level that the tides are felt at Ciudad Bolivar, 260 miles from the sea. Though the country around the upper courses of the river and its tributaries is heavily forested, the lower reaches traverse open savannas where only the banks are lined with trees, and where the adjacent country is periodically flooded so that the natives are compelled to live in pile dwellings. The marshy but heavily forested delta occupies an area of 7000 square miles, and has a coast line of nearly 200 miles, through which upward of 50 channels enter the ocean. Many of these shift their beds, but seven are permanently navigable for large vessels. The principal navigable tributaries of the Orinoco are the Guaviare, the Meta, and the Apuré (qq.v.), and the total navigable length of the system is 4300 miles. This great waterway, however, is but little used, since the adjacent regions are thinly inhabited, and the great natural wealth practically untouched. In 1900 only one steamer of the Royal Mail Steamship Company plied once every two weeks between Trinidad and Ciudad Bolivar. Smaller steamers continue the service as far as Nutrias on the Apuré, but above the Apuré confluence there is no regular navigation. Consult: Humboldt, *Travels in South America*, trans., Bohn Library (London, 1877); Chassanjon, *L'Orénoque et le Caura* (Paris, 1889); Triand, *Down the Orinoco in a Canoe* (London, 1902); Guzman, "La exploracion del Orinoco," in *La España moderna*, vol. clxvi. (Madrid, 1902).

O'RIOLE (OF. *oriol*, from Lat. *aureolus*, golden). Any of several small birds whose plumage is yellow or orange and black. It was given first to the Old World family Oriolidæ, and was naturally transferred to the American hangnests by early English travelers and settlers on account of the similarity in colors. The American orioles belong to the family Icteridæ, and form the subfamily Icterinæ, in distinction from the black-birds, bobolinks, and meadow larks, from which the orioles differ in the extremely acute, sometimes decurved bill, comparatively weak feet, and non-gregarious, arboreal habits. They are agreeable songsters, possess notably handsome plumage, and are renowned as architects. As their nests are usually pensile, the birds are often called 'hangnests.' They are especially characteristic of tropical America, where they go by the name of 'caciques,' or, in Jamaica, 'banana-birds.' The best-known species is the Baltimore oriole (*Icterus galbula*), which ranges in summer as far north as the southern provinces of Canada,

but winters in Central America. Its name was given to it by Linnaeus, whose first specimen came from Maryland, in complimentary allusion to the fact that the colors of the male were those of the livery of Sir George Calvert, the first Lord Baltimore, then proprietor of that colony. The gay plumage has also caused it to be called 'golden robin,' 'fire-bird,' and 'fire-hang-bird.' The male is about eight inches long, brilliant fire-orange, with the whole head, neck, back, wings, and middle tail-feathers black, and with considerable white on the wings. The female is somewhat smaller, much paler, and with the black more or less obscured by olive. The young resemble the female, and do not assume their full plumage before the second year. The Baltimore oriole is one of the most conspicuous birds that the spring migrations bring into the Northern United States, not merely because of the splendor of his plumage, but because of his loud, musical whistle. The food consists chiefly of insects, although fruit and young peas and similar delicacies are eagerly accepted when in season, and ripening grapes are injured to a serious extent in the Hudson Valley and certain other localities. See Colored Plate of SONG BIRDS.

The nest of the Baltimore oriole (see Plate under NIDIFICATION) is the bird's greatest claim to distinction. This admirable structure is woven into the tip of a branch, preferably the drooping limb of an elm or willow, from which it hangs at some distance from the ground; though other trees are frequently used, the elm is the favorite, as the long, drooping branches afford an ideal location for a hanging nest. The construction of the nest is mainly if not entirely the work of the female, the principal materials being grass, slender strips of bark, strings, hair, and vegetable fibres. These are all closely and very firmly interwoven into a pouch, four or five inches in depth. The eggs are four to six in number, not quite an inch long, white, spotted, scrawled in a curious manner with irregular lines of black or brownish.

Another oriole, which does not range quite so far north or west as the Baltimore, and which is much less conspicuous, though the male is very handsome, is the orchard oriole (*Icterus spurius*). A much quieter and more retiring bird than his showy cousin, the orchard oriole is not so often seen or heard, but his song is a more finished product and more melodious. The male is chestnut, with the head and fore parts of the body black, while the female is olive-green and dull yellow. The young resemble the female and the males do not assume full plumage until the third year. The nest is made of grasses, and is not so perfectly pendent as is the Baltimore oriole's. The eggs are similar to those of the latter, but are somewhat smaller and not so much scrawled. (See Plate of EGGS OF SONG BIRDS.) Of the remaining 35 or 40 species, prominent examples are the 'tropical' (*Icterus icterus*), a tropical species common in South America, about ten inches long, bright yellow and black; the black-headed oriole (*Icterus melanocephalus*), another large, rich yellow and black species, occurring in Mexico, a variety of which, known as Audubon's oriole, is found in the lower Rio Grande Valley; and Bullock's oriole (*Icterus Bullocki*), a species very similar to the Baltimore bird, which replaces that species in the Far West. See also CACIQUE—a closely allied group.

Consult Ridgway, *Birds of North and Middle America*, part ii. (Washington, 1902), and American ornithologies generally.

The orioles of the Old World are a small family of about 40 species, the Oriolidae, related to the crows. They are characteristically Oriental and Australian, though several species occur in Africa, and one ranges throughout Europe. This is the 'golden' oriole (*Oriolus oriolus*), somewhat larger than the Baltimore oriole, and equally brilliant. The song is marvelously rich and flute-like, but very short. A very similar Oriental species is the familiar *Oriolus Kundoo*, or 'mango-bird' (q.v.). The outward likeness between these Old World orioles and the American hangnests is increased by the fact that the former also build somewhat pensile nests. The 'mimicry' between them and certain honey-eaters (*Meliphagidae*) is another very interesting circumstance, described at length by Wallace, Newton, and Salvadori. Consult Evans, *Birds* (London, 1900).

ORION (Lat., from Gk. *Ὠρίων*). In Greek legend, a giant hunter: also the name of a constellation. In the Homeric poems Orion appears as the name of a constellation, conceived as a hunter who is watched by the bear, and of a handsome hero, beloved by Eos and slain by Artemis, but there is no hint of a connection between the two stories. Later writers preserve a multitude of local legends about Orion, which cannot be united into a consistent narrative. In Boeotia he enjoyed special fame, as a hunter of mighty strength, who, while reputed son of King Hyrieus, was borne from the earth by the intervention of three gods. A Cretan version made him the son of Euryale, daughter of Minos, and Poseidon, who gave him the power of traversing the sea. Here also he appears as a hunter and the chosen companion of Artemis and Leto. The Chians connected him with their local hero (Enopion, for whose daughter Merope he became a suitor. Here too he, with the aid of Artemis, cleared the land of wild beasts, but (Enopion still refused to give him his daughter, and finally by strategy blinded him; according to one version, because Orion in drunkenness had offered violence to Merope. Orion forced a boy to guide him to the rising sun, whose rays, falling full upon his eyes, restored their sight, or was helped to this cure by Hephaestus, and returned to take vengeance on (Enopion, who was saved by Poseidon. From the Homeric story of his death was developed a series of stories of his love for Artemis, who slew him when his passion became too violent, or she loved him and only killed him by accident, for Apollo, in his anger at her love, challenged her to hit a black spot on the sea; she shot her arrow and found only too late that it was the head of her lover, who was swimming. In general these myths seem to have no connection with the constellation, but in the following it is difficult not to see astronomical origin. Orion in Boeotia met Pleione and her daughters, and pursued them for five years till they were caught up into the sky as the Pleiades, who still seemed to flee before the giant. In Crete Orion boasted that he would kill all beasts upon the earth, whereupon Gaia sent a scorpion, who killed the hunter by stinging his heel. Artemis set both in the sky, and Orion still hastens to set as he sees the scorpion appear above the horizon.

ORIÓN, ō'rē-ōn'. A town of Luzon, Philippines, in the Province of Bataan, situated near the west shore of Manila Bay, four miles south of Balanga (Map: Luzon, D 8). Population, in 1896, 10,373.

ORISKANY, BATTLE OF. In American history, a battle fought about two miles west of Oriskany, N. Y., on August 6, 1777, during the Revolutionary War, between about 800 American militiamen under General Herkimer (q.v.) and an equal force of Loyalists and Indians under Sir John Johnson (q.v.) and Joseph Brant (q.v.). The Americans, while on their way to relieve Fort Schuyler (on the site of Rome, N. Y.), fell into an ambushade in a deep ravine, but fought Indian fashion and with the utmost bravery for several hours, and finally drove the enemy from the field. The battle greatly crippled Saint Leger (q.v.), who soon afterwards, alarmed at the approach of Gen. Benedict Arnold, rapidly retreated into Canada, thus abandoning the plan of campaign which had been drawn up by General Carleton and which provided for his effecting a junction with General Burgoyne and General Howe or General Clinton at Albany. In proportion to the numbers engaged it was one of the bloodiest battles of the war, more than a third of the contestants being killed or wounded on each side. General Herkimer was mortally wounded early in the action and died several days later. Consult: Dawson, *Battles of the United States* (New York, 1858); and Stone, *Life of Joseph Brant, Including the Indian Wars of the American Revolution* (ib., 1838).

ORISKANY STAGE. A division of the Lower Devonian, named from the type occurrence at Oriskany, N. Y. It is found in the central and eastern parts of New York, and extends southward along the Appalachians into Virginia. It attains a thickness of 200 feet in many places, and consists of sandstones and calcareous shales. It is usually found in association with the Lower Helderberg rocks. The formation is of economic importance in Virginia, where it yields iron ore. See DEVONIAN SYSTEM; GEOLOGY.

ORIS'SA (Skt. *Odra*). A former kingdom on the east coast of Hindustan, which extended from Bengal—a part of which it included—on the north to the banks of the Godavari on the south, and from the coast on the east to Gondwana on the west, embracing an area much larger than that of the region which now bears the name. The authentic history of Orissa begins with the foundation of the Kesari, or Lion, dynasty, about A.D. 474. The Hindu rulers of the land were always Brahmanical rather than Buddhist in religion, and they possessed a high degree of culture and civilization. Orissa maintained its position as an independent monarchy till the sixteenth century, when the Mohammedans began to harass the country. Finally, in 1568, the last independent King of Orissa was defeated by Seleiman, the Afghan King of Bengal, under the walls of Jaipur, and in 1578 the Afghans in their turn were forced to surrender Orissa to Akbar, and it remained a portion of the dominions of the Great Mogul until 1751. In 1742 the Mahrattas began wresting the country from the declining power of the Mogul emperors, and in 1751 Orissa became a Mahratta province. The Great Mogul ceded his rights to the East India Company in 1765. Under the Mahrattas the condition of the country was

wretched in the extreme, and in addition to the distress caused by their lawlessness Orissa was ravaged by famine in 1770 and again in 1777. In 1803 the Mahratta power was crushed and Orissa became an English possession. Revolts took place in 1804 and in 1817-18. An agreement was made between the East India Company and the native chiefs and princes by which the former bound themselves to perform certain services for the country (as maintaining the river banks in good repair), while the latter engaged to pay a yearly tribute. Of the many principalities into which Orissa was divided, a large number fell into arrears with the Government, and the result was that numbers of the estates were sold, and the Government, as a rule, became the purchaser. Much of the territory originally forming a portion of this kingdom thus fell into the hands of the British. In 1865-66 a terrible famine visited the country. The present British commissioner-ship of Orissa extends from a point a little west of the Hugli estuary to the borders of Madras, and includes the delta of the Mahanadi. It constitutes the southwesternmost portion of Bengal. The British districts have an area of 9841 square miles, and the native States of Orissa, 17 in number, embrace an area about once and a half as large. The British districts had a population, in 1891, of 4,047,352; in 1901, of 4,350,372. The native States have about 2,000,000 people. The hill districts, which nowhere present an elevation of more than 3000 feet, are inhabited by the Gonds, the Koles, the Sourahs, and the Khonds. The irrigation of a large portion of Orissa is provided for by an extensive and costly system of canals taken over by the Government in 1868. The chief towns are Cuttack, the capital, Balasor, an important seaport, and the holy city of Puri.

ORITHYIA (Lat., from Gk. *Ὀρίθυια*, *Oreithyia*). The daughter of the Athenian King Erechtheus. Boreas carried her off to Thrace, and she became the mother of Cleopatra, Calais, and Zetes.

ORIZABA, ō'rē-thā'mā (called by the Aztecs *Citlaltépetl*, 'Star Mountain'). One of the highest peaks of North America, exceeded seemingly only by Mount McKinley in Alaska. It is situated on the boundary between the States of Vera Cruz and Puebla, Mexico, 65 miles west of the city of Vera Cruz. It is a beautifully symmetrical volcanic cone rising to a height of 18,250 feet. Its summit is covered with perpetual snow, and in clear weather is visible from ships far out in the Gulf. Forests of oak and pine cover the lower and middle slopes, the former following upon the luxuriant tropical flora. The timberline is found at 13,500-14,000 feet. The summit crater, which is much smaller than that of Popocatepetl, is in a condition of full preservation, and from it at times issue sulphurous and other vapors. The volcano has been quiescent during the past half century. It was first ascended in 1848 by two American officers, Reynolds and Maynard.

ORIZABA. A city in the State of Vera Cruz, Mexico, situated 68 miles southwest of Vera Cruz, on the railroad between that city and Mexico (Map: Mexico, L 8). The town lies in a beautiful valley over 4000 feet above the sea, and partly surrounded by lofty mountains, among which towers the magnificent volcano of Orizaba.

(q.v.), 20 miles distant to the northwest. In spite of the high altitude, the climate of the valley is tropical, and especially subject to hot winds from the south. The houses are mostly one-storied, and the town contains few objects of interest. The greater part of the valley is occupied by sugar plantations, and Orizaba is an important centre of the Mexican sugar industry. There are also a number of cotton and flour mills, most of the power being furnished by the Rio Blanco. Population, in 1895, 31,512. Orizaba was an ancient Indian town, and its present name is a corruption of the Nahuatl *Ahuailizapan*, meaning 'pleasant waters.' It was for a number of years the capital of the State.

ORKHAN, ör-kän' (1279-1359). A Turkish Sultan, son of Othman, founder of the Ottoman dynasty. He captured Brusa in 1326, and succeeded his father in the same year. He made Brusa his seat of government. Orkhan married Theodora, a daughter of the Byzantine Emperor John Palæologus, in 1347. He won a footing in Europe (1354), and made extensive gains in Asia Minor. Orkhan may be considered one of the greatest generals of the dynasty.

ORKNEY ISLANDS. An archipelago lying north of Scotland, and separated from Caithness by the Pentland Firth (Map: Scotland, F 1). It consists of about 70 islands and islets, of which 29 are inhabited. The principal islands are Pomona or Mainland, Hoy, South and North Ronaldsay, Flotay, Burray, Ronsay, Shapinsay, Stronsay, Eday, Westray, and Sanday. The area of the islands is 375 square miles. With the exception of Hoy, which is mountainous, the islands are generally low, with an irregular, partly rocky, partly sandy coast line. The highest hill is the Ward of Hoy, 1555 feet. The rocks are of the Old Red Sandstone formation, except a small granite district near Stromness. The climate is mild owing to the proximity of the Gulf Stream. The annual rainfall varies from about 28 inches on the east side of the isles to 37 inches on the west. The soil is fertile and produces barley, oats, potatoes, and turnips. The inhabitants also engage in cattle, sheep, and poultry raising, and fishing. Live stock, sea food, poultry, and eggs are largely exported. Though Orkney is a separate county of Scotland, it combines with the Shetlands to return one member to Parliament. The only towns are Kirkwall (q.v.), the capital, and Stromness, with a fine harbor admitting the largest vessels, both in Pomona. The population of the islands was, in 1891, 30,450; in 1901, 26,698.

The *Orcades* (whence the modern adjective Orcadian) are mentioned by classical writers, but of their inhabitants almost nothing is known till the Middle Ages. They were probably of the same stock as the British Celts. From an early period, however, the Norsemen resorted to these islands, and in the tenth century they were ruled by independent Scandinavian jarls (earls), but in 1098 they were made subject to the Norwegian Crown. In 1231 the Scandinavian feudal lords were succeeded by Scotch nobles under the overlordship of the Norwegian kings. In 1468 the islands were given to James III. of Scotland as a security for the dowry of his wife, Margaret of Denmark. In 1590 Denmark formally resigned all pretensions to the sovereignty of the Orkneys. The present inhabitants are generally

of Scandinavian and Scotch descent. The antiquities include the standing stones of Steennis, the Maeshowe tumulus, and an old Pictish fort.

Consult: Low, *A Tour Through the Islands of Orkney and Shetland* (Kirkwall, 1879); Tudor, *The Orkneys and Shetland* (London, 1883); Wallace, *Description of Orkney* (Edinburgh, 1883); Brand, *A Brief Description of Orkney, Zetland, Pightland Firth, and Caithness* (ib., 1883); Buckley and Haure-Brown, *Vertebrate Fauna of the Orkney Islands* (ib., 1891); Craven, *History of the Church in Orkney, 1662-88* (Kirkwall, 1893); id., *The Church in Orkney, 1688-1882* (ib., 1893).

ORLANDO. A city and the county-seat of Orange County, Fla., 147 miles south of Jacksonville; on the Plant System and the Florida Central and Peninsular railroads (Map: Florida, G 3). It is a popular winter resort, situated in a healthful region, noted also for its hunting and fishing. There are some manufacturing establishments, but the city is more important as the centre of extensive fruit-growing interests. Population, in 1890, 2856; in 1900, 2481.

ORLANDO. (1) The Italian form of Roland, one of Charlemagne's paladins. (2) In Shakespeare's *As You Like It*, a son of Sir Rowland de Bois, brother to Oliver, and Rosalind's lover.

ORLANDO FURIOSO. A famous poem by Ariosto, published in 1516, in forty cantos; revised by the author and enlarged to forty-six, 1532. It was a continuation of Boiardo's *Orlando Innamorato* and is professedly a romance of chivalry, though a light irony, like that of Cervantes in *Don Quixote*, can be felt in the treatment. For the sources of the story, consult Rajna, *Le fonti dell' Orlando Furioso* (Florence, 1876). See also ARIOSTO.

ORLANDO INNAMORATO, é'ná-mô-rä'tô. See BOIARDO.

ORLANDUS LAS'SUS. See LASSO, ORLANDO DI.

ORLE (OF. *orle*, *ourle*, Fr. *orle*, from ML. *orlus*, *orla*, diminutive of Lat. *ora*, border, coast). In heraldry (q.v.), one of the charges known under the name of sub-ordinaries.

ORLÉANAIS. Formerly a province of Central France, on both sides of the Loire. It is now included mainly within the departments of Loiret, Loir-et-Cher and Eure-et-Cher, while smaller portions belong to the departments of Seine-et-Oise, Sarthe, Indre, Cher, Nièvre, and Yonne.

ORLÉANS, ör'lá'än'. The former capital of Orléanais, France, and now the capital of the Department of Loiret, situated on the right bank of the Loire, spanned here by a magnificent bridge, about 70 miles south-southwest of Paris (Map: France, H 4). Orléans lies on a forested plain. It is a well-constructed city, with spacious, regular streets and pleasant squares. The city lies in a compact form, extends along the river lined with quays, and is bordered by a semicircle of connected and broad boulevards of the most modern type occupying the site of the ancient fortifications. There is much curious old timber architecture to be found in the city. The noteworthy late-Gothic Cathedral of Sainte Croix dates from 1601. Its impressive façade is one

of the town's attractions. The cathedral contains a decorative monument by Chapu.

The Hôtel de Ville is of brick and stone, dating from 1530. It was reconstructed and enlarged in the last century. In the old Hôtel de Ville are the municipal museums of painting and sculpture and a museum of natural history. In the ancient and artistic Hôtel de Cabut, formerly called in error the house of Diane de Poitiers, is the valuable Historical Museum of Orléans. The house of Agnes Sorel and the house where the Maid of Orleans lodged are still standing. The latter contains the highly interesting Musée Jeanne d'Arc. This collection includes tapestries, statues, portraits, banners, etc., all connected with or illustrating the history of the heroine. Other interesting buildings are the prefecture, the Palace of Justice (1821), and the Hôtel Dieu, which is considered the most attractive hospital in the Republic. Orléans has an equestrian statue of the Maid of Orleans, and a bronze statue of the Republic, erected in 1850. Orléans is on the site of *Genabum*, the Gallic town burned in B.C. 52 by Cæsar to avenge the murder of Roman traders. It was rebuilt by the Emperor Aurelian and named *Aurelianum*, whence its modern name. It was an important place under the Merovingians and continued to flourish under the kings of France; in 1309 it became the seat of a university. During the Hundred Years' War with the English it was distinguished for its loyalty. It was rebuilt by the English in 1428-29, and was relieved by the famous Maid of Orleans—Joan of Arc. It was a Huguenot stronghold during the religious wars, and while besieging it the Catholic leader, the Duke of Guise, was assassinated in 1563. In the Franco-German War of 1870-71 several sanguinary battles were fought in the neighborhood; in October, 1870, it was occupied by the Germans, who were driven out a month later by the French; in December, however, the city was recaptured by the Germans and held until the end of the war. Population, in 1901, 67,311.

ORLEANS, Or'le-anz. An island in the Saint Lawrence River, belonging to Montgomery County, Quebec, Canada, a few miles below the city of Quebec (Map: Ontario, F 4). It has an area of 69 square miles, with a population of about 5000. The surface is undulating and covered in some portions with extensive forests. The soil is rich, and in a high state of cultivation, fruit culture being of considerable importance. There are a number of villages. The island is a favorite picnic and summer resort. It was General Wolfe's camping ground prior to the siege of Quebec in 1759. Jacques Cartier, in 1535, named it *Île de Bacchus*, owing to the abundance of its grape vines.

ORLEANS. The name borne by a cadet branch of the Valois and Bourbon houses of France. Philip, the fifth son of Philip VI. of France, was created Duke of Orleans in 1344. After his death, without issue, the duchy was bestowed (1392) on Louis, Count of Valois, the younger brother of Charles VI., who thus became the founder of the House of Orleans-Valois. Louis was a man of exceptional gifts and great views and played an important rôle during the tragic period of the Hundred Years' War, when the fortunes of France under its mad King, Charles VI.,

were at their lowest. He strove with Philip the Bold of Burgundy for the control of the King, and with his wife, Valentina Visconti, was suspected of plotting for the throne. After the death of Philip, Louis was for some time without a rival in the kingdom, enjoyed the favor of Queen Isabeau, but rendered himself unpopular by his extravagance and the licentiousness of his character. The contest against him was renewed by Philip's son, John the Fearless, whose wife Louis had seduced. A reconciliation between the two took place in November, 1407, and three days later Louis was assassinated at the instigation of John. He had eight children by Valentina Visconti and an illegitimate son, Dunois (q.v.), the celebrated bastard of Orleans. Louis's eldest son, Charles, Count of Angoulême and Duke of Orleans (1391-1465), carried on the struggle against the House of Burgundy as head of the party of the Armagnacs. He was taken prisoner by the English at Agincourt and spent twenty-five years in captivity. He was noted as a poet. (See CHARLES OF ORLEANS.) His son Louis ascended the French throne as Louis XII. (q.v.), and reunited the Duchy of Orleans to the Crown. It was subsequently held by the younger sons of Francis I. and of Henry II. until 1574, when Henry, Duke of Anjou, the last male scion of the House of Valois, ascended the throne of France. Of the bearers of the title belonging to the House of Bourbon the following are the most important:

GASTON JEAN BAPTISTE, Duke of Orleans (1608-60), best known for his talents in conspiracy. He was the third son of Henry IV. of France and of Maria de' Medici, and was born at Fontainebleau, April 25, 1608, being known after 1611 as Monsieur. In 1626 he was made Duke of Orleans, and married Mary of Bourbon, Duchess of Montpensier, the richest heiress in France. In the same year he was involved in the conspiracy of Chalais against Richelieu (q.v.), and basely abandoned his accomplice to his fate. He never ceased, however, to intrigue against the great Minister, and in 1632 raised Languedoc against the King with the aid of the Maréchal de Montmorency. He deserted the latter at the battle of Castelnaudary (September 30, 1632), and made his peace with the Court, while Montmorency suffered torture and death. In 1636 he plotted with the Count of Soissons against the life of Richelieu, but his cowardice led to the discovery of the conspiracy, and Gaston purchased peace at the expense of his accomplices. He was concerned in the conspiracy of Cinq-Mars (q.v.), but upon the arrest of the latter (June 13, 1642) submitted and pleaded for pardon. He became Lieutenant-General of the Kingdom after the death of Louis XIII., and served with credit against Spain. During the Fronde (q.v.) he changed from the Court to the Parlement and to Condé, and in July, 1652, was named by the Parlement Lieutenant-General. With the triumph of Mazarin his political activity came to an end, and he spent the last year of his life in retirement at Blois. By his first wife, who died the year after their marriage, he was the father of the celebrated Grande Mademoiselle, Anne Marie Louise, Duchess of Montpensier (q.v.).

The title of Duke of Orleans was next borne by PHILIPPE, brother of Louis XIV. (1640-1701), the founder of the existing House of Orleans, who had two daughters by his first wife, Henri-

etta Maria of England, and a son and daughter by his second wife, Elizabeth, daughter of the Elector Palatine. The son, PHILIPPE, Duke of Orleans (1674-1723), was Regent of France during the minority of Louis XV. He possessed excellent talents, but his youth was passed in unbridled dissipation. Louis XIV. compelled him to marry his daughter, Mademoiselle de Blois, by Madame de Montespan (q.v.). He displayed great personal courage and military talent during the War of the Spanish Succession in Holland, Italy, and Spain; but his presence in Madrid after his victories (1708) was regarded with apprehension both by Philip V. and by Louis XIV. In consequence of this, he lived for some years in retirement from the Court, spending his time in debauchery and in the study and practice of the fine arts and of chemistry. Louis XIV., having legitimized the Duke of Maine and the Count of Toulouse, his sons by Madame de Montespan, appointed the Duke of Orleans president of the regency, but gave the guardianship of his heir and the command of the household troops to the Duke of Maine; but all this was set aside at his death, and the Duke of Orleans became sole Regent in 1715. He was popular, and his first measures increased his popularity; but the financial affairs of the kingdom were perplexing, and the Regent's adoption of the schemes of John Law (q.v.) led to disastrous results. (See MISSISSIPPI SCHEME.) He formed an alliance with England and Holland in 1717, and expelled the Stuarts from France. In the same year he held the celebrated *lit de justice*, in which he prohibited the Parlement of Paris from meddling with financial or political affairs, and declared the legitimized sons of Louis XIV. incapable of succeeding to the throne. His old tutor Dubois (q.v.), who still possessed an unhappy influence over his former pupil, became Prime Minister, and practically ruler of France; the Regent, who was really a man of high abilities, neglecting all duties and pursuing a course of profligacy perhaps unequalled in history. At the instigation of Dubois, the Regent sacrificed the Jansenists and compelled the Parlement in 1722 to recognize the bull *Unigenitus*. (See JANSENISM.) After the coronation of Louis XV., February 15, 1723, and the death of Cardinal Dubois in August of the same year, the Duke of Orleans, although disliking public affairs, consented to become Prime Minister, but he held office for only a few months, dying December 2, 1723, a victim of his incessant debauchery. He was succeeded by his son Louis (1703-52), who was followed by his son, Louis Philippe (1725-85).

LOUIS PHILIPPE JOSEPH, fifth Duke of Orleans, known as Egalité, born at Saint-Cloud, April 13, 1747. He was first known as the Duke of Montpensier, and after 1752 as the Duke of Chartres. He became Duke of Orleans after his father's death in 1785. Although possessed of good abilities, the young Duke early fell into a course of debauchery from which he never absolutely emerged. In 1769 he married a rich wife and used the money so acquired to strengthen his popularity with the masses. In 1771 he opposed the Chancellor Maupeou and was exiled from Court for a number of years. He returned in 1774, but failed to find favor with Louis XVI. and the Queen. He commanded the rear of the royal fleet at the naval combat near Ushant in 1778, and made himself popular by advocating the

cause of America. His increasing popularity rendered him more and more obnoxious to the Court. In the Assembly of Notables in 1787 he declared against the Ministerial proposals; and when the King sought to overcome the resistance of the Parlement by a *lit de justice*, he protested against the proceeding. On the assembling of the States-General, he took the popular side and voted with the extremists in the National Assembly. When the insurrectionary movements began in Paris in 1789 he promoted them by secret agents and money. The Court sent him on an ostensibly diplomatic mission to England, from which he returned after more than six months' absence, in July, 1790, and engaged in new intrigues hostile to the King. He began to find, however, that he was the mere tool of a party who availed themselves of his influence and wealth for their own purposes, and this discovery abated his revolutionary fervor. He withdrew from the Jacobins, was reconciled to the King, and appeared at Court; but was treated with such contempt by the courtiers that he turned once more to the cause of the Revolution. He joined Danton's party, renounced his titles, assumed the name of Philippe Egalité, and was returned to the Convention, in which he took his place with the party of the Mountain. He voted for the death of the King. The Jacobins were dissatisfied with him because he did not give up the whole of his immense wealth, and the baseness of his character alienated all his former supporters. On April 6, 1793, the Convention decreed the arrest of all the members of the Bourbon family, and the estates of the Orleans family were confiscated. Philippe Egalité, with his family, was thrown into prison at Marseilles, and in May was accused of high treason. He was acquitted, but in September was brought before the Revolutionary Tribunal in Paris; and on November 6, 1793, he was condemned, and by his own request was executed the same day. He faced death courageously. His son, the seventh Duke of Orleans, became King of France in 1830. See LOUIS PHILIPPE.

Louis Philippe's eldest son, Ferdinand, Duke of Orleans, was born in Palermo, September 3, 1810. In 1831-32 he served in Belgium, and in 1835-40 in Algeria, and he subsequently took a prominent part in the reorganization of the French army. While on his way from Paris to Neuilly, July 13, 1842, the horses of his carriage became unruly, and in jumping from it he fractured his skull. He was a prince of many amiable qualities, and his death was greatly deplored by the French people. He left two sons, Louis Philippe, Count de Paris (q.v.) and Robert Philippe, Duke de Chartres (q.v.). After the fall of the Empire, the Orleans Princes were permitted to return to France, whence they had been expelled in 1848, and for a time they exercised considerable influence on the politics of the day. They plotted the restoration of the July monarchy, but enjoyed little popularity owing to their close alliance with all the elements of reaction in France. In June, 1886, the Count de Paris, the Duke de Chartres, and the Duke d'Aumale were sent into exile, where the two former continued to plot with Boulanger (q.v.) for the overthrow of the Republic. The son of the Count de Paris, Louis Philippe Robert, Duke of Orleans (1869—), is the legitimate pretender to the Crown of France. Becoming

of age in 1890, he went to Paris and there offered himself for the customary military service, but was arrested under the Expulsion Bill of 1886, which prevents the direct heirs of former reigning families from residing in France. After being imprisoned for a few months, he was liberated by President Carnot, and escorted to the Swiss frontier by the French police. He afterwards lived in Brussels for a time. Between the years 1890 and 1895 he traveled in Asia. In 1896 he married an Austrian princess. He had early assumed the ducal title last used by his grandfather. He made a bid for popularity in connection with the Dreyfus affair in 1897 by upholding the army, but gained little by his interference. Until 1900 he resided in England, where he was well treated and received, but in that year he brought himself into great odium by publicly approving disgraceful caricatures of Queen Victoria, published in Paris. The other sons of King Louis Philippe were the Duke of Nemours, the Prince de Joinville, the Duke d'Aumale, and the Duke de Montpensier (q.v.). In 1852 the Government confiscated a large part of the Orleans estate to the value of 50,000,000 francs.

Consult, in addition to the histories of France and of the different reigns and periods: Laurentin, *Histoire des ducs d'Orléans* (Paris, 1832-34); Marshal, *La famille d'Orléans, depuis son origine jusqu'à nos jours* (ib., 1845); Saint-Simon, *Mémoires*; Perkins, *France Under the Regency* (Boston, 1892); Lemontey, *Histoire de la régence* (Paris, 1832); Wiesener, *Le régent, l'abbé Dubois et les Anglais* (ib., 1891-93); Jobez, *La France sous Louis XV., vols. i., ii.* (ib., 1864-65); Crétineau-Joly, *Histoire de Louis Philippe d'Orléans et de l'Orléanisme* (ib., 1862); Tournois, *Histoire de Louis Philippe Joseph d'Orléans et du parti d'Orléans dans ses rapports avec la révolution française* (ib., 1842-43, 1876); Ducoin, *Philippe d'Orléans Egalité* (ib., 1845-61).

ORLEANS, CHARLES Duke of. A French poet. See CHARLES OF ORLEANS.

ORLEANS, HÉLÈNE LOUISE ELISABETH, Duchess of (1814-58). She was born at Ludwigslust, daughter of the Grand Duke Frederick Louis of Mecklenburg-Schwerin. In 1837 she married the son of Louis Philippe, Prince Ferdinand of Orleans, who died in 1842. After the fall of Louis Philippe (1848) she attempted to seat her elder son, the Count of Paris, upon the throne, but was unsuccessful and had to leave France for England.

ORLEANS, HENRI PHILIPPE MARIE, Prince d' (1867-1901). A French explorer, born at Ham, near Richmond, England, a son of Robert, Duke de Chartres (q.v.). In 1889-90 he accompanied Gabriel Bonvalot on a journey through Central Asia; two years later he explored Indo-China; and in 1895 discovered the sources of the Irrawaddy, an achievement for which he received the gold medal of the Société de Géographie de Paris and the cross of the Legion of Honor. In 1897 and in 1898 he visited Abyssinia, and in 1901 went to Anam, where he died. Among his writings are: *Une excursion en Indo-Chine* (1892); *Autour du Tonkin* (1894); *A Madagascar* (1895); and *Du Tonkin aux Indes* (1897).

ORLEY, ORL, BERNART, OF BAREND VAN (c.1492-1542). A Flemish painter, born at Brus-

sels, hence also called Barend van Brussel. Probably a pupil of his father, Valentyn van Orley (1466-c.1530), he went to Rome after 1509 and became a successful imitator of Raphael, in whose school he studied. He was Court painter successively to Charles V., to Margaret of Austria, Regent of the Netherlands, and to her successor, Mary of Hungary. Van Orley stands next to Mabuse among the leaders of the tendency to 'Italianize' Flemish art. His coloring is sadly degenerate from the old Flemish masters, cool in general effect, yet gaudy, and although his early works show good composition and elevated sentiment, he afterwards lapsed into the mannered style of the later followers of Raphael. Flemish thought and practice are most observable in his "Pietà," in the Brussels Museum, which also contains the "Trials of Job" (1521), "A Holy Family," and two portraits. His most considerable work is probably the shrine with "The Trinity Worshipped by Saints," in Saint Mary's at Lübeck. Noteworthy are furthermore "A Holy Family," in Dresden; "Marriage of the Virgin," in the Louvre; "The Magdalen Reading," in the National Gallery, London; and "Repose in Egypt," in the Royal Institution at Liverpool. The large "Last Judgment," in the Church of Saint James, at Antwerp, is most indicative of his adopted Italian manner. Of his designs for tapestries, the best known are "The Life of Abraham," in Hampton Court, and "Maximilian's Hunt," in the Louvre. The windows with the portraits of Francis I., Charles V., and Mary of Hungary, in the Cathedral at Brussels, were also done from his cartoons. For his biography, consult Wauters (Paris, 1894).

ORLOFF. The name of a prominent Russian family. GRIGORI (1734-83) was a grandson of Ivan, founder of the family. He won the love and favor of Catharine II., whom he helped put on the throne. His influence with the Empress, who bore him a son, the first Count Bobrinski, came to an end in 1772. His brother ALEXEI (1737-1808) also took part in the conspiracy of 1762, and with his own hands strangled Peter III., husband of Catharine II. For his victory over the Turks at Tchesme in 1770 he received the epithet Tchesmenski. He did much for the improvement of Russian horses. Alexei's nephew, named ALEXEI FEDOROVITCH (1787-1861), was a natural son of Fedor (1741-1796). He fought bravely in the wars with Napoleon, and in the Turkish campaign; was plenipotentiary at the signature of the Treaty of Adrianople (1829); and, after acting as Minister to Great Britain, negotiated the Peace of Unkiar-Skelessi in 1833. For a long time he was chief of the Russian police. In 1856 he was made prince when he was sent to Paris to represent Russia. His son, NIKOLAI (1820-70), at Paris until 1880, and at Berlin. He wrote on the war of 1806 and urged the abolition of corporal punishment.

ORLOP (formerly also *overlope*, from Dutch *overloop*, orlop, a running over, from *orer*, over + *loopen*, to run). The deck immediately below the berth deck in the old-fashioned rigged men-of-war. See DECK.

OR'MAZD, or OR'MUZD (Pers., from Phl. *Aûharmazd*, OPers. *Auramazda*, Av. *Ahura Mazda*, Lord Wisdom). In the Zoroastrian religion, the Supreme Being. In the Avesta (q.v.) he is repre-

sented as the head of the heavenly host and as sovereign over the realm of good, light, and truth. In the Old Persian Inscriptions, as well as in the Pahlavi texts and the Avesta, he is the creator of all that is good in the world. Ormazd is the guardian of mankind; he is a giver of rewards; but he may mete out punishment as well. His throne is in the heavens, in the realm of eternal light, where his presence is manifested by splendor and glory. This is the sense in which we must understand the Avesta when it alludes to Ahura Mazda's 'form.' Auramazda is represented on the sculptured rocks of Behistun as a crowned and bearded figure in a winged circle above the head of King Darius, a conception borrowed from Assyro-Babylonian art. In the Sassanian bas-reliefs, Ormazd is portrayed on horseback presenting the Imperial crown to Ardashir.

The spiritual side of Ahura Mazda is constantly dwelt upon in the Avesta. He creates through his 'Holy Spirit,' which is a 'spirit of intelligence' as contrasted with the ignorance and lack of prescience on the part of Ahriman (q.v.). In the philosophic development of Zoroastrianism this spiritual essence of Ahura Mazda is often conceived to be an emanation separate and apart from the divinity, acting in opposition to the Evil Spirit, Angra Mainyu, and yet of the same substance as Ormazd. From this transcendental Zoroastrian view it is possible to understand how the different Iranian sects early began to tend toward monotheism as opposed to the earlier dualism which made Ahriman self-existent, and coeval, though not coeternal, with Ormazd. This unifying tendency sometimes postulated Boundless Time, or Eternity, as the source alike of Ormazd and Ahriman; sometimes it is presupposed that the Holy Spirit and the Evil Spirit were the children of Ormazd, the wicked principle being due to a moment of doubt on the part of the great god. But in all cases Ormazd rises supreme as the acknowledged head and sovereign of the heavenly kingdom. Ahura Mazda is attended by a band of six (or seven) archangels, 'Immortal Holy Ones,' and also by a score or more of angels and a host of minor spirits.

In viewing the Zoroastrian conception of Ormazd we must also allow the existence of a few reminiscences of naturalistic ideas, a tinge here and there of the sky god warring against the serpent demon of the heavens. But these survivals are very slight. The same is true of the occasional Varuna of the Vedas, as an old Aryan conception of God. Ormazd as a deity stands far above both Hindu and Babylonian ideals, and approaches the Judæo-Christian conception of Jehovah.

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ORME, *orm*, PHILIBERT DE L'. See **DE L'ORME**, PHILIBERT.

ORME, ROBERT (1728-1801). An Anglo-Indian historian. The son of Dr. Alexander Orme, physician and surgeon of the British army

in Bombay; he was born at Anjengo, Travancore, India. He was educated at Harrow, England, and went back to India in 1742 as a writer in the employ of the East India Company. In 1752 he went to England in company with Captain Clive, afterwards Lord Clive, Baron of Plassey, his friend for many years. He returned again to India, and in 1754 became fourth member of the council at Fort Saint George, and rose to be a commissary and accountant-general (1757-58). He was influential in establishing the power of Great Britain in India, and active in the interest of his friend Clive, whom he succeeded in having appointed as military commander of that country. He returned to England finally in 1759, and became historiographer to the East India Company, retiring to Ealing in 1792, where he died on January 13, 1801. His works include *A History of the Military Transactions of the British Nation in Indostan* (5th ed., London, 1799); and *A General Idea of the Government and People of Indostan* (ib., 1811). Consult biographical memoir attached to his *Historical Fragments of the Mogul Empire* (2d ed., London, 1782).

ORMEROD, ELEANOR A. (1828-1901). An English naturalist and entomologist. She was born at Sedbury Park, Gloucestershire, and early devoted herself to the study of injurious insects. She was the first woman to receive a fellowship in the Meteorological Society (1878). The Royal Horticultural Society awarded her the Silver Floral Medal for her services to the collection of economic entomology; and from Edinburgh University in 1900 she received the degree of LL.D. Her publications include: *Cobham Journals* (1879); *Manual of Injurious Insects* (1881); *Guide to Insect Life* (1884); and *Annual Reports of Observations on Injurious Farm Insects* (1877 et seq.).

ORMOC, *ör-mök'*. A town of Leyte, Philippines, situated on the Bay of Ormoc, on the west coast of the island. It is surrounded by stone breastworks and three ruined forts, and is an important hemp port. Population, 8107.

OR/MOLU (Fr. *or moulu*, ground gold, from *or*, from Lat. *aurum*, gold, and *moulu*, p.p. of *moudre*, from Lat. *molere*, to grind). A gilded bronze, or fine brass, sometimes colored or lacquered, to give it additional brilliancy. It was used, especially during the Gothic and Renaissance periods, for mounting on furniture. It is also used for candelabra and other fine metal work.

ORMONDE, *ör'mond*, JAMES BUTLER, twelfth Earl and first Duke of (1610-1688). A British soldier and statesman, the first of the ancient Anglo-Irish family of Butler on whom the ducal title was conferred. He was born in London. On his father's death he became Viscount Thurles, and heir of the title. His grandfather, Walter, Earl of Ormonde, having displeased James I. and having been imprisoned, the young heir was seized as a royal ward, and placed under the guardianship of the Archbishop of Canterbury. In his twentieth year he married his cousin, Lady Elizabeth Preston, and in 1632 succeeded to the earldom and estates of Ormonde. On Strafford's recommendation Ormonde was appointed to the chief command of the army in Ireland in 1640, just before the outbreak of the great rebellion there. He repeatedly defeated

the insurgents. When, in 1643, he concluded an armistice, his policy was loudly condemned as well by the friends as by the enemies of the Royalist Party in England. During the long contest of Charles with the Parliament, Ormonde continued to uphold the royal interest in his Irish government. When the last crisis of the King's fortunes came, he resigned his Irish command, and retired to France, from which country he again returned to Ireland, with the all but desperate design of restoring the royal authority. After a gallant but unequal struggle, he was compelled, in 1650, to return once more to France. His services to the royal cause continued unremitting during his exile; and at the Restoration he accompanied Charles II. on his return, and was rewarded for his fidelity by the ducal title of Ormonde. His after-life was less eventful, although he twice again returned to the government of Ireland. In 1670 occurred the well-known attempt by the notorious Colonel Blood (q.v.) upon the life of Ormonde. He escaped uninjured, and lived until the year 1688. His letters and papers were published under the title, *Original Letters and Papers Concerning the Affairs of England, 1641-60* (London, 1739). Consult Carte, *Life of the Duke of Ormonde* (last ed., Oxford, 1851).

ORMS'BY, JOHN (1829-95). An English author and traveler. He belonged to an English family that settled in Ireland in the reign of Queen Elizabeth, and he was born at the family-seat, Gortner Abbey, in the county of Mayo. After graduating B.A. from Trinity College, Dublin, he went to London, where he studied law at the Middle Temple, but he soon drifted into literature. To *Fraser's Magazine* and other periodicals he contributed many sketches of travel, some of which were collected under the title of *Autumn Rambles in North Africa* (1864) and *Stray Papers* (1876). Becoming interested in Spain and Spanish literature, he translated the *Cid* (1879) and *Don Quixote* (1885), both admirably. Consult the biographical sketch by Leslie Stephen in the *Alpine Journal* (London, 1896).

ORMULUM, THE. An English poem written about 1200, by Orm or Ormin (a Danish word meaning 'worm'). Of the author nothing is directly known. He was probably of a Danish family dwelling in the northeastern part of the old Kingdom of Mercia, and he may have been an Augustinian monk. The poem, 'named Ormulum for that Orm it wrought,' is composed of a series of homilies (based on Ælfrie, Bede, Gregory I., and Isidore), extending from the Annunciation into the Acts of the Apostles. It exists in only one manuscript (Bodleian Library), believed to be the author's own copy. The manuscript, containing more than 20,000 half lines, is, however, only a fragment, about one-eighth of the entire work as written by Orm. The poem has great linguistic value as a representative of the English a little more than a century after the Norman Conquest. Orm wrote his poem in the regular septenarius, an iambic line, divided into two sections of eight and seven syllables. A marked peculiarity of the orthography is the doubling of consonants for indicating short vowels and for other phonetic reasons. Consult the *Ormulum*, ed. by Holt (Oxford, 1878); and the bibliography of critical works on the poem in Körting's

Grundriss der Geschichte der englischen Literatur (Münster, 1899).

ORMUZ, ōr'mūz, ORMUS, or HORMUZ. A small island in the entrance to the Persian Gulf, near the coast of Persia (Map: Persia, F 7). It contains the ruins of a city which in the thirteenth century was transferred hither from the mainland. It had long been the headquarters of the Persian trade with India, had a population of 40,000, and remained an important commercial centre after it was captured by the Portuguese in 1515. They retained it until 1622, when it was taken by the English and given to Shah Abbas of Persia, who destroyed the city and transferred its trade to the port of Bender Abbas on the mainland. The island still yields salt and sulphur.

ORMUZD. See ORMAZD.

ORNAMENT (OF., Fr. *ornement*, from Lat. *ornamentum*, adornment, from *ornare*, to adorn, equip). In general, any adornment executed not for its own sake, but for that of the object or structure to which it is applied; in a narrower sense, any motive or element in a decorative scheme or pattern. Ornament has always been an important department of architectural design, because, however possible it may be theoretically to impart to buildings, by mere excellence of composition and proportion, that beauty without which they are merely works of engineering, in actual fact the arts of architecture and of industrial design have always depended chiefly for the beauty of their products upon the judicious use of ornament, and the various historic styles are most readily distinguished by the character of their ornament. Ornament has, in turn, in its historic developments followed the lead of architecture, and its styles are as clearly marked; for the decorator, however free in theory to design according to an unfettered fancy, has in all ages been dominated by the limitations of tradition, inheritance, custom, and circumstance, which have constrained him into habitual and established ways of designing.

Ornament is classified according to various categories. That which belongs to immovable structures is called *architectural ornament*; the ornament of movable structures (furniture) and objects is *industrial*. Ornament whose form is determined by structural features, or which is an inherent part of the structural framework, is called *structural ornament*; such are capitals and bases, moldings and cornices, finials and corbels. That which is added to a structure or object which has already received definite form is called *applied ornament*; such are all inlays, mosaic, painted ornament, and plaster-work. Ornament produced by relief or depression is called *plastic* or *glyptic ornament*, and includes all carved, engraved, chased, and molded ornament; while ornament by color, whether of mosaic, inlay, painting, enamel, or stained glass, is *chromatic ornament*. When the forms of ornament are purely geometric or fanciful, they are said to be *conventional*, as in Moorish and Saracenic decoration; when copied more or less closely from animal or vegetable forms, they are *naturalistic*; when natural forms are subjected to a decorative regularization, they constitute *conventionalized natural ornament*; such are the acanthus-leaves of the Corinthian capital and the foliage of early Gothic carving. *Grotesques* are deco-

rative combinations of heterogeneous natural forms, as in griffins, sphinxes, Gothic gargoyles, and the like.

Apparently all primitive and savage ornament and most ancient Oriental ornament was originally magical or fetishistic (see FETISH), and the artificial symbolism of classic and modern ornament is a survival of this primitive magical significance. Conventional ornament has arisen partly from the gradual 'decay' of originally symbolic forms, partly from the manipulations of pottery, basketry, weaving, and metal work. Structural ornament, which the Greeks were the first to develop into importance, has always derived many of its forms from obsolete structural processes—as the triglyph and dentil from obsolete systems of wooden construction. Structural ornament was carried to the highest perfection by the mediæval church-builders, who developed an entirely new system of decorative structural forms in working out the problem of a three-aisled vaulted structure of stone (see GOTHIC ARCHITECTURE); clustered shafts, capitals, vaulting-ribs, pinnacles, tracery, etc., were at once structural necessities and decorative embellishments; and all the minor details grew up as the result of this structural development. The Roman system, revived in the Renaissance and almost universally followed to-day, was to erect a structure of coarse materials and then clothe it in a decorative garment of marble incrustation, stucco, and applied ornament; and the Byzantines and the Mohammedan nations developed the use of applied color, by means of mosaic, stucco, tiles, etc., in different directions to a wonderful pitch of splendor. Ornament has in different lands and periods received notable developments outside of architecture, as in the textile arts, in pottery, china, and porcelain; in goldsmith's work and enamel; in furniture, in manuscript illumination, typography, and book-binding. The Western nations have excelled, as a rule, in form; the Eastern nations in color. Chinese and Japanese art has never been surpassed in its handling of color ornament in porcelains and earthenwares, and it also excels in minute carvings in ivory and castings in bronze.

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ORNAMENTS RUBRIC, THE. A rubric in the English Prayer-Book on the interpretation of which much of the ritual controversy has turned. It precedes the Order for Morning Prayer, and runs as follows: "And here it is to be noted that such ornaments of the Church and of the ministers thereof, at all times of their ministration, shall be retained and be in use as were in this Church of England, by the authority of Parliament, in the second year of the reign of King Edward the Sixth." By 'ornaments' are understood, according to an official decision of the Judicial Committee of the Privy Council, 'all articles used in divine service.' The rubric is

simply a more emphatic form of that inserted in 1559 and again in 1604. It was deliberately retained in 1661, in spite of the opposition of the Puritans, and has held its present place since the final revision in 1662. Its interpretation rests upon the question whether it refers to the state of things under the first Prayer-Book of Edward or to that immediately anterior to its issue, in the partially reformed services of 1548. The traditional view refers the words of the rubric to the first Prayer-Book. But this was not actually in use by authority of Parliament until the third year of Edward's reign. On the other hand, the wording, on the face of it, points to a certain year—the year before the introduction of the Prayer-Book. The difficulty of deciding between these views is increased by a clause in the Elizabethan Act of Uniformity. This provided for the retention of the ornaments "until other order be taken by the authority of the Queen's majesty with the advice of the Ecclesiastical Commissioners or of the Metropolitan of this realm," and the question arises whether further order was formally taken or not. There appears to have been little or no effort to enforce the observance of the rubric in Elizabeth's day. The times were troublous, and in some influential quarters there was no intention of using the ornaments. If 'other order' was taken it may have been through the 'Advertisements' (see ADVERTISEMENTS OF ELIZABETH) in 1566. But whether these could override the Elizabethan act or not is a very intricate historical point. Consult Parker, *The Ornaments Rubric* (Oxford, 1881); and see RITUALISM.

ORNE, ðrn. A department of France, formed of part of Normandy and bounded on the north by the Department of Calvados (Map: France, F 3). Area, 2372 square miles, more than one-half of which is cultivated land. A range of wooded hills, attaining a maximum altitude of 1370 feet, extends across the south of the department from east to west. North of this range the surface slopes toward the English Channel. The principal river is the Orne, which gives its name to the department. The climate is damp, though in general temperate. The soil is fertile, but agriculture is not in an advanced state; the chief crops are wheat, oats, and barley. There are several millions of apple and pear trees in the department, and cider is extensively made. Cattle, and horses of the purest Norman breed, are reared. Marble, granite, and other stones for building are quarried; and there are manufactures of textiles and pins. Capital, Alençon. Population, in 1896, 339,162; in 1901, 325,441.

OR'NITHODELPHIA (Neo-Lat., from Gk. *ὄρνις*, *ornis*, bird + *δέλφος*, *delphys*, womb). A subclass of the Mammalia, the Prototheria (q.v.), distinguished by the bird-like arrangement of the reproductive organs. Compare DIDELPHIA; MONODELPHIA.

ORNITHOLOGISTS' UNION, AMERICAN. A society founded in New York in 1883, and incorporated under the laws of the District of Columbia in 1888, for the advancement of its members in ornithological science, the publication of a journal of ornithology and other works relating to that science. The Union publishes the *Auk*, a quarterly journal of ornithology, the *American Ornithologists' Union Check-List of North American Birds*, and the *Code of Nomen-*

clature. The *Check-List* is a standard, and many of the principles of nomenclature adopted by the Union in 1885 are now used in other branches of zoölogical science. The membership of the Union consists of fellows, honorary fellows, corresponding fellows, members, associates, and patrons.

ORNITHOLOGY (from Gk. *ορνις*, *ornis*, bird + *λογία*, *logia*, account, from *λέγειν*, *legein*, to say). The science of bird study. The word was first used, so far as is known, in 1670, in Blount's *Glossographia*, where it is mentioned as the title of a late book. The Hebrew scriptures (Jer. viii. 7, and Song of Solomon ii. 12) show that the Hebrew sages had noted the phenomena of the spring migration, and we are told that Solomon "spake also of beasts, and of fowl, and of creeping things, and of fishes." But hundreds of years before Solomon, Egyptian artists were noting birds and drawing and coloring their portraits so well that we may recognize species.

In the writings of Aristotle we find mention of about 170 species of bird, but only about four-fifths can be identified. Pliny the Elder devoted one volume of his writings to birds, much of the information in which was evidently taken from Aristotle, but after him down to the latter part of the seventeenth century there is hardly a work on birds that is anything more than an entertaining compilation of absurdities. The *Historia Animalium* of Gesner, published at Zurich (1551-58), and the *Historia Naturalium* of Aldrovandi, published at Bologna after his death in 1605, are characteristic of the superstitions and utterly unscientific trash which passed for natural history in those days. In 1676 there appeared in Latin Ray and Willughby's *Ornithologia*, and two years later an English revised edition. This book was really a foundation for modern ornithology. It divided birds into the two groups land-birds and water-birds, and the latter group was again divided into swimmers and those which frequent watery places. For 200 years these divisions were made use of by ornithologists, and it is only within very recent years that they have been discarded. In 1735 appeared the first edition of Linnaeus's epoch-making work *Systema Naturæ*, in which chaos was reduced to order and the binomial system of nomenclature was propounded and used. The twelfth edition (1766) is the basis of modern systematic zoölogy. Linnaeus followed quite closely the general classification of Ray. Following Linnaeus are a long list of ornithologists, one of whom was M. J. Brisson, whose six-volume *Ornithologie* was one of the best works on birds published during the eighteenth century. As a descriptive ornithologist he is ranked among the best. Another Frenchman of note was Buffon, whose nine-volume *Histoire naturelle des oiseaux* is an extraordinary piece of work, especially when considered from a literary point of view. Then there is Latham, whose *General Synopsis of Birds* was completed in 1785, but afterwards appeared in several revised editions. The compilation by Gmelin in 1788 of a thirteenth edition of Linnaeus's *Systema* was most important, but the rarity of the original has caused some confusion as to what is Linnaeus's and what Gmelin's work. The next writer of importance is Cuvier, whose *Règne animal* of 1817 revolutionized zoölogical classification. Cuvier made use almost exclusive-

ly of external characters, particularly of the bill and feet. He grouped birds in six orders—Accipitres, Passeres, Scansores, Gallinæ, Grallatores, Natatores. This classification has been the foundation of the classification of birds adopted in natural histories, and even in many zoölogies, down to the present day. The advantages of this classification are clear, for the number of orders is small and they are based on obvious external differences. In addition to this, Cuvier's great reputation as a zoölogist gave weight to his views, and consequently the Cuvierian system has continued almost unbroken, the only very radical change being the recognition of the differences between the Carinatae and Ratitæ, and the separation of the latter from the Grallatores.

With the opening of the nineteenth century there came a great increase in the number of bird students and the publication of ornithological literature. American ornithology has been wholly a growth of the past century. In England the publication of Gilbert White's *Natural History of Selborne* in 1789 did more to stimulate popular interest in ornithology than any other book ever has done. It has passed through more editions, by far, than any other work on natural history. Bewick's *History of British Birds* first appeared in two volumes, in 1797 and 1804. The next works of note are the magnificent monographs by John Gould (q.v.)—*Birds of Europe* (5 vols., 1832-37); *Rhamphastidæ* (1834); *Trogonidæ* (1838); *Birds of Australia* (7 vols., 1848); *Trochilidæ* (5 vols., 1849-61); *Odontophorinæ* (1850); *Birds of Asia* (7 vols., 1850-53); and *Birds of New Guinea* (1875-81). We mention all of these because of their wealth of illustration, which consists of more than 3000 colored plates. The works of Illiger, Vieillot, and Temminck appeared between 1810 and 1820, and all three were important leaders in the systematic zoölogy of their day. The works of C. L. Nitzsch deserve special mention because of his being the founder of the study of pterylosis (q.v.) by his *System der Pterylographie*.

Turning now to America, the first ornithologist of any reputation was William Bartram, who published in 1791 his *Travels Through North and South Carolina*, which has been called 'the starting point of American ornithology.' In 1808 appeared the first volume of Alexander Wilson's *American Ornithology*, the last two volumes of which were published in 1814 by Ord, Wilson's friend and editor. Wilson was one of our most remarkable ornithologists, and his great work contains an account of about 280 species of birds, which were not only faithfully described, but carefully figured in colors. Several editions of this classic have been published. After Wilson's death, his work was continued by Charles Lucien Bonaparte, who published in the years 1825-33 his four large volumes, uniform with Wilson's *Ornithology*. In 1831 appeared the bird volume of Richardson and Swainson's *Fauna Boreali-Americana*, a book of the greatest importance. The *Manual of Ornithology of the United States and Canada*, by Thomas Nuttall, appeared in 1832-34, and is a well-written and interesting treatise. The Audubon period followed, in which appeared that most magnificent of bird-books, the original folio edition of Audubon's *Birds of America*. Altogether there were 435 plates with more than 1000 figures. The text to accompany

this set of plates consisted of five volumes called *Ornithological Biography*, and is intensely interesting reading. These were not by any means the only books which Audubon (q.v.) wrote, but it is on these that his fame rests most securely. There can be no question, however, that much of Audubon's success was due to his keen Scotch friend William MacGillivray, who was an adept at avian anatomy.

The Audubonian period may be said to have passed into the Bairdian in the fifties; especially on the publication in 1858 of Vol. ix. of the *Pacific Railroad Reports*, devoted to the birds secured by the various parties making surveys for the proposed transcontinental railroad. In this volume Spencer F. Baird came to the front as an ornithologist, for although he was materially assisted by Cassin and Lawrence, the work was primarily his. It has well been said that this book "effected a revolution in classification and nomenclature," for the names used both for groups and species were a radical departure from those current in the Audubonian period. Baird was the leading American ornithologist of the third quarter of the nineteenth century, and his influence remains strong.

Since 1870 ornithology has progressed marvelously, and among those who advanced it Elliott Coues may be placed foremost because he first made really accessible to American students a knowledge of the bird fauna of their own country. Adding to his very extensive acquaintance with birds a wide knowledge of ornithological literature and history, and a charming literary style, he made his *Key to North American Birds* highly influential, and, at the period of its first publication (Boston, 1872), an indispensable guide to every bird-student. Revised editions were issued successively in 1884, 1887, 1890, and 1903. Dr. Coues was the author of numerous other books and papers, of which *Birds of the Northwest* (1874), and *Birds of the Colorado Valley*, part i. (1878), were most important. The critical bibliography begun in the later work and continued elsewhere constitutes a history of the development of American ornithology.

The names of Robert Ridgway and J. A. Allen belong, with that of Coues, in the front rank of American ornithologists of their period. The former spent his life in the service of the Smithsonian Institution, and was co-author with S. F. Baird and T. M. Brewer in the important *History of North American Birds*, of which the first three volumes (land birds) were issued in Boston in 1874, and the last two (water birds) in 1884. Besides many technical and faunal papers, he published a *Manual of North American Birds* (Philadelphia, 1887), which embodied the ideas and classification that prevailed at the National Museum. A second edition soon followed. In 1901 appeared the first part (Fringillidæ) of a most comprehensive treatise entitled *The Birds of North and Middle America*, written by Ridgway and published by the Smithsonian Institution as *Bulletin No. 59* of the United States National Museum. This work is purely technical, containing no account of the habits of the birds, but as a guide to American ornithology it is the most advanced and complete treatise of its time. The second part appeared in 1902 and others followed at intervals.

Dr. J. A. Allen (q.v.) contributed greatly to the philosophy of ornithology, and as editor of

The Auk for many years exerted a constant and critical scientific influence. The latter part of his life was spent as curator of the department of birds in the American Museum of Natural History at New York, where his assistant was Frank H. Chapman, whose numerous books, especially his practical *Handbook*, vastly stimulated the growth of the popular interest and knowledge of birds which was so striking a feature of the intellectual development of the country toward the close of the nineteenth century. Since 1883 the controlling factor in the progress of the science of ornithology in America has been the American Ornithologists' Union (q.v.).

Cuvier's scheme of classification held its ground in popular books, with very little change, during the entire century. Since 1860, however, ornithologists have recognized that, however 'convenient' Cuvier's system may be, it is woefully unnatural, and many and varied have been the attempts to produce a 'natural' classification. Of these we can only mention the most important. In 1867 Huxley published his celebrated *Classification of Birds*, based very largely upon skeletal characters, especially those connected with the skull. His classification may be briefly summarized as follows:

Division A. Metacarpals not ankylosed together; tail longer than body; order SAURURÆ.

Division B. Metacarpals ankylosed; tail considerably shorter than body:

(a) Sternum devoid of a keel; order RATITÆ.

(b) Sternum provided with a keel; order CARINATÆ.

Order SAURURÆ. Archaeopteryx only.

Order RATITÆ:

(A) Humerus short; 1 ungual phalanx.

(a) With a hallux, kiwis (Apteryx).

(b) No hallux; moas, cassowaries.

(B) Humerus long; 2 ungual phalanges.

(a) Ischia united beneath sacrum; pubes free; rheas.

(b) Ischia free; pubes united ventrally; ostriches.

Order CARINATÆ:

(1) Vomer broad behind and interposing between the pterygoids, the palatines, and the basisphenoidal rostrum; *Dromæognathæ* (tinamous).

(2) Vomer narrow behind; pterygoids and palatines articulating largely with basisphenoidal rostrum.

(a) Maxillopalatines free.

(1) Vomer pointed in front; *Schizognathæ*. (Plovers, shore-birds, gulls, penguins, cranes, hemipodes, fowls, sand-grouse, pigeons, hoatzin.)

(2) Vomer truncated in front; *Ægithognathæ*. (Passerines, swifts, woodpeckers.)

(b) Maxillopalatines united; *Desmog-nathæ*. (Birds of prey, parrots, cuckoos, kingfishers, trogons, ducks, geese, flamingoes, storks, cormorants.)

This classification was the first important contribution to ornithology after the publication of the *Origin of Species*, and it is really the basis of later systems. The work of Garrod and Forbes on avian anatomy led to many changes in the relative position of certain birds and

groups and increased immensely our store of facts, but the systems which they proposed have never met with any general acceptance. Selater's scheme, proposed in 1880, included some 26 orders, and has for that reason alone failed to meet any wide acceptance. The same criticism applies to his successors, and the complexity of the systems proposed by Reichenow, Stejneger, Fürbringer, Sharpe, and Gadow has militated against their general use. Indeed, it is a rather notable fact that no system that has yet been proposed has proved satisfactory. A very full history of the taxonomy of ornithology may be read in the 'Introduction' of Newton's *Dictionary of Birds* (New York, 1896).

The very latest scheme of arrangement having the sanction of authority is that adopted by Evans and the editors of the *Cambridge Natural History* in vol. ix. of that work, "Birds" (London, 1901). It divides all birds, fossil and recent, into sub-class I., ARCHÆORNITHES (Archæopteryx alone) and sub-class II., NEORNITHES (all the remainder). The Neornithes are divided into—A, *Ratitæ*, birds with a keelless sternum; B, *Odontolæ*, ratite birds, with teeth in the mandibles, set in grooves; and C, *Carinata*, birds with keeled sternums. This last sub-class is considered divisible into 14 groups, as follows: Ichthyornithes (Ichthyornis); Colymbiformes (loons and grebes); Sphenisciformes (penguins); Procellariiformes (petrels); Ciconiiformes (cormorants, etc., pelicans, herons, ibises, flamingoes); Anseriformes (ducks, geese, swans); Falconiformes (falcons, vultures); Tinamiformes (tinamous); Galliformes (game-birds, fowls, pheasants, hoatzin); Gruiformes (rails, cranes, bustards, sun-bitterns, etc.); Charadriiformes (shore-birds, coursers, thick-knees, gulls, auks, sand-grouse, pigeons); Cuculiformes (cuckoos, parrots); Coraciiformes (rollers, motmots, kingfishers, hornbills, hoopoes, owls, nightjars, swifts, humming-birds, trogons, orioles, puff-birds, toucans, woodpeckers, and related forms); Passeriformes (passerine birds). The last immensely numerous group (see PASSERES) is subdivided by Evans as follows:

PASSERES ANISOMYODÆ.

Subclassmates (Eurylamidæ).

Clamatores (pittas, tyrant fly-catchers, co-tingas, tree-creepers, etc.).

PASSERES DIACROMYODÆ.

Suboscines (lyre-bird, Atrichornis).

Oscines (singing birds generally, from larks up to finches).

The classification of birds, as of other groups of animals, adopted for the purposes of this Encyclopædia (see CLASSIFICATION OF ANIMALS), is that given in Parker & Haswell's *Text-Book of Zoology* (London and New York, 1897), and is in outline as follows:

CLASS AVES.

Sub-class I. Archæornithes.

Extinct, long-tailed, toothed birds. Includes only Archæopteryx (q.v.).

Sub-class II. Neornithes.

Birds in which the greatly shortened tail usually ends in a pygostyle (see BIRD); metacarpals fused with distal carpals.

Division A. *Ratitæ*.—Sternum without a keel; flightless birds.

Order 1. Megistanes (emus, cassowaries, kiwis, and moas).

Order 2. Rheæ (Rheas).

Order 3. Struthiones (Ostriches).

Order 4. Apyornithes (Apyornis; extinct).

Order 5. Gastornithes (Gastornis and allied Eocene genera).

Division B. *Carinata*.—Sternum with a keel; flying birds.

Order 1. Stereornithes (Phororhacos and allied Eocene genera).

Order 2. Odontolæ (Hesperornis and allied Cretaceous genera).

Order 3. Ichthyornithes (Ichthyornis, Aptornis and allies of the Eocene).

Order 4. Pygopodes (loons and grebes).

Order 5. Impennes (penguins).

Order 6. Tubinares (petrels, albatrosses, etc.).

Order 7. Steganopodes (cormorants, frigate-birds, pelicans, etc.).

Order 8. Herodiones (herons, ibises, etc.).

Order 9. Anseres (ducks, swans, screamers).

Order 10. Accipitres (vultures, falcons, secretary bird).

Order 11. Crypturi (tinamous).

Order 12. Gallinæ (fowls, game-birds, curassows, pheasants, and hoatzin).

Order 13. Grallæ (rails, cranes, bustards, etc.).

Order 14. Gavie (gulls, terns, and auks).

Order 15. Limicolæ (shore-birds, curlews, jacanas, etc.).

Order 16. Pterocletes (sand-grouse).

Order 17. Columbæ (pigeons, dodo, etc.).

Order 18. Psittaci (parrots, cockatoos, etc.).

Order 19. Striges (owls).

Order 20. Picariæ (cuckoos, rollers, kingfishers, bee-eaters, hoopoes, nightjars, swifts, humming-birds, woodpeckers, hornbills, and allies).

Order 21. Passeres (lyre-birds and song-birds generally).

See BIRD, and bibliography there given.

ORNITHOPHYLOUS PLANTS (from Gk. *ὄρνις*, *ornis*, bird + *φίλος*, *philos*, loving). Plants pollinated by means of birds, especially humming-birds. In Africa and some other parts of the world many species are so pollinated, but in most regions only a small number are fertilized in this way. The term is being replaced by bird-pollinated. See POLLINATION.

ORNITHOPODA. See DINOSAURIA.

ORNITHORHYNCHUS, *ὄρνι-θό-ρυγχος*, **ORNITHORHYNCHIDÆ.** See DUCKBILL.

ORNITHOSAURIA (Neo-Lat. nom. pl. from Gk. *ὄρνις*, *ornis*, bird + *σαῦρος*, *sauros*, lizard), or PTEROSAURIA. An order of extinct flying lizards in which the bones are hollow, the fore limbs admirably developed as wings, and the head more or less bird-like in form. They appeared in Jurassic time and continued to the end of the Cretaceous. Among the members of the group are the greatest flying creatures known to have ever lived. The genera are Dimorphodon, Ornithostoma, Pteranodon, and Rhamphorhynchus, all of which are described in the article on PTERODACTYL.

ORNITHOSTOMA (Neo-Lat. from Gk. *ὄρνις*, *ornis*, bird + *στόμα*, *stoma*, mouth). The greatest known flying creature that has ever lived, a winged reptile, found in the Cretaceous rocks of Kansas. See PTERODACTYL.

OROBUS (Neo-Lat. from Gk. *ὄροβος*, Lat. *errum*, OHG. *arawiz*, *arwiz*, Ger. *Erbse*, vetch). A name formerly applied to a genus of plants of

the natural order Leguminosæ, allied to vetches, and sometimes called bitter vetch, but now merged with *Lathyrus* (q.v.). The species are perennial, chiefly natives of Europe. They afford good food for cattle. *Lathyrus montanus*, a European species, with racemes of purple flowers, is especially common in hilly districts. The stem is unbranched, erect, about a foot high, with narrow membranous wings, the root swelling out at irregular intervals into sweet liquorice-flavored tubers, which are boiled or roasted in Holland, Belgium, Scotland, and other countries.

OROCHONES, ô-rô-chô'nâz. A people of the eastern Amur in Asia, of the Tungus type. The term Orochon is said to be applied by the Manchus to the Tunguses in general.

OR'ODUS (Neo-Lat., from Gk. ὄρος, *oros*, mountain + ὀδούς, *odous*, tooth). Fossil shark teeth of Carboniferous age. See SHARK, Fossil.

OR'OHIP'PUS (Neo-Lat., from Gk. ὄρος, *oros*, mountain + ἵππος, *hippos*, horse). An ancestor of the horse in the Middle Eocene period. See HORSE, Fossil.

O'ROIDE, or **O'REIDE** (from Fr. *or*, from Lat. *aurum*, gold + Gk. εἶδος, *eidos*, form). A variety of brass originally invented in France as a substitute for ormolu, and resembling gold. The substances used in making it are: Copper, 100 parts; tin or zinc, 17 parts; magnesia, 6 parts; ammonium chloride, 3.6 parts; lime, 1.8 parts; and crude argol, 9 parts. The copper is melted, then the magnesia, ammonium chloride, lime, and argol are added, little by little, and briskly stirred for about half an hour. The tin or zinc is added lastly in small quantities at a time until all is fused. The crucible is then covered and fusion is maintained for half an hour, when the dross is skimmed off, and after cooling the alloy is ready for use. Oroide has a fine grain, is malleable, and is capable of being brilliantly polished. It finds extensive use as a substitute for gold in the manufacture of cheap jewelry.

OROMA, ô-rô'mâ. An African people. See GALLAS.

O'RONO. A town in Penobscot County, Maine, 8 miles northeast of Bangor, on the Penobscot River, and on the Maine Central Railroad (Map: Maine, F 6). It is the seat of the University of Maine (q.v.) and State Experiment Station, and has manufactures of lumber, pulp, and paper. Settled in 1774, Orono was incorporated first in 1806. The government is administered by town meetings. Population, in 1890, 2790; in 1900, 3257.

ORONTES, ô-rôn'têz (Lat., from Gk. Ὀρόντης). The ancient name of a river in Syria, now called Nahr-el-Asi. It rises in the Lebanon Mountains and flows northward as far as the city of Antioch, and then westward to the Mediterranean Sea (Map: Turkey in Asia, F 4). Its length is about 250 miles. Its lower course is remarkably beautiful, with high rocky banks crowned with luxuriant foliage. Near its source stands an ancient monument.

ORONTIUS FINEUS, ô-rôn'shî-ûs fi-nê'ûs (1494-1555). A French mathematician (named Oronce Fine, or Finé), born at Briançon. He was called the 'restorer of mathematical science' in France. A chair of mathematics was created for him in 1532 at the Collège de France. Here he

wrote his most famous work, entitled *Protomathesis* (1532), consisting of four books on arithmetic, two on geometry, five on cosmography, and four on gnomonics.

OROOMIAH, ô'rôô-mê'îl. A town and lake in Persia. See URUMIAH.

O'ROONO'KO, or **THE ROYAL SLAVE**, **THE HISTORY OF**. A novel by Mrs. Aphra Behm, about 1660. The hero was an African prince, a slave in Surinam, where the author knew him in her childhood. He was sold because of his marriage to Imoinda, a favorite of the King, but found her again a slave in the same colony. Oroonoko led an unsuccessful rising of the blacks, killed his wife, and was barbarously murdered by the colonists. A tragedy by Thomas Southerne, based on this novel, was performed in 1696.

OROPUS (Lat., from Gk. Ὀρωπός). A town in Northwestern Attica, on the border of Bœotia; celebrated for its temple and oracle of Amphiaraus. Its situation led to constant strife between the Thebans and the Athenians for its possession. The former held it B.C. 412-383 and 366-338. Subsequently the town seems to have been for a long time independent or reckoned in the Bœotian confederation. It had been restored to the Athenians before the second century A.D., for the traveler Pausanias includes it in Attica. The town lay on the seacoast in a little plain, but the temple of Amphiaraus was about four miles inland, in one of the beautiful wooded valleys which abound in this region, on a terrace above a little stream. It was excavated by the Greek Archaeological Society in 1884-87. It contained a temple and altar, a colonnade, and small theatre, and we hear also of baths for men and women, and other buildings for the sick, who came to consult the god, but of these no certain remains have been found. Many inscriptions show the popularity of the place and throw light on the organization and ritual. It was a resort of the sick, for Amphiaraus was a god of healing, and, like Æsculapius, prescribed for his worshippers through dreams. He was also a seer and might be consulted on other affairs. The inquirer, after paying a fee and offering sacrifice, slept in the temple, and his dreams contained the answer to his question. The fame of the shrine was such that Sulla granted the dwellers on the territory of the god exemption from taxation, and his action was later (B.C. 73) confirmed by the Senate after a hearing by the consuls. See Prelle, "Ueber Oropos und das Amphiareion," in *Berichte der sächsischen Gesellschaft der Wissenschaften* (Leipzig, 1852); Frazer, *Pausanias*, vol. ii. (London, 1898); Dürrbach, *De Oropo et Amphiarai sacro* (Paris, 1890). The excavations are described and the inscriptions published in the *Praktika* of the Greek Archaeological Society for 1884, 1887, 1890, and the *Ephemeris Archaeologica* (Athens, 1884-92).

OROSHAZA, ô'rôsh-hâ-zô. A market-town of Hungary, in the County of Békés, 33 miles northeast of Szegedin (Map: Hungary, G 3). The chief occupations are cattle-raising and viticulture. Population, in 1890, 20,000; in 1900, 21,385, mostly Magyars.

ORO'SIUS, **PAULUS**. A Spanish cleric and historian. He was born at Tarragona, in the latter part of the fourth century. He went to Africa in 415 to get the advice of Augustine at Hippo as to the suppression of heresy in

Spain, and thence, on Augustine's advice, to Palestine to consult Jerome, then living at Bethlehem. He went back to Africa in 416, and is heard from in 417, but the date and place of his death are unknown. His chief work, the *Adversus Paganos Historiarum Libri vii.*, was intended to refute the current notion that the misfortunes of the Roman Empire and the wretchedness of the masses were due to the anger of the gods at the abandonment of their worship and the profanation of their altars. The work is a trivial, inaccurate, uncritical miscellany of facts, yet it has obtained a place in literature from being a favorite text-book of universal history during the Middle Ages, and was translated into Anglo-Saxon by Alfred the Great (Eng. translation by Bosworth, London, 1858; also edited by Sweet, ib., 1883). Some manuscripts bear the title of *Hormesta* or *Ormista*, conjectured by some to be a corruption of *Or. m. ista.*, i.e. *Orosii Mundi Historia* (Orosius's History of the World). The *editio princeps* of the work is Augsburg, 1471. Other works are attributed to Orosius. Those with best reason are *Liber Apologeticus de Arbitrii Libertate*, and the *Commonitorium de Errore Priscillianistarum et Origenistarum*, an explanation of religious affairs in Spain addressed to Augustine. These three works are reprinted in Migne, *Pat. Lat.*, xxxi., but the best critical editions are, of the *Historia* and *Liber Apologeticus* by Zangemeister (Vienna, 1882); of the former alone, id. (Leipzig, 1889); of the *Commonitorium* by Scheps in his edition of Priscillian (Vienna, 1889).

OROTAVA, *ō-rō-tā'vā*. A town near the north coast of Teneriffe, one of the Canary Islands. It is picturesquely situated at the foot of a peak, in a remarkably fertile and healthful region. It has a beautiful church and a botanical garden. Its harbor is an open roadstead. It nevertheless exports considerable quantities of wine and cochineal. Population, in 1900, 9002.

OROZCO Y BERRA, *ō-rōs'kō & bër'rā*, MANUEL (1816-81). A Mexican historian and archaeologist. He was born in the City of Mexico; studied engineering and law; and in 1852 became director of archives. He suffered a short imprisonment under Juárez for accepting office from Maximilian. Journalism was his first step in literature, and in 1846 he had become editor of *El Porvenir*. He contributed to Andrade's *Diccionario universal de historia y geografía Mexicana*, and wrote: *Noticia de la conjuración del Manque del valle* (1853); *Geografía de las lenguas y carta etnográfica de México* (1864); and *Historia antigua de México* (1880-81).

ORPHAN, *THE*. A play by Thomas Otway (1680), in blank verse, based upon the love of two brothers for Monimia, the orphan ward of their father. It is a cruel tragedy, as gloomy as anything of Ford's, and the horror is even deepened by the occasional contrast of a lighter strain.

ORPHANS' COURT. See *SURROGATE*.

ORPHEUS, *ōr'fē-ūs* (Lat., from Gk. *Ὀρφεύς*, of uncertain origin; possibly connected with the Skt. *Rbhus*, divine artists in the Vedas, or, perhaps with greater probability, with Gk. *ὀρφ-*, *orph-*, dark). A Greek legendary musician, whose prominence is largely due to his connection with a body of religious teaching. According to the

common literary tradition, he was a Thracian, son of *Œagros* and *Calliope* or *Polyhymnia*, though some late writers name *Apollo* as his father. To him was attributed by some the invention of the lyre or of the cithara, while others held that these were given him by *Apollo*. Proverbial was the power of his music, which drew to him wild beasts, birds, and even fishes, calmed the winds and storms, stilled the raging of the sea, and turned back the course of rivers. His song also plays an important part in the stories connected with the voyage of the *Argonauts*, where he appears as priest and seer. Most famous, however, was his journey to the lower world to recover his wife, *Eurydice*, a legend which seems to have received its full development only in the late Alexandrian time. (See *EURYDICE*.) According to one version, Orpheus killed himself in his grief at the second loss of *Eurydice*; others said he was smitten by the thunderbolt of *Zeus* because his music by its magic power was breaking down the laws of nature. The most common version was that he was torn in pieces by the Thracian women, in their orgiastic worship of *Dionysus*. His members were flung into the sea, whence they were collected by *Calliope* and the *Muses* for burial amid the lamentations of all nature and the now remorseful women. Only the head floated across the sea to *Lesbos*, where it gave oracular responses from the cleft in which it lodged. The wonderful lyre was placed among the stars by *Zeus*, or inherited by *Musæus*, or dedicated in a temple of *Apollo*. Orpheus himself in the other world delighted the shades with his song.

There seem to be no representations of Orpheus in ancient art before the red-figured Attic vases of the earlier fifth century, where he appears simply as a singer among the Thracians, or as murdered by the women. From that time, however, the representations become more frequent, though they are most numerous in the later Hellenistic and Roman periods. Among the scenes represented, two are especial favorites in the later art: (1) The rescue or loss of *Eurydice*, as in the beautiful Attic relief of which the best example is in *Naples*, and others in *Rome* and *Paris*, and (2) Orpheus playing on his lyre, surrounded by the wild beasts, of which several examples occur among the *Pompeian* paintings, while for some reason not yet satisfactorily stated it was a favorite theme in early Christian art.

The importance of Orpheus was largely due to the mass of religious literature which was attributed to him from the sixth century B.C. The origin and exact nature of these writings and the character of the Orphic sects are among the most intricate and perplexing questions in the history of Greek religious thought, nor is there any general agreement among scholars as to the detailed answers. It seems clear that, amid the general unrest which characterized Greek thought during the sixth century, leading to the speculations of the *Ionian* physicists and other early philosophers, to the practical maxims of the *Seven Wise Men*, and other manifestations of distrust as to the earlier beliefs, there sprang up teachers who professed to be able to purify the soul from the sins of this life, and secure it happiness in the world to come. Among the doctrines and rites for securing this happiness, those taught in poems attributed to Orpheus seem to

have enjoyed the widest popularity and to have influenced largely the thought and life of the time, furnishing more than mere suggestions to Pythagoras and Xenophanes. The votaries submitted to purification by various rites, including the sprinkling with blood, and were required to govern their lives by strict rules, which included abstinence from all animal food and beans, and forbade the wearing of any garment containing wool. Those who were initiated and followed the precepts of the master might hope to escape the horrors of Tartarus, and enjoy the bliss of the righteous, as described in a poem which narrated fully the journey of Orpheus to the other world, and the revelations there received by him. Gold plates containing verses from this poem have been found in graves in Lower Italy, obviously buried with believers to guide them in their journey to the world beyond. It is not clear that there was a large and organized Orphic sect. Rather the teachings and especially the rites seem to have been in the hands of wandering priests, many of whom possessed a very doubtful reputation among the thoughtful, who regarded them as impostors greedy only for gain. On the other hand, there can be little doubt that, according to the common practice among the Greeks, the believers in these teachings formed religious societies. There seems no satisfactory evidence that Orpheus was regarded as a god by these people, for their worship centred around Dionysus, and their beliefs and practices were based on a system which seems to have been set forth in a *Theogony*, attributed to Orpheus, and of which many fragmentary citations have been preserved. It is in part an effort to combine the Bacchic worship of Dionysus, the omnipresent god, with the Greek conception of the supremacy of Zeus. In the beginning were Chaos, Cronos (Time), and Æther. From Chaos and Æther Cronos produced a silver egg, from which came Phanes, the creator of all things, who is also Dionysus. After he had produced the heaven and earth and all things thereon, he retired from sight, but after the world of the gods had grown up Zeus swallowed Phanes, and thus this Dionysus became wholly a part of Zeus. The son of Zeus and Persephone was Dionysus Zagreus, who was to succeed his father, but who was enticed away by the hostile Titans, torn in pieces, roasted and eaten. The heart alone was rescued and brought by Athena to Zeus, who placed it in the third Dionysus, son of Semele. He also consumed the Titans with his thunderbolt, and scattered the ashes through the world, which thus became pervaded by Dionysus. The soul is immortal, and at death passes to Hades to be punished or rewarded, and then after a time to be reborn in animal or man, according as its former life has been evil or good. Through initiation and pure living the soul may safely pass the perils of the lower world and the judgment, and when it has three times been acquitted of all guilt, it is freed from the round of rebirths and passes to the Islands of the Blessed.

Of the large mass of literature which passed under the name of Orpheus, only a small collection of late pieces has survived, the so-called *Orphica*, including the *Argonautica*, a short hexameter poem of 1384 verses, on the voyage of the Argo, with special reference to the deeds of Orpheus; the *Lithica*, in 768 verses, containing a

discourse of Orpheus on the wondrous properties of stones; and 88 hymns to gods and natural powers. The first two works can hardly be earlier than the fourth century A.D., and most of the hymns are also late, though they may well contain earlier elements.

The scientific treatment of the Orphic mysteries was begun by Lobeck, *Aglaophamus* (Königsberg, 1829), whose work is still of great value. Consult also: Kern, *De Orphei Epimenidis Pherecydis Theogoniis* (Berlin, 1888); Maass, *Orpheus* (Munich, 1898), to be used with great caution. For the *Orphica*, see Herrmann, *Neue Heidelberger Jahrbücher*, vi. (Heidelberg, 1896). For the *Orphica*, see Herrmann, *Orphica* (Leipzig, 1805); Abel, *Orphica* (Berlin, 1885); Dieterich, *De Hymnis Orphicis* (Marburg, 1891). Consult: Knapp, *Ueber Orpheusdarstellungen* (Tübingen, 1895); Heussner, *Die altchristlichen Orpheusdarstellungen* (Leipzig, 1893).

ORPHEUS C. KERR. The nom-de-plume of Robert Henry Newell, intended to represent the sound of 'office-seeker.'

ORPIMENT. See ARSENIC.

ORR, or, HUGH (1717-98). An American inventor. He was born in Lochwinnoch, Renfrewshire, Scotland, but at the age of twenty emigrated to the United States, and in 1739 settled at Bridgewater, Mass., where he worked as a gunsmith and manufacturer of edged tools. The five hundred muskets produced by him for the province are said to have been the first of American make. During the Revolutionary War his foundry cast for the United States Government quantities of cannon and cannon-balls. Among his numerous inventions was a machine for the cleaning of flax.

ORR, JAMES (1844-). A Scotch theologian and Church historian, born and educated in Glasgow. From 1874 to 1891 he was pastor at Hawick, and for the ten years following was professor of Church history in the Theological College of the United Presbyterian Church, from which post he went to Glasgow College to a chair of apologetics and theology. He visited America in 1895 and lectured at Chicago on modern German theology, and again in 1897, when he lectured at Allegheny and Auburn Theological seminaries. Dr. Orr took a prominent part in promoting union between the Free and Presbyterian Churches. His publications include: *The Christian View of God and the World* (1893); *Ritschlian Theology and Evangelical Faith* (1897); *Neglected Factors in the Study of the Early Progress of Christianity* (1899); *Early Church History and Literature* (1901); and *Progress of Dogma* (1902).

ORR, JAMES LAWRENCE (1822-73). An American political leader, born at Claytonville, S. C. He graduated at the University of Virginia in 1841, and was admitted to the bar two years later. The next year he was elected to the State House of Representatives, and from 1849 to 1859 represented his district in Congress. During his last term at Washington, he was Speaker of the House, and used his power to favor the Lecompton Constitution of Kansas and other measures of the slave power. Though a strong partisan of State's rights, he dreaded the consequences to South Carolina which he foresaw would follow the ordinance of secession passed by the conven-

tion of 1860, of which he was a member. After its passage, however, he accepted the appointment as one of the three commissioners sent to Washington to treat for the transfer of Federal property within the State, and after his return organized and commanded Orr's Regiment of South Carolina Rifles. Before they had seen any real service, however, he resigned his commission in 1862 to enter the Confederate Senate, of which he continued to be a member until the end of the war, when he was elected Governor of South Carolina as a Republican. Later he was for a time United States Circuit Judge, and from 1873 until his death was United States Minister to Russia.

ORRENTE, *ôr-rân'tâ*, PEDRO (c.1570-1644). A Spanish painter, born at Montealegre, Province of Murcia. He probably was a pupil of El Greco at Toledo, but was an imitator of Jacopo da Ponte, after whose manner he painted chiefly Scriptural subjects, in which animals and landscape could suitably be introduced. Hence he was called the Spanish Bassano. He worked at Toledo, Murcia, and Valencia, where he established a prosperous school, then at Cuenca, Madrid, and Seville. Although he treated all kinds of subjects, he is the chief painter, among the Spaniards, of cattle, sheep, and other animals. The best of eight pictures by him in the Madrid Museum include the "Sacrifice of Isaac," "Repose of Lot's Family," and "Adoration of the Shepherds." The Dresden Gallery contains "Jacob Lifting the Stone from the Well" and the Vienna Museum, "Christ Healing the Sick" and "John the Baptist." An excellent portrait of himself is in the Louvre.

ORRERY. An astronomical instrument, showing the motions of the planets round the sun, and of the satellites round their planets, which was in high repute during the eighteenth and beginning of the nineteenth centuries, though now regarded as a mere toy. The orrery was probably invented by Graham, but named after Charles Boyle, Earl of Orrery in Ireland. It is a combination of the old planetarium (q.v.) with other machines which showed the motions of the earth, moon, and planetary satellites. Though the construction of a machine which would exhibit accurately the motions, distances, and magnitudes of the planets is impossible, yet an orrery is in some degree useful as giving a general notion of the way in which the planetary motions are performed.

ORRERY, EARLS OF. See BOYLE.

ORRIS ROOT (probably a corruption of *Iris* root). The rootstock (rhizome) of certain European species of *Iris* (q.v.), namely *Iris Florentina*, *Iris Pallida*, and *Iris Germanica*, the first of which yields the principal supply. Orris root was formerly used in many medical preparations as a stimulant, but is now almost entirely disused. It is sometimes chewed to sweeten an offensive breath. In drying it acquires a pleasant smell of violets, on which account it is used in perfumery.

ORSAY, *ôr'sâ'*. ALFRED GUILLAUME GABRIEL, Comte d'. See D'ORSAY, ALFRED GUILLAUME GABRIEL, COUNT.

ORSEILLE, *ôr'sâ'y'*. See ARCHIL.

OR'SHA. A town in the Government of Mohilev, Russia, situated on the Dnieper, about 45

miles north of Mohilev. It trades in grain to a considerable extent. Population, in 1897, 13,161.

ORSI, *ôr'sê*, ACHILLE D' (1845—). An Italian sculptor, born at Naples, where he studied at the Royal Institute, and in 1875 won a stipend which enabled him to supplement his artistic training in Rome. At the international art exhibition of 1877, in Naples, a life-size group, "The Parasites," attracted universal attention by its vigorous characterization and detailed realistic treatment. His "Proximus Tuus," representing an exhausted peasant, found its way into the National Gallery in Rome.

ORSINI, *ôr-sê'nê*. A noble family of Rome, celebrated as the champions of the Guelphic cause against their hereditary enemy, the Colonna (q.v.). They trace their origin to the early centuries of the Christian Era, but first appear prominently toward the end of the twelfth century, when a member of the house was elected to the Papal throne as Celestine III. Their strife with the Colonna frequently plunged the city into turmoil, and their rule, like that of their rivals, pressed heavily on the inhabitants. The line of the Orsini divided into the seven branches of Pitigliano, San Savino, Tagliacozzo, Angiullara, Oppido, Bracciano, and Mentana. The only surviving branch is that founded in Naples by Francesco, first Duke of Gravina. The members of the family who attained especial distinction were: GIOVANNI GAETANO ORSINI, who became Pope as Nicholas III. and PIETRO FRANCESCO DEGLI ORSINI, who ascended the Papal chair as Benedict XIII.—PAOLO ORSINI was a famous condottiere of the first half of the fifteenth century, and fought against Ladislas of Naples and Francesco Sforza. VIRGINIO ORSINI (died 1497) fought for the Papacy under Sixtus IV., and against it under Alexander VI. He made common cause with Charles VIII. of France in 1494, and was punished by imprisonment at Naples, where he died. RENZO DA CERI (died 1536) was a general in the service of Francis I. of France, and fought against the Emperor, Charles V. He conducted the defense of Rome against the Imperialist troops in 1527, and after the storming of the city held out for some time in the Castle of Saint Angelo. PAOLO GIORDANO ORSINI, Duke of Bracciano, was the husband of the unfortunate Virginia Accoramboni (q.v.).—ANNE MARIE DE LA TRÉMOUILLE (1635-1722), widow of Adrien Blaise de Talleyrand, Prince of Chalais, married, in 1675, Flavio Orsini, Duke of Bracciano, and became an ardent and skillful supporter of the French policy at the Papal court. In 1701 she went with Philip V. to Spain in the official capacity of mistress of the Queen's household, but in reality as the young King's adviser. She sought to establish the Bourbon throne in Spain on a firm basis by creating a national party in support of the new King, and with the exception of a short period of disgrace, exercised almost absolute power at the Spanish Court till the death of Philip's Queen. After the marriage of Philip V. to Elizabeth Farnese she retired from Madrid, and lived in Holland, Genoa, and Rome. Consult: Litta, *Famiglie celebri italiane*, vol. viii. (Milan, 1819 et seq.); Combes, *La princesse des Ursins* (Paris, 1858).

ORSINI, FELICE (1819-58). An Italian revolutionist, born in Meldola, and known for his attempt on the life of Napoleon III. While a

youth he engaged in conspiracies for the liberation of Italy, and in 1844 was condemned to the galleys for life. He was released in 1846, and took an active part in the revolution of 1848-49, fighting at Rome and Venice, and carrying on the revolutionary propaganda at Genoa and in the Duchy of Modena. Forced to flee the country, he found refuge in England, where he supported himself by lecturing and published *The Austrian Dungeons in Italy* (1856). In 1857 he went to Paris with the intention of assassinating Napoleon III., whom Orsini regarded as the greatest obstacle to the liberation of Italy. On the evening of January 14, 1858, as the carriage containing the Emperor and the Empress was drawing up before the opera house, Orsini and three companions, Pieri, Rudio, and Gomez, exploded a number of bombs, killing ten of the bystanders and wounding one hundred and fifty. The Emperor and Empress escaped unhurt. The conspirators were seized, tried, and sentenced, Orsini, Pieri, and Rudio to death, and Gomez to imprisonment for life. Rudio's life was spared at the intercession of the Empress, but Orsini and Pieri were executed on March 13, 1858. Consult: *Memoirs of Felice Orsini, Written by Himself* (Edinburgh, 1857); Montazir, *Felice Orsini* (Turin, 1862).

ORSK, örsk. A town of Eastern Russia in the Government of Orenburg, situated on the Ural River, 140 miles east of Orenburg. It has brick-kilns and tanneries, and is a trade centre of some importance. Population, in 1897, 14,036.

ORSON. See VALENTINE AND ORSON.

ORSOVA, ör'shó-vő. A frontier town of Hungary, situated on both sides of the Cerna at its confluence with the Danube, on the Rumanian boundary, 94 miles east of Belgrade (Map: Turkey in Europe, D 2). Old Orsova, on the west bank of the Cerna, has a new harbor, with quarantine station, and is a free port, a first-class port of entry, and one of the principal stations for the steamers on the Danube. Its population in 1900 was 4610. New Orsova, on the east bank, is inhabited chiefly by Turks, its population being about 3000, and was formerly a Turkish fortress, but has been held by Austria since 1878.

ORTEGAL, ör'ta-gäl', CAPE. See CAPE ORTEGAL.

ORTELIUS, ORTEL, or **OERTEL**, êr'têl, ABRAHAM (1527-98). A Flemish geographer, born at Antwerp. He was the author of the famous atlas, *Theatrum Orbis Terrarum* (1570), long authoritative throughout Europe; *Thesaurus Geographicus* (1596); *Itinerarium per Nonnullas Galliarum Belgicarum Partes* (1584); and other geographical works. Philip II. of Spain recognized his merits, and appointed him royal geographer in 1573.

ORTH, ört, AUGUST (1828-1901). A German architect. He was born at Windhausen, Duchy of Brunswick, and educated at the Collegium Carolinum in Brunswick (1850-55), and at the Academy of Architecture in Berlin, where he also frequented the studio of Strack, and in 1856 won the Schinkel prize. After a visit to Italy in 1859, he was active principally in Berlin, where, besides such public buildings as the Görlitz railway station and the Cattle Market, the erection of several church edifices claimed more especially his attention. These comprise the "Zionskirche"

(1866-73), the "Dankeskirche" (1884), the "Friedenskirche" (1891), the "Himmelfahrtskirche" (1891-93), and the "Emmauskirche" (1893), in all of which the architect endeavored to modify Romanesque forms of style according to modern proportions and exigencies.

ORTH, őrth, GODLOVE STONER (1817-82). An American legislator, born in Lebanon County, Pa. He graduated at Pennsylvania College, studied law, was admitted to the bar in 1839, and in the same year began to practice in Indiana. He represented his district in the Indiana State Senate for six sessions (1842-48) and was for one year president of that body. In 1861 he represented Indiana at the Peace Conference. In the Civil War, as captain of volunteers, he commanded the ram *Horner* in defensive cruises along the Ohio in 1862. Elected to Congress from Indiana, he served from 1863 to 1871, and from 1873 to 1875; framed the 'Orth Bill,' which reorganized the diplomatic and consular systems; and resigned his seat to accept the mission to Austria. After his return he again served in Congress from 1879 until his death.

ORTH, JOHANN. See JOHN NEPOMUK SALVATOR.

ORTH, ört, JOHANNES (1847—). A German pathologist. He was born at Wallmerod, and studied under Rindfleisch at Bonn and Virchow in Berlin. In 1887 he became professor of pathology at Göttingen, and in 1902 succeeded Virchow at Berlin. His works are: *Compendium der pathologisch-anatomischen Diagnostik* (1876; 6th ed., 1900); *Cursus der normalen Histologie* (1878; 5th ed., 1888); *Lehrbuch der speziellen pathologischen Anatomie* (1887-93, incomplete); and *Medizinischer Unterricht und ärztliche Praxis* (1898).

ORTHERIS, STANLEY. A character in Kipling's *Soldiers Three*, and other tales of English army life in India. Mulvaney, Learoyd, and he are, in a way, 'Three Guardsmen' of to-day. In this little Londoner, Kipling has immortalized the Cockney, and given an actual type of the British soldier.

ORTHIS (Neo-Lat., from Gk. ὀρθός, *orthos*, straight, correct). An important extinct genus of hinged brachiopods very common in the Paleozoic formations of all parts of the world. The shells are usually rounded in outline, the valves generally convex, through the dorsal valve is flat in some genera, the cardinal area is well developed, and the hinge is a ball and socket mechanism. The several hundred known fossil species have been distributed among a number of new genera and subgenera, of which the more important are *Dalmanella testudinaria* of the Trenton limestone, *Bilobites biloba* of the Niagara beds of North America, and the Gotlandian beds of Europe, *Platystrophia bifurcata* of the Ordovician of America and Europe, *Rhipidomella vanuxemi* of the Hamilton group, and *Schizophoria striatula* of the Devonian. The period of greatest development of the orthids was during the Middle Paleozoic, and they died out toward the end of the Carboniferous period.

ORTHOCERAS, ör-thós'ê-rás (Neo-Lat., from Gk. ὀρθός, *orthos*, straight, correct + κέρας, *keras*, horn). A genus of fossil nautiloid cephalopods, characterized by straight conic shells, whose surface may be either smooth or trans-

versely striated. The interior of the shells is divided into chambers by simple transverse septa, and there is a median siphuncle. The members of this genus, which range from the Silurian to the Triassic periods, are of much importance as index fossils. The limits of the genus as defined by the majority of writers have been so broad as to include almost all of the straight-shelled Paleozoic cephalopods, and the assemblage of species thus brought together was found by Hyatt and other investigators to contain species that belong more properly in a number of different families and several new genera. All of the straight-shelled forms are now classed together in an artificial group as orthoceracones, in distinction to the curved shells or cyrtoceracones. The orthoceracones are in general antecedent to the cyrtoceracones in each family or race. They appear first in the Upper Cambrian and are very abundant in the Ordovician rocks, where *Orthoceras titan* of the Black River limestone, with a length of about ten feet, is the largest known form of this group of cephalopods. During the Ordovician the orthoceracones gave rise to several derived genera of curved and coiled shells, and to shells with peculiarly restricted apertures. Some of these forms gave rise to side lines of evolution that flourished for variable periods of time, such as *Cyrtoceras*, *Gyroceras*, *Lituites*, *Phragmoceras*, and *Ascoceras*. *Nautilus* itself, which has persisted to the present day, was derived in early Ordovician times from one of these orthoceracones through a curved shell like *Cyrtoceras*. During the Silurian, Devonian, and Carboniferous periods the orthoceracones diminish in both size and number, and they disappear during the Trias. The derivation of *Belemnites* of the Mesozoic from some Paleozoic orthoceracones is considered by some authors to have taken place through the formation by the orthoceras of a heavy deposit of lime upon the apical portion of its shell, this serving as a post to anchor the shell in an upright position in the mud of the sea bottom. Consult: Ruedemann, "Professor Jaekel's Theses on the Mode of Existence of *Orthoceras* and Other Cephalopods," *American Geologist*, vol. xxxi. (Minneapolis, 1903); Von Zittel and Eastman, *Text-book of Paleontology*, vol. i. (New York and London, 1900). See CEPHALOPODA; NAUTILUS.

ORTHOCLASE (from Gk. *ὀρθός*, *orthos*, straight, correct + *κλάσις*, *klasis*, fracture, from *κλάν*, *klan*, to break). One of the monoclinic feldspars, composed of potassium-aluminum silicate. It has a vitreous lustre, and is either colorless or white, though occasionally light yellow or red, and sometimes green. It usually occurs in crystalline rocks, and is an essential constituent of granite, gneiss, syenite, porphyry, etc. The several varieties of orthoclase include *adularia*, a transparent or translucent variety that shows when polished chatoyant or pearly reflections, the best varieties of which are cut into gems and are known as 'moonstones'; *aventurin*, a similar variety with red and yellow internal reflections, due to minute scales of occluded minerals, the green varieties being known as 'sunstones'; *perthite*, a flesh-red variety containing layers of albite and often yielding bright golden-yellow reflections; and *variolite*, a dark-green variety, which takes its name from its supposed power to cure smallpox.

ORTHO'EPEY (Gk. *ὀρθοεπεία*, *orthoepcia*, correct speaking, from *ὀρθοεπεῖν*, *orthocpein*, to speak correctly, from *ὀρθός*, *orthos*, straight, correct + *ἔπος*, *epos*, word). That part of grammar which treats of the correct pronunciation of the words of a language.

ORTHOGENESIS (Gk. *ὀρθός*, *orthos*, straight, correct + *γένεσις*, *genesis*, origin). Generation according to ordinary processes, as distinguished from such aberrant courses of development as parthenogenesis, alternation of generations, and other special modes.

ORTHOGONAL. See PROJECTION.

ORTHOGRAPHY (Lat. *orthographia*, from Gk. *ὀρθογραφία*, correct writing, from *ὀρθός*, *orthos*, straight, correct + *γράφειν*, *graphein*, to write). The art of writing words correctly, as regards spelling. The word is seldom used in an absolute sense—that is, with the meaning of spelling which is scientifically correct—since outside of the discussions of phonetists (see PHONETICS) such spelling does not exist; it ordinarily signifies merely the art of spelling in accordance with accepted or prevailing usage, and also such customary spelling itself. See SPELLING and SPELLING REFORM.

ORTHOGRAPHY, FIGURES OF. Deviations from the ordinary accepted spelling of words. They are three in number; *archaism*, *crasis*, and *mimesis*. *Archaism* consists in spelling words according to a usage which is obsolete or obsolescent, as if one should write, "The *gret Kyng hathe fifty fair damyselles alle maydenes*." So Vergil has *olli for illi*, Horace *duellum for bellum*. *Crasis* (Gk. *κράσις*, a mixing) in Greek grammar denoted the mixing of two words by the coalescence of their final and initial vowels into one long syllable. Thus *τὰ ἀνδρά* became *τὰνδρά*. The occurrence of crasis is indicated by the *coronis* (') placed over the vowel or diphthong of the resulting long syllable. In Latin grammar the term crasis was applied to the union of any two vowels into a long vowel or diphthong, and so became synonymous with contraction. Examples of crasis in Latin are *cogo* (for *coago*), *nil* (for *nihil*), *cors* (for *cohors*). *Mimesis* (Gk. *μίμησις*, imitation) consists in the representation of the improper pronunciation of words by means of false spelling. *Mimesis* is common in works which profess to represent the speech of the illiterate, or which introduce characters who use dialect, or negro speech.

ORTHOPÆDICS (from Gk. *ὀρθός*, *orthos*, straight, correct + *παῖς*, *pais*, child). The prevention or correction of deformity, especially in children. See CLUB FOOT; KNOCK KNEE; LEG; POTT'S DISEASE; DEFORMITIES.

ORTHOPHOSPHORIC ACID. See PHOSPHORIC ACID.

ORTHOP'ODA (Neo-Lat. nom. pl., from Gk. *ὀρθός*, *orthos*, straight, correct + *πούς*, *pous*, foot). An order of dinosaurs, in the system of Gadow, embracing the groups *Stegosauri* and *Ornithopoda* of Marsh. See DINOSAURIA.

ORTHOPTERA (Neo-Lat. nom. pl., from Gk. *ὀρθόπτερος*, having upright wings, from *ὀρθός*, *orthos*, straight, correct + *πτερόν*, *pteron*, wing). A large and important group of insects comprising the forms known as the straight-winged insects, and including the grasshoppers or true locusts, long-horned grasshoppers (in-

cluding katydids), crickets, cockroaches, walking-sticks, and leaf-insects, and the praying mantis or rear-horse (qq.v.). The mouth parts are fitted for biting, and the metamorphoses are incomplete, the young when first hatched closely resembling the adult insects except in lacking wings. The eggs are few in number, and as a rule are laid in specialized egg-cases, although with some they are deposited without such cases, and with a few are scattered singly. The fore wings are somewhat thickened, but are not as tough as the wing-cases of beetles, and when at rest lie closed upon the back so as to protect the abdomen and the hind wings. They are known as 'tegmina.' The hind wings function in flight, and are delicate and usually folded like a fan. About 10,000 species exist, which makes it a small order when compared with the Hymenoptera, the Coleoptera, and the Lepidoptera, but, in spite of the comparatively small number of eggs, many of the species are tenacious of life and apparently very prolific, and swarm in enormous numbers of individuals, as in the case of the destructive and migratory locusts. One of the striking peculiarities of the order is that we find here most highly developed the ability to produce sounds of a more or less musical character, by rubbing one part of the body, modified for the purpose, upon another. This capability thus to make sounds is confined to the male sex, and its object is to attract the female; and this ability belongs only to the families which jump (the Saltatoria); the runners, walkers, and graspers (Cursoria, Gressoria, and Raptoria) make no sound, but in these groups the phenomena of protective and aggressive resemblances are very highly developed, especially in the tropical forms. In these groups the wings seem to be of little use as organs of flight, but they are of striking value in ornamentation and in concealment. This is especially true with the Phasmidæ and Mantidæ, where the effectiveness of color and pattern is extraordinary, the tegmina resembling plant structures with remarkable minuteness of detail. Even the eggs are so modified as to resemble the seeds of plants.

Orthoptera are among the oldest of fossil insects. Cockroaches were numerous and varied in Paleozoic time, and the other families are numerous represented in Mesozoic and Tertiary rocks.

Consult: Sharp, *Cambridge Natural History* (London, 1895); Comstock, *Manual for the Study of Insects* (Ithaca, 1898); Howard, *The Insect Book* (New York, 1902); Lugger, *Annual Report of the State Entomologist of Minnesota* (Minneapolis, 1898); Scudder, *North American Orthoptera* (Cambridge, 1897).

ORTIGUEIRA, ôr'tâ-gâ'e-râ. A town in the Province of Coruña, Spain, picturesquely situated in a beautiful valley at the head of a land-locked bay 23 miles northeast of Ferrol. The harbor is well sheltered, but shallow, and has no wharves; the town is chiefly noted for its romantic surroundings and for the good sea-bathing afforded. Population (commune), in 1887, 17,563; in 1900, 18,975.

ORTLER, or ORTLER SPITZE. The highest peak of the Austrian Empire, on the border of Tyrol, 68 miles southwest of Innsbruck. It rises to a height of 12,790 feet from the northern portion of the Ortler group, in the chain of the Rætian Alps. It was first ascended in 1804.

The view from the summit is the most imposing of the Eastern Alps.

ORTOLAN (Fr. *ortolan*, from It. *ortulano*, *ortolan*, gardener, from Lat. *hortulanus*, gardener, from *hortus*, garden). A European bunting (*Emberiza hortulana*) having a plumage of mixed browns, black, and white. It appears in the autumn in great flocks on both coasts of the Mediterranean Sea, when it returns from its summer home and breeding places in the far north. No bird is so highly esteemed by epicures, and vast numbers are used for the table. It is taken chiefly by nets. See Plate of BUNTINGS.

In America the name is given to both the bobolink ('reed-bird') and the sora-rail, neither of which has the slightest relation to an ortolan, but both of which are small birds, much sought after in the fall in the Middle States, as a delicacy.

ORTON, EDWARD (1829-99). An American educator and geologist. He was born in Deposit, N. Y., graduated at Hamilton College in 1848, and studied at Lane Theological Seminary, at the Lawrence Scientific School, Harvard, and at Andover Theological Seminary. He taught successively at the State Normal School, Albany, N. Y., at the Chester (N. Y.) Academy, and at Antioch College, of which he was also president in 1872-73. He was first president of the Ohio Agricultural and Mechanical College (now Ohio State University) (1873-81), and was professor of geology there from 1873 to 1899. He was an assistant State geologist (1869-82), was State geologist (1882-99), served for a time on the geological surveys of the United States, of Kentucky, and of Kansas, and was president of the Geological Society of America (1896), and of the American Association for the Advancement of Science (1898-99). He was essentially an economic geologist, and specialized in the study of oil and gas, developing several well-known theories, notably the 'anticlinal theory,' and becoming widely known as an authority on the nature and geological occurrence of these products. He wrote portions of vols. i., ii., and iii. of the *Reports of the Ohio Geological Survey*, and a large part of vols. v., vi., and vii., besides numerous papers in the geological magazines and papers on petroleum, gas, and asphalt in the *Kentucky Geological Reports* (1891), and in the *Report of the United States Geological Survey* (1887).

ORTON, JAMES (1830-77). An American naturalist, born at Seneca Falls, N. Y. He graduated at Williams College in 1855, and then studied theology at the Andover Seminary. In 1860 he returned from an extensive trip through Europe and Palestine, and was ordained a Congregational minister. He became professor of natural science in Rochester University in 1866, in the next year he took charge of a scientific expedition across South America, and in 1873 took part in an expedition to Lima and Lake Titicaca. From 1869 to the time of his death he was professor of natural history in Vassar College. He published *The Miner's Guide and Metallurgist's Directory* (1849); *The Andes and the Amazon* (1870); and *Comparative Zoölogy* (1875).

ORTONA, ôr-tô'nâ. A town in the Province of Chieti, Italy, situated on the Adriatic, 12 miles east of Chieti (Map: Italy, J 5). It has a cathedral, a ruined castle, a harbor, and an

extensive trade in wine. Population, in 1881, 12,122; in 1901, 14,974.

ORTYGAN (Neo-Lat. *ortyx* (ortyg) + an, from Gk. *ὄρυξ*, quail). A button-quail, or bush-quail (q.v.) of the Old World genus *Turnix*, which includes a large number of diminutive game-birds of pleasing appearance and excellent qualities. These birds are called 'hemipods' in the older books.

ORTYGLIA, ὀρ-τίγ'τ-α. An ancient name of Delos (q.v.).

ÖRTZEN, ēr'tsen, GEORG, Baron (1829—). A German poet. He was born at Brunn, Mecklenburg-Strelitz; studied law, served in the Prussian Army (1850-55), and then entered the consular service. He was employed in New York (1879), Constantinople (1880), Marseilles (1881), and Christiania (1889), and retired in 1892. He wrote several volumes of verse, including: *Gedichte* (3d ed. 1861); *Aus den Kämpfen des Lebens* (1868); *Satiren und Glossen eines Weltmannes* (1874); *Epigramme und Epiloge in Prosa* (1880); *Eines Lyrikers Chronik* (1888); *Auf Schwarzwaldwegen* (1896); *Nacht* (1900); and *Symphonien des Windes* (1901). Under the pseudonym "Ludwig Robert" he published *Erlebnisse und Studien in der Gegenwart* (1875).

ORUBA. An island of the Dutch West Indies. See ARUBA.

ORURO, ὀ-ῤῥῶ'ró. A western department of Bolivia, bounded by the Department of La Paz on the north, Cochabamba on the east, Potosi on the south, and by Chile on the west (Map: Bolivia, D 7). Area estimated at 21,321 square miles. The surface is an elevated plateau, a part of the great Titicaca basin, and is interspersed with marshes and arid plains. The climate is cold and the soil mostly unfit for agriculture, though some cattle-raising is carried on. The mineral deposits of the State are rich, including tin, silver, and copper, which are profitably mined. The civilized population was officially estimated in 1898 at 130,000, including over 90,000 Indians. The capital is Oruro.

ORURO. The capital of the Department of Oruro, Bolivia, situated 9 miles east of the Desaguadero River, in a valley bordering an arid plain, 12,200 feet above sea level, and 120 miles southeast of La Paz (Map: Bolivia, D 7). A portion of the city is in ruins, and its former fine public buildings are in a decayed condition. A railroad connecting the town with Antofagasta on the Chilean coast has somewhat revived its importance, which is derived mainly from the valuable tin mines in the neighborhood. Population, 16,000. Oruro was founded in 1606.

ORVIETO, ὀρ-ῤῥῶ'tó. A town and episcopal see of Central Italy, in the Province of Perugia, with a station on the Rome-Florence Railroad, 60 miles northwest of Rome (Map: Italy, F 5). It occupies a strong position on a steep hill, 1165 feet high, accessible by an inclined railway, is well built, and is surrounded by walls. It has been the see of a bishop since A.D. 509. The cathedral, a beautiful specimen of the Italian Gothic, and one of the most richly decorated edifices in Italy, is of black and white marble; it was begun in 1290 and completed about the middle of the fourteenth century. The façade is unsurpassed in the beauty of its mosaics, sculptures, and elaborate ornamentation. The interior

is also finely decorated with sculptures and paintings. There are several other churches, chief of which is the Gothic San Giovenale, dating from the eleventh century. Other interesting features are the castle with the public garden and amphitheatre, Saint Patrick's Well, and the former Papal palace, or Palazzo Soliano, with a museum containing medieval works of art and a collection of antiquities, most of them found in an Etruscan necropolis between the town and the railroad station. The city trades in grain, cattle, silk, oil, and white wine. Population (commune), in 1881, 15,931; in 1901, 18,543. Orvieto, known in the Middle Ages as 'Urbs Vetus,' occupies the site of an ancient and wealthy Etruscan city. It was repeatedly a place of refuge for the popes.

ORYX, ὀ'ρίξ (Lat., from Gk. *ὄρυξ*, *oryx*, gazelle, pickaxe, from *ὀρύσσειν*, *orysscin*, to dig). A large antelope of Northern Africa (*Oryx leucoryx*), distinguished by its uniform whitish color, often reddish on the under part, and by the sabre-like curve of the great horns, which may touch the rump when the head is thrown back. These horns are able to sweep around with immense force and effect, and hunters find oryxes dangerous animals to approach when wounded. This species, which is confined to the Eastern Sudan and Nubia, is known by the Arabs as 'abu harte,' and represents the genus which includes the gemsbok, addax, beatrix antelope, beisa (qq.v.), and some other species of the desert and plains regions of Africa. The word 'oryx' among the ancients was the name of an antelope often represented on the monuments of Egypt, usually in profile, so that it seems to have but one horn. It is evident that one or another species of this genus was portrayed; and the fable of the unicorn may have arisen from these mural paintings.

ORZESZKOWA, ὀρ'zhesh-kō'vá, ELIZA (1842—). A Polish novelist. She was born near Grodno; at sixteen married a Polish noble, who was banished to Siberia in 1863; and after that time devoted herself to literature and the advocacy of woman's rights. Her more important novels are: *Eli Makower* (1874), which treats of the relations of the Jews to the Polish nobility; *Meir Ezofowicz* (1878), which bears upon the contest between Talmudic orthodoxy and liberal theology in a rural setting; *Lost Souls* (1886), and *Cham* (1888), sketches of life in White Russia; *On the Niemen* (1888), and *Bene Nati* (1892), both descriptive of the lesser nobility; as well as the earlier and more typical *Pan Graba* (1872). More recently she published *The Argonauts* (1889) and *The Votaries of Power* (1900). Her collected works, with a biography by Chmielowsky, appeared at Warsaw (1899).

OSAGE, ὀ-sāj', or ὀ'sāj (properly *Ouasage*, the French form of *Washashe*, or *Wasash*, the name used by themselves). An important Indian tribe of Siouan stock (q.v.), formerly holding an extensive area between the Missouri and Arkansas rivers, in what is now Missouri, Arkansas, Kansas, and the Indian Territory, and at present gathered upon a reservation in north-eastern Oklahoma. They are mentioned by Marquette as early as 1673, and through the colonial period generally acted as allies of the French against the other tribes, who seem almost without exception to have considered them as com-

mon enemies in whom no faith could be placed. Their principal wars were with the Cherokee and Chickasaw in the east and with the Kiowa, Cheyenne, Pawnee, and others on the plains. By successive cessions, beginning in 1808, they sold their original extensive territory until their removal to their present reservation in 1870, but through the aid of competent lawyers were able to secure such terms that they are now the richest tribe per capita in the United States, their annual income from invested funds and current leases being about \$600,000, or over \$300 for every man, woman, and child in the tribe. The result, however, has been rather detrimental than otherwise, tending to encourage dissipation and hinder industrial progress. From an estimated population of over 6000 a century ago they have diminished to 3000 in 1875 and 1790 in 1901, of whom only about 800 are full-bloods.

OSAGE. A city and the county-seat of Mitchell County, Iowa, 157 miles northwest of Dubuque, on the Red Cedar River, and on the Illinois Central and the Chicago Great Western railroads (Map: Iowa, E 1). It has the Sage Public Library, with 3000 volumes, and Cedar Valley Seminary; and near the city are the fair grounds of the County Agricultural Society. Osage is of considerable importance as the shipping point of a productive farming, stock-raising, and dairying section, and there are large nursery interests. The water-works are owned by the city. Population, in 1890, 1913; in 1900, 2734.

OSAGE ORANGE, or Bow Wood (so called from the Osage Mountains in Arkansas, of which it is a native), *Maclura aurantiaca*. A North American tree of the natural order Urticaceæ, which attains a height varying, according to soil and situation, from 20 to 60 feet. Its wood, which might probably be used for dyeing as a substitute for fustic (q.v.), is bright yellow, fine-



LEAVES AND FRUIT OF OSAGE ORANGE.

grained, and very elastic, and was much used by the North American Indians for making bows. The tree has been successfully used in many places as a hedge plant, its thorny stems forming an impenetrable barrier when properly trained. Its inedible fruit, which is about the size of a large orange, has a tuberculated surface of a golden color, and is filled internally with radiating somewhat woody fibres, and with a yellowish milky juice, the odor of which is generally disliked. The leaves of the Osage orange have been very successfully substituted for mulberry leaves in feeding silkworms.

OSAGE RIVER. A tributary of the Missouri. It rises in eastern Kansas, and flows in

a winding course eastward through the State of Missouri, emptying into the Missouri River a few miles below Jefferson City (Map: Missouri, C 3). It is about 500 miles long, and navigable at high water for 200 miles.

OSAKA, ô-sä'ká, or **OZAKA,** ô-zä'ká (Jap., contraction of *O-ye-saka*, the great estuary hill, in allusion to the rising ground on which the castle stands). An important manufacturing and trading centre of Japan, and one of the three Imperial cities. It is situated on the island of Hondo, on both banks of the Yodo River, the outlet of Lake Biwa (q.v.), and on the shores of Osaka Bay, in latitude 34° 42' N., and longitude 135° 31' E., 20 miles by rail from Kobe, and 27 from Kioto. It is built for the most part on low-lying level land. The city is intersected by the Yodo and numerous canals spanned by 1300 bridges, and has in consequence been styled the 'Venice of the East.' The streets are laid out with great regularity at right angles to each other, and are in the main narrow. The town has an average annual temperature of about 59° and a rather unhealthy climate.

Osaka has many industries, its principal manufactures being those of cotton, glass, and iron and steel products. Other important manufactures are boots and shoes, matches, tobacco products, clocks, etc. There is also considerable ship-building. A fine Government mint, for which 40 acres are used, was established here under foreign superintendence in 1871. In connection with it are a refinery and sulphuric acid works, which are a source of great profit to the Government. Osaka was opened in 1868 for foreign residence and trade, and a foreign settlement was laid out on the river island of Kawaguchi. The harbor, however, is poor and unsuited for large vessels, and Kobe has attracted most of the foreign trade, especially since the opening of the railway. The foreign settlement is, therefore, occupied for the most part by missionaries. Commercially Osaka is important chiefly in the internal trade, while in regard to foreign commerce it is only of slight importance in comparison with Yokohama and Kobe. The total foreign commerce of the port in 1901 amounted to over \$11,000,000, the bulk of the trade being in cotton goods. Small steamers ply regularly between Osaka and the ports of Shikoku and the Inland Sea.

There are many temples and places of interest in the city and vicinity. The chief is the castle, which is one of the most famous in Japan. It stands on high ground in that part of the city known as the Upper Town. At the end of the fifteenth century its site was occupied by the monastery and temples of the Shin-shiu sect of Buddhists, and was so strongly fortified by them that it defied the repeated attacks of the great general Nobunaga (q.v.). In 1583 Hideyoshi (q.v.) made it the seat of his power and erected within the citadel a palace, which was, as some authorities believe, the most magnificent building the world ever saw. It survived the attack of Iyeyasu (q.v.) against Hideyori, Hideyoshi's son, but was burned by Tokugawa retainers in the civil war of 1868. It now contains the headquarters of the Osaka military district. Population of city, in 1898, 821,235; of the fu, 1,311,909.

OSAWATOMIE. A city in Miami County, Kan., 61 miles south by west of Kansas City, Mo., on the Missouri Pacific Railroad (Map:

Kansas, H 3). It derives its name from two streams near by, the Osage and Pottawatomie. It is the seat of the oldest and largest State insane hospital, with accommodations for about 1200 patients, dating from 1866, and has a Masonic temple, the Agnew Opera House, a city hall, and city library, and a monument commemorating the battle of Osawatomie. The city is in an agricultural and stock-raising region, and has a supply of natural gas. Division headquarters and shops of the Missouri Pacific Railroad are maintained here. The government is vested in a mayor, elected biennially, and a council. There are municipal water-works. Osawatomie was one of the 'free-State' settlements made by the Emigrant Aid Society in 1855, and was prominent in the contest between the pro-slavery and anti-slavery elements in Kansas. For a time John Brown (q.v.) lived in the immediate vicinity of the town. On August 30, 1856, it was the scene of a sharp skirmish between a band of pro-slavery men and John Brown and his followers, and, after the latter had been dispersed, was almost completely destroyed by the former. Osawatomie was chartered in 1883 and in 1890 became a second-class city. Population, in 1890, 2662; in 1900, 4191.

OSBALDISTONE. In Scott's *Rob Roy*, the name of two cousins, Francis and Rashleigh. Francis marries Di Vernon and Rashleigh, the villain of the story, is killed by Rob Roy.

OSBORN, ɔz'börn, HENRY FAIRFIELD (1857—). An American geologist and paleontologist, born at Fairfield, Conn. He graduated at Princeton in 1877, and was appointed assistant professor of biology there in 1880, and professor of comparative anatomy in 1881. In 1890 he was made Da Costa professor of zoölogy in Columbia University, and was chosen curator of vertebrate paleontology in the American Museum of Natural History. Osborne's Western explorations resulted in great contributions to American paleontology and in remarkable additions to the collection of the American Museum. Of especial value are his reconstructions of prehistoric mammals, as painted by Charles Knight and displayed in the American Museum. In 1900 he was appointed paleontologist to the Canadian Geological Survey and to the United States Geological Survey. He wrote: *Evolution and Heredity* (1890); *From the Greeks to Darwin* (1894), an historical sketch of evolution; and *Hereditary Mechanism* (1895), and collaborated with W. B. Scott in the preparation of the work entitled *American Fossil Mammals*.

OSBORN, SHERARD (1822-75). An English naval officer, explorer, and author, born in Madras, India. Entering the British Navy in 1837, he soon rose to a captaincy, and served in Malayan and Chinese waters. On two Arctic expeditions (in 1850-51 and 1852-54) in search of Sir John Franklin, he commanded a vessel, and during a part of the Crimean War he was senior officer in the Sea of Azov. Ordered to Hong Kong in 1857, he took a spirited part in the war at Canton (1857-58). In 1864 he commanded the armor-plated *Royal Sovereign*, and in 1873 became rear-admiral. His writings include: *Stray Leaves from an Arctic Journal* (1852); *Quedah; or, Stray Leaves from a Journal in Malayan Waters* (1857); and *The Career, Last Voyage, and Fate of Sir John Franklin* (1865).

OSBORNE, ɔz'börn, FRANCIS (1593-1659). An English author. He was the son of Sir John Osborne, of Chicksands, Bedfordshire, lived in London, where he was employed by his father, who was at the head of the office of the Lord Treasurer's remembrancer, and about 1650 removed from North Farnbridge to Oxford. There he held minor office under the Commonwealth and lived uneventfully, gaining some fame and many influential friends in London after the publication of his *Advice to a Son* (1656-58). This popular work was published anonymously. It contained a series of pithy commonplaces somewhat in the manner of Lord Chesterfield. Besides several political pamphlets, Osborne wrote a *Miscellany of Sundry Essays, Paradoxes, etc.* (1659). His collected works were published in 1673, and in 1722 reached an eleventh edition.

OSBORNE HOUSE. A country residence of Queen Victoria on the Isle of Wight, in the neighborhood of the town of East Cowes. Osborne House was bought by the Queen in 1840. Here she died, January 22, 1901. After her death King Edward presented Osborne House to the English people.

OSBOURNE, ɔz'börn, LLOYD (1868—). An American writer, son of Samuel Osbourne and Fanny Van de Grift (afterwards the wife of Robert Louis Stevenson). He was born in San Francisco, April 7, 1868, and studied at the University of Edinburgh with a view to becoming a civil engineer. With Stevenson he went to Samoa, where he was appointed vice-consul from the United States. In conjunction with Stevenson, he wrote: *The Wrong Box* (1889); *The Wrecker* (1892); and *Ebb Tide* (1894).

OS'CAN. One of the ancient languages of Italy. See ITALIC LANGUAGES.

OSCAR I. (1799-1859). King of Sweden and Norway from 1844 to 1859. He was born in Paris, July 4, 1799, being the son of Marshal Bernadotte. (See CHARLES XIV. JOHN.) After the election of his father as Crown Prince of Sweden, Oscar received the title of Duke of Sudermania. In 1818 he entered the University of Upsala. He was accomplished in the fields of science, literature, and the fine arts, and was an enthusiastic student of music. He was in full sympathy with the Swedish nationalists. He succeeded his father March 8, 1844. His rule was distinguished for its justice; and many liberal measures, such as the removal of Jewish disabilities, freedom of manufactures and commerce, and parliamentary reform (the last mentioned being vigorously opposed by the nobility), were laid before the *Riksdag* by his orders. He advocated these changes with tact, and in many cases his policy was successful. In 1823 he married Josephine Beauharnais, the granddaughter of the Empress Josephine, by whom he had five children, the eldest of whom, on account of his father's failing health, was appointed Regent, September 25, 1857, and succeeded to the throne as Charles XV. on the death of Oscar, July 8, 1859. See SWEDEN.

OSCAR II. (1829—). King of Sweden and Norway after 1872. He was born in Stockholm, January 21, 1829, being the third son of Oscar I. In 1872 he succeeded his brother, Charles XV., on the throne. During his reign the development of the sister kingdoms was retarded by no for-

eign complications and received an effective stimulus in the efforts of the King, who showed himself a generous patron of industry, science, and the arts. On the question of the vexed relations between Sweden and Norway, arising from the latter kingdom's struggle for self-government, he firmly opposed all attempts looking toward the dissolution of the union between the kingdoms, but otherwise showed himself in favor of concessions to the Norwegians. He has also attained some note as a writer, the list of his works including: *Charles XII.; Prose Writings*; a number of volumes of lyric poetry, and a translation of Goethe's *Tasso*. His collected writings were published at Stockholm in 1885-94. In 1857 he married Princess Sophie of Nassau, by whom he had four sons.

OSCEOLA, ōs'ē-ō'lā (Seminole *As-se-he-ho-lar*, Black Drink) (c.1804-1838). A famous Seminole chief, born near the Chattahoochee River, Ga. His father was an English trader and his mother an Indian woman, the daughter of a Creek chief. Removing to Florida when very young, he there acquired great influence among the Seminoles, and took the lead in opposition to the territorial aggressions of the whites. In 1835 his wife, the half-breed daughter of a fugitive negro slave, was reclaimed as a slave by her mother's former owner, and Osceola, infuriated, threatened revenge, and was temporarily imprisoned. On being released, he began the attacks on the whites which opened the second Seminole War (see SEMINOLES), and in December he killed with his own hand the Indian agent Thompson. For two years he was in almost every important engagement, and, by his shrewdness, skill, and bravery, foiled several white generals in succession. Finally (October 31, 1837), he was treacherously seized while holding a conference under a flag of truce with Gen. Thomas S. Jessup, and was confined at Saint Augustine and Fort Moultrie until his death, January 20, 1838.

OSCHATZ, ō'shāts. A town in the Kingdom of Saxony, on the Döllnitz, 32 miles west of Leipzig (Map: Germany, E 3). Its manufactures include sugar, felt, knitted goods, cloth, and leather. Population, in 1890, 9,400; in 1900, 10,652.

OSCHERSLEBEN, ōsh'ērs-lā-ben. A town of the Province of Saxony, Prussia, on the Bode, a branch of the Saale, about 30 miles southwest of Magdeburg (Map: Prussia, D 2). It has sugar refineries, and manufactures agricultural implements, fertilizers, chocolate, bricks, and boilers. In the vicinity are lignite mines. Population, in 1890, 10,700; in 1900, 13,400.

OSCINES, ōs'ī-nēz (Lat., singing birds). The great group of Passeres (q.v.) which includes the song birds. They are characterized by several distinct pairs of intrinsic muscles of the syrinx, inserted into the ends of the upper bronchial half-rings, and constituting thus a complex and effective vocal apparatus. Not all the Oscines sing, but all truly singing birds are Oscines. The side of the tarsus is usually covered with a horny plate, which forms a sharp ridge behind, with the corresponding plate of the other side. The primaries are nine or ten in number, but when ten the first is very short. The Oscines are the largest group of birds, and in-

clude about 5000 species of the 11,000 known birds. They are found in all parts of the world, but are perhaps most abundant in the temperate zones. Many of them are of very brilliant plumage, but as a rule the musical powers and intelligence are more noticeable than the beauty, and they are universally regarded as the most highly developed group of birds. Most of them are of comparatively small size, the very great majority being less than a foot in length. The raven (q.v.) is the largest of the suborder, while the kinglets (q.v.) are probably the smallest. Of our North American birds, about one-half are Oscines. For the anatomy and classification of the group, consult: Evans, *Birds* (New York, 1900); Newton, *Dictionary of Birds* (ib., 1893-96); Stejneger, *Standard Natural History*, vol. iv. (Boston, 1885).

OSCULATING CIRCLE. In geometry, a circle that has three, i.e., the greatest possible number, of consecutive points in common with a given curve. A curve can at any given point have more than one tangent circle, i.e. circles with which it may be imagined to have either one or two points in common; but it can, at any given point, have only one *osculating* circle, for only one circle can pass through three given points. The curvature of a curve at a given point is obviously identical with the curvature of its osculating circle at that point, and hence the osculating circle is often spoken of as the 'circle of curvature' of the curve at the given point.

OSCULATION (Lat. *osculatio*, a kissing, from *osculari*, to kiss, from *osculum*, kiss, little mouth, diminutive of *os*, Skt. *asya*, mouth). One curve is said to *osculate* another when the curves have several consecutive points in common, and the degree of osculation depends upon the number of points of contact; that is, the greater the number of consecutive points in contact, the higher the degree of osculation. The number of possible points of contact is determined by the number of *independent* arbitrary constants contained in the equation of the tangent curve. The same is true of a straight line and a curve. The equation of a straight line, being of the form $y = mx + c$, contains two arbitrary constants, m and c ; hence a straight line can coincide with a curve in two consecutive points, and the contact is said to be of the first order. This straight line is the tangent at the point of contact. When a straight line, not a tangent, meets a curve, there is section instead of contact, and in that case only one point is common to the straight line and the curve. The general equation of the circle, $x^2 + y^2 + dx + ey + f = 0$, contains three arbitrary constants, d , e , and f , and therefore a circle can have three consecutive points in common with a curve, and the contact is of the second order. The circle is known as the circle of curvature or the *osculating* circle, and has for its radius the radius of curvature of that portion of the curve with which the circle is in contact. No other circle can have so high a degree of contact with a curve at any point as the osculating circle at that point. Surfaces and some twisted curves admit of spheres of osculation. See CURVE.

ÖSEL, Ōzel, or **OESEL**. A large island in the Baltic Sea, belonging to the Russian Government of Livonia, and situated at the entrance to

the Gulf of Riga (Map: Russia, B 3). It has an area of 995 square miles. It is irregular in outline, with a long and narrow peninsula extending southward toward the Domesnäs of Courland, and its coasts are indented with numerous small bays, offering, however, few harbors. The surface is undulating, in parts marshy and but sparsely forested. The soil is not unfertile, and the climate is mild enough to permit the cultivation of all the common cereals, including wheat. The chief occupations of the inhabitants are agriculture, fisheries, and the rearing of cattle and horses. The population, including that of some small dependent islands, was, in 1897, 56,869, chiefly Esthonians. The principal town is Arensburg, on the southeast coast, with a population, in 1897, of 4621. Oesel was occupied by the Knights Swordbearers early in the thirteenth century, and when their power was broken it was sold in 1559 by its bishop to Denmark. In 1645 it was ceded to Sweden, and in 1721 it came into the possession of Russia.

OS'GOOD, FRANCES SARGENT (LOCKE) (1811-50). An American poetess, born in Boston. When but a girl she contributed poems to the "Juvenile Miscellany" of Lydia Maria Child (q.v.), and won some reputation, which she increased by other poems and by editorial work. In 1835 she married Samuel S. Osgood, a portrait painter, and visited England, where she published among other works a collection of poems called "A Wreath of Wild Flowers from New England" (1839), and a play written at the request of Sheridan Knowles, "The Happy Release, or The Triumphs of Love." A *Memorial* by friends, with an account of her life by Griswold, was printed in New York in 1851. A complete illustrated edition of her poems appeared in 1850.

OSGOOD, GEORGE LAURIE (1844-). An American musician and director. He studied voice-culture under Sieber, Haupt, and Robert Franz in Germany, and under Lamperti in Italy. Largely through the success he had achieved in Germany, Theodore Thomas engaged him for a winter tour in America. In 1872 he took up his residence in Boston as a vocal teacher, and three years later became conductor of the Boylston Club. In 1890 he also took charge of the Boston Singers' Society. His anthems, choruses, part songs, and songs are well known. He published a *Guide in the Art of Singing*, which was favorably received.

OSGOOD, SAMUEL (1748-1813). An American soldier and politician, born in Andover, Mass. After graduation at Harvard College (1770), ill health compelled him to exchange a mercantile career for the theological studies already undertaken. Having been a delegate to the Essex County (Mass.) Convention (1774), and active in the Provincial Congress, in 1775 he served as captain of minute-men at Lexington and Concord. For a short time he was aide to General Artemus Ward, but left the army to reënter the Provincial Congress. From 1780 to 1784 he was a member of the Continental Congress, and from 1785 to 1789 first Commissioner of the United States Treasury. He was later Postmaster-General, Speaker of the New York Assembly, State supervisor, and naval officer of New York port.

OSGOOD, SAMUEL (1812-80). An American clergyman, born at Charlestown, Mass. He was graduated at Harvard College in 1832, and at the Cambridge Divinity School in 1835. In 1836-37 he edited the *Western Messenger* at Louisville, Ky. In 1837 he became pastor of the Unitarian Church at Nashua, N. H., in 1841 of the Westminster Church in Providence, R. I., and in 1849 of the Church of the Messiah in New York. In 1850-54 he was editor of the *Christian Inquirer* in New York. In 1870 he entered the Protestant Episcopal Church, but took no pastoral charge. He was the author of *Studies in Christian Biography* (1851); *God with Men* (1853); *The Hearthstone* (1854); *Milestones in Our Life Journey* (1855); *Student Life* (1860); *American Leaves* (1867); translations from Ols-hausen's *The History of the Passion* (1839), and De Wette's *Human Life* (1842).

OSH, ôsh. A town in the Territory of Fer-gana, Russian Turkestan, situated about 60 miles east of Margelan. It consists of the old native town and the new Russian settlement, and is of some importance in the trade with China. Population, in 1897, 36,474, including over 34,000 Mohammedans.

O'SHAUGHNESSY, ô-shâ'ne-sî, or ô-shâ'ne-sî, ARTHUR WILLIAM EDGAR (1844-81). An English poet, born in London, March 14, 1844. In 1861 he was appointed assistant in the library of the British Museum; two years later he was transferred to the department of natural history, a post which he held till his death, January 30, 1881. His verse comprises *The Epic of Women and Other Poems* (1870); *Lays of France* (1872), based upon the *lais* of Marie de France; *Music and Moonlight* (1874); and *Songs of a Worker* (posthumous, 1881). The first volume especially contains pieces of great beauty. O'Shaughnessy belonged to the Neo-Romantic School more completely represented by William Morris and Swinburne. In 1873 he married Eleanor, daughter of Westland Marston. She died in 1879. In collaboration with her he wrote *Toyland* (1875), a collection of tales for children. Consult Moulton, *O'Shaughnessy, His Life and His Work* (London and Chicago, 1894).

OSHAWA, ôsh'â-wâ. A port of Ontario County, Ontario, Canada, on Lake Ontario and on the Grand Trunk Railway, 33 miles northeast of Toronto and 6½ miles east of Whitby (Map: Ontario, E 4). It has iron foundries and factories, flour mills, etc. Population, in 1891, 4066; in 1901, 4394.

O'SHEA, ô-shâ', MICHAEL VINCENT (1866-). An American educator, born at LeRoy, N. Y. He graduated at Cornell University in 1892, taught for three years in the Mankato (Minn.) Normal School, and, after serving as professor of education in the Buffalo Teachers' College, in 1897 was appointed to a like chair in the University of Wisconsin. He became prominent in university extension work and as a lecturer on pedagogy. His publications include: *Aspects of Mental Economy* (1900); and, in a series under his editorial charge, *Education as Adjustment* (1903), and *Education for Efficiency: Chapters on Method and Management in Teaching* (1903).

OSHIMA, ô'shâ-mîl' (Jap., Big Island). The name of at least twenty places in Japan. The two most important are: (1) The most northerly of the "Seven Islands of Idzu," which stretch

southward for 100 miles toward the Bonin Islands (q.v.), and is best known to foreigners as Vries Island. It is of volcanic origin, is eight miles long and five wide, has a good harbor, and an ever-smoking volcano, Mihara-Yama. It has a population of about 5000, living in six villages along the coast. No rice is produced, as the people live principally by fishing and exporting cherry-tree wood to the main islands of Japan. A little corn and sweet potatoes are raised. The women do most of the work, and, as in the Loochoos, carry their burdens on their heads. Their dress differs considerably from the dress of the women of the mainland; they wear petticoats, dress their hair differently, and do not blacken their teeth. The men dress as other Japanese. Concubinage does not exist; musical instruments are not found, and dancing is unknown. (2) Anami-Oshima, one of the large islands of the Loochoo Archipelago (see LOOCHOO), which came under the control of the Daimio of Satsuma in 1609. It is 34 miles long and 17 wide; is of volcanic origin, with steep shores, and hills rising to heights of 1400 to 1500 feet. Here in 1867 a modern sugar-refining plant was erected by some foreigners for the Daimio of Satsuma, but, not proving remunerative, it was later removed. The port is Naze, with a good harbor, on the north coast, latitude $28^{\circ} 23' N.$, longitude $129^{\circ} 30' E.$ The inhabitants suffer much from very poisonous snakes of the genus *Trimeresurus*, which infest even the houses.

OSHKOSH'. A city and the county-seat of Winnebago County, Wis., 80 miles northwest of Milwaukee; on Lake Winnebago, at the mouth of the Upper Fox River, and on the Wisconsin Central, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads (Map: Wisconsin, E 5). It is the seat of a State normal school. In the suburbs, three miles distant, is the Northern Hospital for the Insane (State), and near it the County Asylum for the Incurable Insane and the County Poor Farm. The city has a public library, North, South, and Electric parks, and several bridges across the river. Among its notable structures are several public school buildings, the city hall, the county courthouse, and the United States Government building. Lake Winnebago is a popular resort for yachting, ice-boating, fishing, and hunting. Oshkosh has developed important lumber interests, and manufactures products of lumber in great variety—sash, doors, and blinds, matches, furniture, trunks, carriages and wagons, etc. Other manufactures are machinery, boilers, grass twine and matting, flour, tobacco, and malt liquors. The city's commercial interests are increasing, and include a large wholesale trade. The government is administered by a mayor, elected every two years, and a council, of which the executive is a member. The school board is independently elected by popular vote. Oshkosh was settled in 1836 and chartered in 1853. In 1859, 1866, 1874, and 1875 it suffered severely from fires. Population, in 1890, 22,836; in 1900, 28,284.

OSIANDER, ó'sé-án'dér, ANDREAS (1498-1552). A German reformer. He was born December 19, 1498, at Gunzenhausen, near Nuremberg. Osiander, whose real name was Hosemann, was educated at Ingolstadt and Wittenberg, and became a preacher at Nuremberg in 1522, where

he was conspicuously active in introducing the Reformation. He advocated the views of Luther in his controversy with Zwingli, on the question of the Lord's Supper; took part in the conference held at Marburg (1529), and was present at the Diet of Augsburg (1530). In 1548 he was deprived of his office as preacher at Nuremberg, because he would not agree to the Augsburg Interim (see INTERIM); but was immediately invited by Albert, Duke of Prussia, to become the head of the theological faculty in the newly established University of Königsberg. He was hardly settled here when he became entangled in a theological strife that embittered his naturally imperious and arrogant temper. In the treatises *De Lege et Evangelio* (1549) and *De Justificatione* (1550) Osiander asserted that the righteousness by which sinners are justified is not to be conceived as a mere justificatory or imputative act on the part of God, but as something inward and subjective, as the impartation of a real righteousness, springing in a mystical way from the union of Christ with man. The most notable of his opponents was Martin Chemnitz (q.v.). A seemingly amicable arrangement between the disputants was brought about by Duke Albert in 1551; but the strife was soon recommenced, Osiander publishing new writings in which he attacked Melancthon; nor did his death in Königsberg, October 17, 1552, put a stop to the war of words. It was continued by his followers, called *Osiandrists*, who were finally extinguished by the *Corpus Doctrinæ Prutenicum* (in 1567), which caused their banishment from all parts of Prussia. The leader of the party, the Court preacher Johannes Funck, Osiander's son-in-law, was beheaded (1566). Consult the *Life of Osiander*, by Möller (Elberfeld, 1870).

OSIER (OF., Fr. *osier*, from Gk. *ólos*, *oisos*, *ólosos*, *oisyos*, *ólosa*, *oisyá*, sort of osier; connected with Gk. *lita*, *itea*, Lat. *vitea*, withy, *vitis*, vine, OPruss. *vitvo*, OHG. *weda*, Ger. *Weide*, AS. *vēpig*, Eng. *withy*). The popular name of the bushy willows used for making wicker-work. Their long and slender branches are valuable in proportion to their length, slenderness, suppleness, and toughness. The common osier (*Salix viminalis*), a European species common in wet alluvial grounds, sometimes becomes a tree, although when cultivated for hoops and basket-making it is not permitted to do so. It is often planted to prevent the washing of river banks. It has several cultivated varieties much more useful than the original or wild species, which are apt to break, and therefore are of little value. More suitable for the fine kinds of basket-making are *Salix purpurea*, sometimes called the fine basket osier, and a variety known as the green-leaved osier or ornard, and *Salix triandra*, known to English osier cultivators and basket-makers as the Spaniard rod. *Salix alba*, which sometimes becomes a tree, is the golden osier or golden willow, remarkable for the bright yellow of its branches, as well as for their pliancy and toughness. There are other species, such as *Salix caprea*, *Salix lucida*, and *Salix fragilis*, which are also valuable; but the osiers chiefly cultivated belong to the species which have been named, or are very nearly allied to them. Since some of the European species do not stand the American climate very well, *Salix sericea*, *Salix petiolaris*, *Salix lasiandra*, and *Salix laevigata*,

all American species, are recommended for growing in the United States.

Osiers are extensively cultivated on alluvial soils, especially on the tide-flooded river basins of Holland, Belgium, and France, whence large quantities of rods are exported. Much depends on the closeness of planting, as when space is too abundant the shoots of many of the kinds branch more than is desirable. When osiers for the finest kinds of basket-work are desired, single-eye cuttings are planted close together, so as to obtain weak but fine shoots. For ordinary work, cuttings 15 to 16 inches long and of tolerably thick branches are planted in rows from 18 inches to two feet apart, and at distances of 15 to 18 inches in the row. Osier plantations in light soils continue productive for 15 or 20 years, and much longer in rich, alluvial soils. Clay soils are unsuitable. Usually no cultivation is required after planting, although shallow cultivation is recommended to keep down the weeds. The shoots are cut once a year, during the resting period. They are then sorted, those intended for brown baskets are dried and stacked, out of danger of rain, care being also taken to prevent heating, to which, like hay, they are liable, and by which they would be rendered worthless. Osiers intended for white baskets cannot at once be peeled; but after being sorted, they are tied in bundles, placed upright in wide shallow trenches or rivulets in which there is about four inches of water, till they begin to bud and blossom in spring. They are then, in ordinary seasons, easily peeled by drawing them through an instrument called a break, but in cold seasons it is sometimes necessary to lay them for a while under a quantity of litter. They may also be peeled by steaming or boiling the dried shoots. There are extensive plantations in the vicinity of Rochester and Liverpool, New York; Detroit, Michigan; Milwaukee, Wisconsin; Cincinnati, Ohio; and Baltimore, Md. In 1890 there was produced in the United States willow ware valued at \$3,630,000, an increase of 61 per cent. over the production of 1880.

OSIMO, ō'zè-mò. A town of Central Italy in the Province of Ancona, situated eight miles south of Ancona (Map: Italy, H 4). It has a cathedral, a bishop's palace, a museum containing many statues and ancient inscriptions, and a library. The chief industry is silk-spinning. Osimo is the ancient *Aurimum*, founded by the Romans in B.C. 157. Population (commune), in 1881, 17,346; in 1901, 18,529.

OSIRIS (Lat., from Gk. Ὀσίρις, from Egypt. *Hesri*, *Ausar*, *Asiri*). One of the principal Egyptian deities, originally the local god of Abydos and Busiris, who early acquired a solar character and was identified with the setting sun. He thus came to be regarded as the ruler of the realm of the dead in the mysterious region below the western horizon. According to the legend, Osiris was the son of Seb (the earth) and Nût (the sky), and the husband of his sister Isis. When he came to rule over Egypt he found the people plunged in utter barbarism and raised them from their wretched condition by giving them laws, teaching them to till the ground, and instructing them in the worship of the gods. He then traveled over the whole world, spreading the blessings of civilization in every land. His wicked brother Set (Typhon), the enemy of all good, would have

taken advantage of his absence to undo his work and subvert the order he had established, but was defeated by the watchfulness of Isis. When the King returned, however, Set plotted to destroy him by treachery. Having privily taken the measure of Osiris's body, he made a beautiful chest of like dimensions and brought it with him to a great feast, at which Osiris was present. As though in jest, he promised to give the chest to any one whose body should fit it exactly. After a number of the guests had tried in vain, Osiris got into the chest and lay down, when Set and his confederates quickly shut the lid and fastened it securely. They then cast it into the river, and it was borne out to sea by the Tanitic mouth of the Nile. Isis, after long wanderings, found her husband's body and brought it back to Egypt, but while she went to visit her young son Horus, it was discovered by Set, who tore it to pieces and scattered the fragments far and wide. Upon learning of this misfortune, Isis took a boat and carefully sought out the scattered members of her husband. Wherever she found a portion of the body, she buried it, and the spot was ever thereafter revered as sacred ground. When Horus grew up, he took vengeance upon the murderer, Set, and ascended his father's throne. Osiris, meantime, lived again in the under world and became the ruler of the dead. At a very early period the worship of Osiris was connected with the Egyptian doctrine of the immortality of the soul and became popular throughout Egypt. Abydos, where the head of the god was believed to be preserved, enjoyed the reputation of special sanctity, and bodies were brought from all parts of Egypt for burial in its sacred soil. Osiris is usually represented swathed in mummy cloths, holding in his hands the crook and the flail, symbols of royalty, and wearing upon his head the *Atef* crown, which was formed of the tall crown of Upper Egypt with a long feather on each side. Consult: Wiedemann, *Religion of the Ancient Egyptians* (New York, 1897); Erman, *Life in Ancient Egypt* (London, 1894). See also ISIS; HORUS; SERAPIS; SET; and the paragraph on *Religion* in the section on *Ancient Egypt*, and Plate of EGYPTIAN DEITIES, under the title EGYPT.

OSKALOOSA, ōs'ka-lōō'sā. A city and the county-seat of Mahaska County, Ia., 60 miles southeast of Des Moines; on the Burlington Route, the Chicago, Rock Island and Pacific, and the Iowa Central railroads (Map: Iowa, E 3). It is the seat of Oskaloosa College (Christian) and Penn College (Friends), opened in 1873, and has a public library, and a United States Government post office building, erected at a cost of \$65,000. The yearly meetings of the Society of Friends in Iowa are held here. The industrial interests of the city are represented by manufactures of wagons, steam and hot-water heaters, flour, packed meat, woolen goods, vitrified brick, and iron and brass goods. In the vicinity are deposits of coal, which is extensively mined, besides fire clay and limestone. There are also large agricultural and stock-raising interests. Settled in 1843, Oskaloosa was incorporated ten years later. The government is administered under a revised charter of 1885, which provides for a mayor, chosen every two years, and a council. Population, in 1890, 6558; in 1900, 9212.

OSLER, ōs'lēr, WILLIAM (1849—). An American physician and author. He was born at

Bondhead, Ontario, was educated at Trinity University, Toronto, and at the medical faculty of McGill University, Montreal, where he graduated in 1872. He also studied at University College, London, England, and at Berlin and Vienna. In 1874 he returned to Canada and was appointed professor of physiology and pathology in McGill University; ten years afterwards he was called to the chair of clinical medicine in the University of Pennsylvania. In 1889 he was made professor of the principles and practice of medicine in Johns Hopkins University and chief physician to the Johns Hopkins Hospital. His chief publications include: *Clinical Notes on Smallpox* (1876); *Histology Notes* (1882); *Cerebral Palsies of Children* (1889); and *The Principles and Practice of Medicine* (1892 et seq.).

OSMAN, ōs-mān'. Founder of the Ottoman Empire. See OTHMAN.

OSMAN DIGNA, dig'nā (c.1836—). A follower of the Mahdi in the Sudan. He was born, according to some, at Suakin, while others give his birthplace as Rouen, France, and his father as a Scotchman named Nisbet. According to this latter account, the family moved to Alexandria, in 1849, where the father soon died, and the widow married a Turk named Osman, who adopted young Nisbet and called him Osman Ali. They went to Suakin and engaged in the slave trade, Osman continuing the traffic after the death of his stepfather. His business of slave-selling being broken up by the English, he took part in the revolt of Arabi Pasha (q.v.), and after the failure of that movement he attached himself to the cause of the Mahdi. About this time he received the name Digna because of the fullness of his beard; also the title of the 'Emir of the Dervishes of God.' He maintained himself at the head of a powerful army around Suakin and inflicted a severe defeat on Baker Pasha near Tokar, southeast of that place, on February 4, 1884. Immediately after this victory, however, he was defeated by General Graham near Tokar and at Tamanieb. As the Mahdi's ablest general he was largely responsible for the fate of Gordon and the loss of the Sudan to the English. In December, 1888, he suffered a bloody reverse at the hands of General Grenfell, but nevertheless continued his raiding expeditions in the Sudan. In 1899 he fought in the last campaign of the Mahdist forces, whose strength had been broken the previous year at Omdurman. On January 19, 1900, he was captured near Tokar and sent a prisoner to Rosetta.

OSMANIE, ōs-mā'nē-ā, ORDER OF. A Turkish order conferred for conspicuous service to the State. It was established by Abd-ul-Aziz on his accession to the throne in 1881, and has four classes. The decoration is a green-enameled gold star with six points, suspended by the star and crescent from a green ribbon with red bands. In the centre of the star is a crescent on a red background.

OSMAN'LIS. See TURKS.

OSMAN NURI PASHA, ōs-mān' nūrē pā-shā' (1837-1900). A Turkish general, called Grazi (the victorious). He was born at Amasia, in Asia Minor. He was educated for the army at the Turkish military academy, became a subaltern officer in 1854, and fought in the Crimean War. He took part in the suppression of the

rebellion of the Druses (1860), and in that of the Cretan insurrection of 1866-68. He was made a general of brigade in 1874, and in the following year a general of division. When Serbia made war upon the Ottoman Empire in 1876, he was put in command of a corps of 35,000 men at Widin, and his successes won him the rank of marshal. In July, 1877, he took up a strongly fortified position at Plevna, thus arresting the advance of the Russians. He inflicted a severe defeat upon them on July 30th, and successfully withstood a desperate assault made by them and their Rumanian allies on September 11th. He held his position until his supplies failed him, and at last on December 10th made a gallant effort to break through the enemies' lines. Overpowered by superior numbers, he was forced to surrender. He was taken to Russia as a prisoner of war, but after the Treaty of San Stefano (1878) returned to Constantinople and became commander-in-chief of the Imperial Guard. He was Minister of War, 1878-85, and Grand Marshal of the Palace till his death, which occurred at Constantinople, April 4, 1900. Consult Levaux, *Ghazi Osman Pasha* (Paris, 1891). See RUSSO-TURKISH WAR.

OSMIUM (Neo-Lat., from Gk. ὀσμῆ, *osmē*, ὀδμή, *odmē*, odor, from ὀζειν, *ozein*, to smell). A metallic element discovered by Tennant in 1803. It is one of the platinum metals, and is found native alloyed with rhodium, ruthenium, and palladium. When *osmiridium*, which is found as a hard, crystalline substance (insoluble in aqua regia) in platinum ores, is heated to a white heat in porcelain tubes in a current of air, the volatile oxide of osmium (OsO_4) readily sublimes over. Metallic osmium may be obtained from the oxide by reducing the latter with hydrogen, carbonic oxide, or carbon.

Osmium (symbol, Os; atomic weight, 191) is a lustrous, blue-white metal with a specific gravity varying between 20 and 22.5. It is extremely difficult to fuse, much more so than platinum and iridium. Its compounds with oxygen include a monoxide (OsO), a sesquioxide (Os_2O_3), a dioxide (OsO_2), and the tetroxide (OsO_4) mentioned above. The tetroxide is the only one of the oxides that is volatile. Osmic acid, H_2OsO_4 , has been obtained in the free state by the decomposition of its potassium salt (potassium osmate, K_2OsO_4) with water and precipitating with alcohol in a current of hydrogen.

OSMO'SIS (Neo-Lat., from Gk. ὀσμός, *ōsmos*, impulsion, from ὠθεῖν, *ōthein*, to push). This phenomenon, which is discussed in its fundamental form and from the physical point of view under SOLUTIONS, plays an important part in plant physiology. The plant cell, consisting of a mass of protoplasm, surrounded by a somewhat tough but flexible and elastic membrane, the cell wall, and inclosing a watery fluid, the cell sap, is an appropriate mechanism for an effective display of osmotic phenomena, which are fundamental to three important functions: (1) turgor (q.v.), (2) absorption and transfer of water, (3) absorption and transfer of dissolved substances. (See ABSORPTION.) The general principles set forth in the article SOLUTIONS may be summarized with respect to plants as follows: (a) Dissolved substances diffuse to the limits of the solvent and exert an osmotic pressure comparable to gas pressure and manifesting the same laws.

(b) The osmotic pressure of several non-reacting substances in solution together equals the sum of the pressures of each solute upon the given volume of solvent. (c) Osmotic pressure may be made evident by interposing a membrane between solutions of unequal pressure, the solvent freely passing, while the solutes are hindered or prevented. (d) In plants water is the sole solvent. The plant cell is an osmotic apparatus. The cell wall is ordinarily permeable to both solvent and solutes, but the protoplasm is a semi-permeable membrane with respect to many solutes. Under normal conditions, therefore, when water is available, it enters the cell and allows the osmotic pressure of the solutes to manifest itself in pushing the protoplasmic membrane against the cell wall until the elastic resistance of the wall balances the pressure. A cell with wall distended is said to be turgid. The presence of solutes in the water within the semi-permeable membrane of protoplasm in the surface cells of the root demands the entrance of water from the outside until an equilibrium is reached. But the attainment or maintenance of equilibrium is constantly prevented by the evaporation of water from surfaces exposed to the air; for when water evaporates from a cell the elastic resistance of the cell wall is no longer equal to the osmotic pressure and water enters from a neighboring cell, and so on, corresponding action making possible the movement of water from more and more remote cells until the turgor is equalized by the entrance of water from without. (See CONDUCTION.) The absorption of solutes from water in contact with the plant is independent of the movement of water. If by removal from the cell sap, either by use or by transformation, the osmotic partial pressure of any solute within the cell be diminished, other molecules of this solute may gain entrance. Provided the protoplasm be permeable to it, the entrance of any solute depends on a disturbance of the equilibrium between the osmotic partial pressure of that substance inside and outside the cell.

Since the osmotic pressure of solutions of acids and salts (electrolytes) is greatly increased by their electrolytic dissociation (see DISSOCIATION), which occurs in watery solutions, this must be an important factor in plant life. Normally all the solutions surrounding the plant are dilute watery solutions in which the extent of such dissociation is considerable. The solutions within the plant cell, too, contain solutes in a state of electrolytic dissociation. In considering the osmotic phenomena within the plant, therefore, allowance must be made for the increase of osmotic pressure due to electrolytic dissociation.

OSMUN, THOMAS EMBLEY, best known by his pseudonym, 'Alfred Ayres' (1834-1902). An American orthoëpist and critic. He was born in Montrose, Summit County, Ohio, and was educated at an academy in Cleveland, Ohio, at Oberlin College, and in Paris and Berlin, where he spent six years. Returning to America in 1859, he settled in New York, where he engaged in newspaper and magazine work and became well known as a dramatic critic. His extensive writings on orthoëpy and elocution were exceedingly popular, and so widely read as to give rise to the claim made for him by some that he had done more to better the condition of written and spoken English in America than any other man in

his generation. In 1891-94 he was employed on the staff of the *Standard Dictionary*. Among his published works are: *The Orthoëpist* (1880); *The Verbalist* (1881); *The Mentor* (1884); *The Essentials of Elocution* (1886); *Acting and Actors* (1894); *Some Ill-used Words* (1901).

OSMUNDA (ML., water fern). A genus of ferns, distinguished by spore-cases in branched, stalked masses. The *osmunda royal*, royal or flowering fern (*Osmunda regalis*), is the noblest and most striking of North American ferns, found also in many parts of Europe. It has bipinnate fronds, and paniced spore-cases upon altered fronds, which appear as distinct stalks and simulate the general appearance of a phanerogamous plant. The sterile fronds sometimes rise to 5 feet in height. Its rootstocks were formerly employed in scrofula. The rootstocks abound in a mucilaginous substance, which is used in Northern Europe instead of starch. The cinnamon fern (*Osmunda cinnamomea*), another common North American species, is clothed with rusty wool when young, hence the name. *Osmunda claytoniana*, another American species common in low ground, has fertile fronds 2 to 4 feet in height.

OSNABRÜCK, ōs'nā-brük (formerly called Osnaburg by English writers). An ancient town in the Province of Hanover, Prussia, situated on the Hase, about 30 miles northeast of Münster (Map: Prussia, B 2). It consists of the old, irregular town, surrounded by promenades laid out on the site of the ancient fortifications, and the new quarters regularly laid out and containing a number of handsome buildings. The Catholic cathedral is a partly Romanesque and partly Transitional building of the thirteenth century surmounted by three towers. The Gothic Marienkirche dates mainly from the fifteenth century and is of architectural merit. Among other noteworthy buildings is the Rathaus (fifteenth century), where the preliminary negotiations for the Peace of Westphalia were carried on.

The educational institutions comprise two gymnasia (of which one, the Gymnasium Carolinum, was founded by Charlemagne), a seminary for priests, two teachers' seminaries, a theatre, and a valuable museum. Industrially Osnabrück is among the most important towns of Hanover. It has extensive iron foundries, and manufactures various kinds of machinery, boilers, pipes, wire, nails, pianos, organs, rugs, cotton goods, paper, brick, tobacco, etc. In the vicinity are stone quarries and coal mines. The trade is important in local manufactures and agricultural and animal products. Population, in 1890, 39,900; in 1900, 51,574, including over 15,000 Roman Catholics.

Osnabrück received mint, market, and custom privileges as early as 888, and was surrounded with walls in 1082. Although constituting a part of the Bishopric of Osnabrück, founded by Charles the Great, at the end of the eighth century, it enjoyed practical independence, and became a member of the Hanseatic League. In accordance with the provisions of the Peace of Westphalia, the Bishopric of Osnabrück was held alternately by Roman Catholics and Protestants until its secularization in 1803. In 1857 the Roman Catholic bishopric was reestablished. Consult: Mithoff, *Kunstdenkmäler und Altertümer im Hannoverschen*, vol. vi. (Hanover, 1879); *Osnabrücker Geschichtsquellen*, edited by the His-

torischer Verein von Osnabrück (Osnabrück, 1891 et seq.); Wülm, *Osnabrück, seine Geschichte*, etc. (ib., 1901).

OSORIO, ô-sô'rê-ô, MANOEL LUIZ (1808-79). A Brazilian general, born in Rio Grande do Sul, near Pelotas. In the civil war of 1839 to 1845 in his native province, he won his spurs; then served bravely in the Uruguayan campaign of 1851-52, and from 1865 to 1869, when he was disabled in action, took a prominent part in the war with Paraguay. During this war he was commander-in-chief (1865-66), and in 1867 was made lieutenant-general. Osorio entered politics, became Senator in 1877, and from 1878 to his death was Minister of War, but his great fame was as the brave and dashing cavalry leader who won from his soldiers the title of 'The Fabulous' (*O legendario*).

OSPREY (from OF. *orfraie*, from Lat. *ossi-fragus*, osprey, bone-breaker, from *os*, bone + *frangere*, to break), or FISH-HAWK. An accipitrine bird, which represents the genus *Pandion* and family *Pandionidae*, and differs from the ordinary falcons in the reversible, owl-like outer toe, the lack of an aftershaft to the feathers, the long, closely feathered tibiae, and other structural details, and in its habit of feeding exclusively on live fish, caught from the water. The osprey is cosmopolitan, except in some oceanic islands, but is everywhere local, as it is not able to live far from the shores of bodies of water or large rivers. The typical form is that of the Old World (*Pandion halietus*), of which the American fish-hawk and an Australian 'fishing eagle' are regarded as geographical races.

Our American fish-hawk is about two feet long. It is of a dark-brown color, variegated with white, gray, and black; the under parts are white except a light brown band across the breast. The bill is short, strong, broad, and very strongly hooked. The tail is rather long and the wings are very long. The soles of the feet are very rough and covered with small pointed scales which enable it to secure a firmer hold on its slippery prey, which it seizes with its talons alone and bears away to its nest or to a perch. It is often robbed of its gains by the bald eagle, which loves fish, but is unskillful in catching them.

The nest of the fish-hawk is a huge, stick-built affair (a load for a cart) placed on a sea-fronting cliff or in a tree—in the United States usually the latter; and the same structure may be repaired and reoccupied for many seasons. In favorable places colonies of fish-hawks may nest in company; and they have occasionally nested upon platforms placed upon tall poles for their accommodation. Another feature of interest is that other birds—notably the American grackles—often build their nests in the outer interstices of the osprey's rough structure, and dwell there undisturbed. The eggs (two to four) are white, blotched with claret-brown, purplish, and ochre. Excellent accounts of the fish-hawk are given in the books of Wilson, Nuttall, Audubon, and other of the older ornithologists, as well as in modern treatises on birds. See Plate of EAGLES AND HAWKS.

OSSA (Lat., from Gk. *Ὀσσα*). The ancient name of a mountain in Northeastern Thessaly, separated from Olympus by the vale of Tempe.

It is now called Kissavos. The conical summit is 6398 feet high. According to Homer, the young giants, Otus and Ephialtes, planned to pile Ossa on Olympus and Pelion on Ossa in order to reach heaven.

OSSEIN, ôs'sê-in (from Lat. *os*, bone). A substance allied to gelatin and forming the organic part of bones. It is obtained by the prolonged action of dilute hydrochloric acid on bone, which dissolves all the inorganic matter. The material thus obtained retains the form of the bone without its hardness, and must be repeatedly washed with water, and treated with alcohol and ether to remove traces of salts, fat, etc. It is insoluble in water, but is converted into gelatin by the action of boiling water—a transformation which is much facilitated if a little acid be present. The ossein yielded by different kinds of animals requires different times for its conversion into gelatin, and that of young animals changes more rapidly than that of adults of the same species.

OSSETES, ôs-sêts'. A people of the Kazbek region in the Central Caucasus. The Ossetes seem to be somewhat above the average in stature, with subbrachycephalic head-form, and largely without the prepossessing physical characters of some of the other peoples of the Caucasus. Ripley (1899) is inclined to regard the Ossetes as immigrants from the direction of Iran; their own tradition brings them from the region of the Don in Southeastern Russia. The Ossetes call themselves Iron, which has been identified with Iran (Eran). (See OSSETIC LANGUAGE.) Their religion is a mixture of Christianity and Islam. Family life is strong, but the married woman (though girls are consulted for marriage) has a rather servile position. Detailed information about the Ossetes will be found in Haxthausen, *Transcaucasia* (London, 1854); Von Erckert, *Der Kaukasus und seine Völker* (Leipzig, 1887); Chantre, *Recherches anthropologiques dans le Caucase* (Paris, 1885-87); and Koval-evski, "The Customs of the Ossetes," in the *Journal of the Royal Asiatic Society* for 1888. See OSSETIC LANGUAGE.

OSSETIC LANGUAGE. A modern Iranian language spoken in the central part of the Caucasus. In its phonology it resembles Armenian (q.v.) in many respects, but these similarities are to be regarded as accidental coincidences. In structure the language, like the other modern Indo-Iranian vernaculars, is analytic in type. The noun has ten cases, formed by postpositions (e.g. *käg*, 'man,' *kägä*, 'to the man,' *käji*, 'of the man,' *käjmä*, 'with the man,' while the plural *kägtä*, 'men,' has the corresponding forms *kägtän*, *kägtj*, *kägtimä*). The verb has three tenses, present, preterite, and future, and four modes, indicative, imperative, optative, and subjunctive. Compound tenses and a passive voice are formed, as in many other languages, by the participles and the verb *äum*, 'to be' (e.g. *undistät*, 'ye were cursed'). Ossetish has two main dialects, Tagaurish, Ironish, or Irish in the northeast, with a sub-dialect Tualish in the south, and Digorish or Dugorish in the northwest. By far the most important linguistically is Tagaurish. The Ossetish has but a scanty literature, although rich in folk-tales. The Psalms and most of the New Testament have been translated into it. The Russian alphabet is often employed, although the Armenian is the

more common. Consult: Sjögren, *Ossetische Sprachlehre* (Saint Petersburg, 1844); Rosen, *Ossetische Sprachlehre* (Lemgo, 1846); Konkadze and Korayevym, *Osetinskiye teksty* (ed. by Schiefner, Saint Petersburg, 1868); Miller, *Osetinskiye etyudy* (Moscow, 1881-87); id., *Digorskiya skazanina* (ib., 1902); Stackelberg, *Beiträge zur Syntax des Ossetischen* (Strassburg, 1886); Hübschmann, *Etymologie und Lautlehre der Ossetischen Sprache* (ib., 1887).

OS'SETT. A municipal borough in Yorkshire, England, on the Calder, 3½ miles west of Wakefield (Map: England, E 3). Its staple industry is the manufacture of woollens. Coal is extensively mined in the neighborhood. The town owns its water supply, maintains a free library, technical school, and sewage works. It has a mechanics' institute. Population, in 1891, 11,100; in 1901, 12,900.

OS'SIAN, more correctly **OISÍN**, or **OSSÍN**. A legendary character of Irish literature, whose exploits are connected with historical events of the last days of heathendom in Ireland. As time went on poems about Ossin spread over Ireland and Scotland. The whole cycle underwent changes in individual poems. The tradition was embellished, and more and more it grew to resemble fairy lore. According to the evidence of these largely fragmentary or late poems and of the prose romances, Ossin belongs to the third century A.D. and to Ireland. King Cormac MacArt had a son-in-law Finn (or Fionn), who commanded the Fianna or Fenians, a sort of praetorian guard of the royal chieftain, among whom were Finn's son Ossin, his grandson Oscar, and another grandson Caoilte (or Caillte). Cormac is said to have died in 266. His successor, Carbery, thought the Fenians a danger to his throne. Civil war arose. Carbery slew Oscar. The Fenians were crushed in 293 at the battle of Gabhra. Ossin and his cousin Caoilte fled, and we find them, only 150 years later, in the company of Saint Patrick, through whose ministrations they die baptized, according to some forms of the legend. The "Story of Ossin in the Land of the Young" makes him pass long years in fairyland. It is possible to distinguish three periods in the Ossin cycle: (1) The ancient, recorded in fragments older than the twelfth century, of which there may be altogether some 100. (2) The mediæval, containing documents chiefly of the twelfth century, of which the most important is the *Agallamh na Senorach* or *Colloquy of the Elders*, a chaos of local legends, of prose and verse, the latter apparently the more ancient, and bearing somewhat the relation to the former, in diction, that the *Elder Edda* does to the *Younger*. The work of this period is more patriotic, chauvinistic even, than are the ancient fragments. It expresses hatred for the foreigner, under the guise of Fenian opposition to the Lochlannach. Another noteworthy characteristic is that woodcraft plays a greater part and there is more appreciation of nature than earlier. (3) The post-mediæval Ossinic documents are mainly in verse. The wilder forms of nature become prominent in them, and many of the songs are defiantly and dramatically pagan, as though in scorn of the sour fanaticism of Patrick, who is quite transformed from the genial saint of the earlier period. The first examples of the cycle in this stage are to be found in Dean McGregor's *Book of Lismore*, a compilation of 1518, or per-

haps earlier. But Irish and Scotch tales of Ossin and the Fenians continued to be sung and told in the seventeenth, eighteenth, and even in the nineteenth century. The last deliberate contribution to the Ossin cycle was Michael Comyns's *Oisin in Tir na N-Og*, which, as it was written about 1750, is by an odd coincidence almost exactly contemporary with Macpherson's (q.v.) dislocated mosaic of phrases from Ossinic poems coupled with those of other cycles and set in a modern and rather cheap paste, which he published as "Ossian." Yet the reaction against Macpherson's poems has been too strong. In Macpherson's work landscape plays a very great part; in the Ossin cycle a very small one. It may be noted too that Macpherson confounds heroes of the cycle of Cuchullin with the Fenians and makes both contemporaries of the Northmen of the eighth century. (See MACPHERSON.) It is doubtful if any fragment of verse by Ossin remains. Poems are first attributed to him in twelfth-century manuscripts. Indeed, the origin, authorship, date, historical background, and even the existence of the hero, are all matters of uncertainty and debate. Consult: Ossianic Society publications (Dublin, 1854-61); Simpson, *Poems of Ossian* (London, 1857); J. F. Campbell, *Popular Tales of the West Highlands, Orally Collected, with a Translation* (ib., 1860-62); Mac Lauchlan, *The Book of the Dean of Lismore* (ib., 1862); Clerk, *The Poems of Ossian, with a Dissertation and Translation* (ib., 1870); Campbell, *Leabhar na Teinne* (ib., 1871); *Academy* for 1873—letters by Hennessy; Windisch, *Die altirische Sage und die Ossianischen Gedichte* (Leipzig, 1878); Windisch, *Irische Texte* (Leipzig, 1881-1900); Arbois de Jubainville, *La littérature ancienne d'Irlande et l'Ossian de Macpherson* (Paris, 1880); K. Meyer, *Cath Finntraga, or the Battle of Ventry* (Oxford, 1885); Campbell, *Fiana* (London, 1891); O'Grady, *Silva Gadelica* (London, 1892), and *Silva Celtica* (London, 1895); Texte, *J. J. Rousseau et le cosmopolitisme littéraire au XVIIIe siècle* (Paris, 1895, translated London, 1899); Nutt, *Ossian and the Ossianic Literature* (London, 1899); also the *Revue Celtique* (Paris, 1870 et seq.). See MACPHERSON, JAMES.

OSSIFICATION (from Lat. *os*, bone + *facere*, to make). The vital process by which calcareous matter is deposited in cartilage or membrane, giving rise to bone. At a very early period of embryonic life, as soon as any structural differences can be detected, the material from which the bones are to be formed becomes mapped out as a soft gelatinous substance, which may be distinguished from the other tissues by being rather less transparent, and soon becoming decidedly opaque. From this beginning the bones are formed in two ways: either the tissue just described becomes converted into cartilage, which is afterwards replaced by bone (*intracartilaginous ossification*), or a germinal membrane is formed, in which the ossifying process takes place (*intramembranous ossification*). The latter is the more simple and rapid mode of forming bone. When ossification commences, the membrane becomes more opaque, and exhibits a decided fibrous character, the fibres being arranged more or less in a reticulated manner. These fibres become more distinct and granular from impregnation with lime salts, and are converted into incipient bone, while the cells which are

scattered among them shoot out into the bone corpuscles, from which the canaliculi are extended, probably by resorption. The facial and cranial bones, with the exception of those at the base of the skull, are formed without the intervention of any cartilage.

In intracartilaginous ossification, at the point where ossification begins the cartilage cells arrange themselves into rows, and become separated by the growth of the matrix in which they lie. A deposit of calcareous material now takes place between the rows of cartilaginous cells, and the cartilage assumes a granular and opaque appearance. While this process is going on in the centre, a thin layer of bone is being formed between the surface of the cartilage and the vascular membrane covering it—the periosteum—by the agency of cells called osteoblasts, in much the same way that intramembranous ossification takes place. From this outer shell prolongations consisting of osteoblasts and blood-vessels penetrate toward the centre of the cartilage and form the permanent canals through which the bone is nourished. All the bones of the body except those of the face and the vault of the cranium are formed in cartilage. Certain bones at the base of the skull, as the occipital, are formed partly in cartilage and partly in membrane.

True ossification sometimes occurs as a pathological process; but in many cases the term is incorrectly used (especially in the case of blood-vessels) to designate a hard calcareous deposit, in which the characteristic microscopic appearances of true bone are absent. The osseous tissue that is formed in regeneration of destroyed or fractured bones may be regarded as due to a morbid, although a restorative action. Hypertrophy of bone is by no means rare, being sometimes local, forming a protuberance on the external surface, in which case it is termed an *exostosis*, and sometimes extending over the whole bone or over several bones, giving rise to the condition known as *hyperostosis*. Again, true osseous tissue occasionally occurs in parts in which, in the normal condition, no bone existed, as in the dura mater, in the so-called permanent cartilages (as those of the larynx, ribs, etc.), in the tendons of certain muscles, and in certain tumors. The causes of these osseous formations are not known.

OS'SINING (formerly SING SING). A village in Westchester County, N. Y., 31 miles north of New York City; on the east bank of the Hudson River, and on the New York Central and Hudson River Railroad (Map: New York, G 4). It is a popular residential place, beautifully situated at the widest part of the Hudson, Tappan Bay, and commanding from its elevated site fine views. It has a public library, several private boarding schools, and a soldiers' monument. The arch of the Croton Aqueduct, 88 feet in span and 70 feet above water, with a subjacent arched highway bridge, is an interesting feature. The Sing Sing State Prison, located here, is one of the most prominent in the United States. There are extensive manufactures of machinery, foundry products, porous plasters, pills, shoes and leather, etc. Under a revised charter of 1897 the government is vested in an annually elected president and board of trustees. There are municipal water-works. Population, in 1900, 7939. Settled about 1700 on part of the Philipse Manor. Sing Sing, named probably from the Sin Sincks Indians, was

incorporated as a village in 1813. In 1901 the name was changed to Ossining after several attempts had been made, the former name having become objectionable owing to its association with the prison. Consult Scharf, *History of Westchester County* (Philadelphia, 1886).

OS'SOLI, Marchioness. See FULLER, SARAH MARGARET.

OSTADE, ōs'tā-dē, ADRIAEN VAN (1610-85). One of the greatest of Dutch genre painters. He was born at Haarlem, December 10, 1610, and was a pupil of Frans Hals. He was, however, more influenced by his fellow-pupil Brouwer, in whose manner he painted tavern scenes from peasant life, during what may be called his first manner, which lasted till about 1640. He endeavored to render the artistic effect of the whole, giving little detail, and even caricaturing Brouwer's types. His second manner is characterized by chiaroscuro effects, which show, especially in his interiors, the influence of Rembrandt. The element of the landscape also enters his art, which had heretofore been confined to interiors. From 1650 to 1670 he was at the height of his powers, after which his pictures become cooler in tone, though the colors are brighter, and the execution is more detailed. He lived in prosperous circumstances, having been dean of the Painters' Guild and a member of the civic guard. He died at Haarlem, April 27, 1685.

Over five hundred of his paintings survive, of which there are numerous examples in the galleries of Northern Europe. Of the paintings of his first period, representing tavern scenes, there are good specimens in the private galleries of Vienna and Cassel, and in the public collections of Munich and Dresden. Among the works of his best period are the "Hurdy-Gurdy Man Before a Peasant's Cottage" (1640) and "Peasant Company," in the Berlin Museum; "Interior of a Cottage," (1642), "The Village School," and "The Schoolmaster," in the Louvre; "A Tavern Scene" (1660), "Peasants Smoking," "The Painter in His Studio," and others in the Dresden Gallery; and a number of excellent examples in Buckingham Palace, London. To his best period also belong a number of admirable single genre figures like the "Baker," "Fiddler," "Hurdy-Gurdy Man," and the three "Senses," at Saint Petersburg; the "Merchant," and "Man Reading," in the Louvre; "The Smoker" (Antwerp), and the "Herring Eater" (Brussels); and a fine portrait group wrongly supposed to be the painter and his family, in the Louvre. There are good examples of his later period at Amsterdam, The Hague, Cassel, and Dresden. Ostade was also an etcher of some distinction, having left about 50 plates treating of peasant subjects, most of them dated 1646 and 1647, a period at which he was under the influence of Rembrandt.

Consult: Van der Willigen, *Les artistes de Haarlem* (The Hague, 1870), and the biographies by Gaedertz (Lübeck, 1869), and Lemeke, in Dohme, *Kunst und Künstler* (Leipzig, 1878); also Bode, *Adriaen van Ostade als Zeichner und Maler* (Vienna, 1881); Van der Wiele, *Les frères van Ostade* (Paris, 1893); Rosenberg, *Adriaen und Isack van Ostade* (Bielefeld, 1900); Springer, *Das radierte Werk von Adriaen van Ostade* (Berlin, 1899).

OSTADE, ISAAK VAN (1621-49). A Dutch landscape and genre painter. He was born at

Haarlem, and was a younger brother and the principal pupil of Adriaen van Ostade, from whose works it is difficult to distinguish his early genre paintings, which are not signed. He soon developed an independent style, the chief characteristics of which are warmth and harmony of color and an admirable impasto, his best productions comparing favorably with his brother's. He left about 120 paintings, most of which are in private possession in England. In his independent paintings one of his favorite subjects is traveling parties, consisting of men and horses, resting before a tavern, in which the theme is always varied, the charming landscape being the most attractive feature. Of this subject there are five examples in the galleries of Amsterdam, Buckingham Palace (London), Berlin, the Louvre, and Saint Petersburg. His other chief specialty is winter scenes, represented in fine gray harmonies, in which he usually introduces the frozen canals with the national Dutch amusements of skating and sleighing. Of this variety there are three good examples in the Louvre, and others in the National Gallery, London, and in the Galleries of Antwerp, Saint Petersburg, and Dresden. A third subject, in which the figures rather than the landscapes are the principal part, are groups of peasants sitting in front of taverns or house doors, of which the chief examples are "The Spinner," in the Brussels Museum, and "The Fiddler," in Buckingham Palace. His drawings are no less excellent and carefully executed than his paintings. He died at the height of his power and was buried October 16, 1649, in Haarlem. Consult the authorities referred to under ADRIAEN VAN OSTADE.

OSTA'RIOPHY'SI (Neo-Lat. nom. pl., from Gk. *ὀστέριον*, *ostarion*, little bone, diminutive of *ὀστός*, *osteon*, bone + *φύσα*, *physa*, bladder). A group of teleost fishes, which includes the great majority of the living fishes of the world. This group is characterized, according to Jordan, by the modification of the anterior vertebrae, which are coössified and have some of their lateral and superior elements detached to form a chain of small bones, the Weberian ossicles, which connect the air-bladder with the ear. It is composed of three orders—Nematognathi (q.v.), Plectospondyli (q.v.), and Seyphophori—which are regarded as descended from a common stock.

OSTASHKOV, ős-täsh'kóf. A town in the Government of Tver, Russia, on the eastern shore of Lake Seliger, 162 miles northwest of Tver (Map: Russia, D 3). Among its public institutions are a library and a theatre. It is especially known as a tanning centre and has extensive boot-making interests. Other industries are boat-building and the manufacture of hardware and agricultural implements. A steamer service is maintained on the lake, which also affords good fishing facilities. Population, in 1897, 10,457.

OSTEND, ős-tënd' (Flem. and Fr. *Ostende*). A famous watering place on the North Sea on the west coast of Belgium, in the Province of West Flanders, 14 miles from Bruges (Map: Belgium, A 3). It is the second port in the Kingdom, and is connected by canal with Bruges and Ghent. Ostend is the terminus of branch railway lines connecting with the great Continental systems, and is a station for daily steamers between England and the Continent. The traffic between London and Ostend is immense. In

the season from June 1st to October 25th about 50,000 visitors annually flock to the town. It is beautifully laid out as a fashionable summer resort. The elegant Kursaal is the centre of life in the season. The magnificent stone sea wall is lined with splendid hotels. The harbor works are on a fine scale, embracing a number of basins, which are entered by a channel about 100 yards wide. Ostend has a large fishing fleet, and the culture of oysters is carried on in the so-called oyster parks. Ostend endured a memorable siege by the Spanish from 1601 to 1604, when it finally surrendered to Spinola. Population, in 1901, 39,541. Consult Beaucourt de Noortoelede, *Ostendiana 814-1900 ou la reine des plages*, vols. i.-ii. (Ostend, 1900).

OSTEND COMPANY. A trading corporation founded by the Emperor Charles VI. in 1722, and chartered by him in the following year. As ruler of the former Spanish Netherlands, it was his ambition to make Ostend a great port on the northern waters, as Trieste was on the Mediterranean, and to obtain for the Empire a share in the lucrative trade with the East Indies; hoping, too, that the merchant marine thus created would become the nucleus of an imperial navy. Preliminary voyages had been made for some years before the establishment of the company, and soon after its incorporation as the Ostend East India Company settlements were founded at Covelong on the southeast coast of India and Bankipur on the Hughli. To further his schemes which, after the confirmation of the Pragmatic Sanction, was his favorite project, the Emperor sought the assistance of Spain, whose coöperation was obtained in the second treaty of Vienna (1725). The maritime powers, especially England and Holland, regarded this intrusion on their trade monopoly with resentment, and the Emperor in the preliminaries of Vienna (May, 1727) was compelled to suspend the operations of the company for seven years, and by the second treaty of Vienna in 1731 to abolish it.

OSTEND MANIFESTO. A dispatch drawn up at Ostend, October 9, 1854, and signed by James Buchanan, John Y. Mason, and Pierre Soulé, at that time the United States Ministers to Great Britain, France, and Spain respectively, declaring that the sale of Cuba would be as advantageous and honorable to Spain as its purchase would be to the United States, but if Spain refused to sell, self-preservation required that it be wrested from her by force. Encouraged by the acquisition of Texas, the pro-slavery leaders had been affording ready assistance to filibustering expeditions directed against the islands of the Spanish West Indies, and especially Cuba. These expeditions and the probable future action of the Federal Government in regard to the island created anxiety in Europe, and in 1852 Great Britain and France addressed a joint note to the United States proposing a tripartite convention by which the three Powers should disclaim all intention to obtain possession of Cuba and should discountenance such attempts by any Power. Everett, then Secretary of State, replied, refusing to accede to such an arrangement, while declaring that this country would never question Spain's title to the island. President Pierce in August, 1854, directed the American ministers resident at London, Paris, and Madrid to meet at some convenient point for discussion of the Cuban question.

They met at Ostend, October 9th, and subsequently at Aix-la-Chapelle, though it was at the former place that the memorandum known as the Ostend Manifesto was prepared.

The declaration was not approved in the United States in the platforms of either party, and it was strongly condemned in Europe. Consult: Cluskey, *Political Text-book* (Philadelphia, 1860); also Wilson, *Rise and Fall of the Slave Power* (Boston, 1872-77).

OSTEN-SACKEN, ōs'ten-säk'ken, Baron CHARLES ROBERT (1828—). A Russian diplomatist and entomologist. He was born August 21, 1828, in Saint Petersburg, where he was educated, and in 1849 entered into the service of the Imperial Foreign Office. In 1856 he was appointed Secretary of Legation in Washington; in 1862 Consul-General of Russia in New York. He resigned his post in 1871, but remained in the United States until 1877, when he went to reside in Heidelberg. He devoted the best years of his life to working up the Diptera (flies) of North America, partly in collaboration with H. Loew, and otherwise exerted an immense influence in extending entomological studies in North America. Besides many papers of a systematic, critical, and historical nature, Baron Osten-Sacken has published two catalogues of North American Diptera, also elaborate monographs on different families of flies.

OS'TEOL'EPIS (Neo-Lat., from Gk. ὀστέον, *osteon*, bone + λεπὶς, *lepis*, scale). A fossil crossopterygian fish found in the Old Red Sandstone of the Scottish Devonian.

OSTEOLOGY (Gk. ὀστεολογία, from ὀστέον, *osteon*, bone + -λογία, *-logia*, account, from λέγειν, *legein*, to say). The science which treats of the anatomy, development, and relation of bones and bony tissue. See BONE; SKELETON.

OS'TEOMALA'CIA (Neo-Lat., from Gk. ὀστέον, *osteon*, bone + μαλακία, *malakia*, softness, from μαλακός, *malakos*, soft), MOLLITIES OSSIIUM, or MALACOSTEON. A disease of adult life, characterized by progressive softening of the various parts of the skeleton, with resulting deformities. It is very rarely seen in children or old persons. In the great majority of cases it affects women, chiefly those who have borne children or who are pregnant. It usually progresses from bad to worse, and after perhaps a number of years it causes death, chiefly from exhaustion or complicating disease of the lungs. It has been attributed to the action of many causes, such as defective nutrition, excess of lactic acid, disease of the trophic nerves, ovarian and uterine changes, etc.; in many cases the real exciting cause is uncertain.

The changes in the bony tissue are: Great increase in vascularity, with resulting hemorrhages; then there is degeneration of the medulla or the marrow of the bone, so that it finally becomes converted into a pulp-like substance; then there is destruction of the cancellous or spongy tissue of the bone, so that cavities or tumor-like enlargements result. The periosteum is ordinarily thicker and more vascular than normal, and serves as a protecting envelope to the broken-down bone. Fracture of the bone from no other cause than muscular action or a slight movement is of frequent occurrence, and deformity—sometimes very excessive and peculiar—is sure to be produced in other than the mildest cases.

Until deformity has occurred, or until at least the softening has advanced so far as to permit of the bone being bent, the diagnosis is difficult and uncertain, since the progress of the disease is for a long time an insidious one. Because of the early developed and persistent pain, the affection may be mistaken for rheumatism; but the multiplicity of painful areas, the sex of the patient, the existence of pregnancy, and the presence of large quantities of the salts of lime in the urine should direct suspicion to osteomalacia. Though this disease may not for a time exert any unfavorable influence upon life, the prognosis is grave, for the disease usually ends fatally. However, it occasionally ceases to advance, and it has even been overcome. Medical treatment—the use of phosphorus and the phosphates, the lime salts, cod-liver oil, etc.—has proved of little or no value. The best possible hygienic surroundings should be secured and the patient kept quiet and free from pain. Proper retentive dressing should be applied to prevent fracture and lessen deformity. It is reported that in some cases the removal of the ovaries and uterus has been beneficial. In any event pregnancy should be prevented, as childbearing exerts a powerful and deleterious influence upon the progress of the disease.

OSTEOMYELITIS (Neo-Lat., from Gk. ὀστέον, *osteon*, bone + μυελός, *myelos*, marrow). An inflammation, usually acute, of the marrow of the bone, extending to the bone itself, and due to infection by pyogenic organism. It may follow a wound which exposes the medullary canal to the air, such as a compound fracture, a gunshot injury, or an amputation; or the infective material may be introduced through the blood. The entire shaft of the bone may be involved. The symptoms are severe aching pain, exquisite tenderness, and deep swelling of the soft parts over the bone. A purulent discharge, containing fragments of dead bone and tissue-sloughs, makes its appearance. There is a high fever in severe cases, with chills and sweats.

Children are subject to an acute form of the disease, which is sometimes called acute epiphysitis because it begins at the epiphyseal line and involves the epiphysis. (See OSSIFICATION.) A strain occurs at this point, and an inflammation ensues. The femur and tibia are the bones oftenest affected, and the knee or hip-joint becomes involved and filled with pus. The disease may sometimes be mistaken for rheumatism.

The treatment of this malady, which is a very fatal one, is purely surgical. The affected bone is to be freely opened, dead bone removed, the medullary canal scraped and washed out with a strong antiseptic, packed with gauze, and drained. Amputation is sometimes necessary. The patient's strength should be supported by nourishing food and stimulants.

OS'TEOP'ATHY (from Gk. ὀστέον, *osteon*, bone + πάθος, *pathos*, suffering, disease). A method of treating disease by manipulation, for which its adherents claim a universal curative power. It was invented by Andrew T. Still, of Kirksville, Mo., in 1893. The underlying principles of osteopathy are briefly as follows: The fluids of the human body contain greater or less amounts of all chemical substances, inorganic and organic, that are at all capable of existence, and hence carry a store of all drugs that may be required for checking and destroying any imag-

inable disease; disease itself is nothing but an abnormal effect of the powers of life and presumably arises, along with the normal effect—motion—continually; only, under the influence of the drugs in the body, the activity of those powers is immediately redirected along normal channels, and so disease no sooner arises than it is counteracted and destroyed; the reestablishment of health can be prevented by only one cause, viz. the slight displacement of some bone, which would naturally form an obstruction to the flow of the drug-carrying fluids; therefore, to effect the cure of any disease whatever, all we have to do is to localize the causative displacement of the bone or bones and remove it by appropriate manipulation. Mr. Riggs, of Boston, a lecturer on osteopathy, defines the methods as follows: "Osteopathy is a method of treating disease by manipulation, the purpose and result of which is to restore the normal condition of nerve control and blood supply to every organ of the body, by removing physical obstruction or by stimulating or inhibiting functional activity, as the condition may require."

The technical objections raised by the medical profession to the fundamental principles of osteopathy are numerous and have often been expressed in very strong terms. Even the more sober-minded members of the profession, while fully recognizing the value of methods like massage (q.v.) and Swedish movement (see MOVEMENT CURE) in certain cases, are very emphatic in denying that any such method can be applied in all cases without exception. Their objection is, therefore, not so much against the method itself as against its universal application, to the exclusion of medical diagnosis and of other therapeutic methods of recognized utility. In general, they object strongly to any but a person disciplined by several years' professional study taking full charge of cases in which the health, and perhaps the life, of human beings may be in great danger. Before the law the osteopath takes the position that he practices, not medicine, but osteopathy; that he cannot, therefore, be required to take a prolonged course of medical study; and that no law is in the way of his entering upon the practice of osteopathy after a few months of special training. This position has been often sustained by courts of justice, many judges defining the practice of medicine proper as the treatment of diseases by the use of drugs, while physicians generally define their practice as the treatment of diseases by any method whatever, whether involving the use of drugs, or the application of the methods of surgery, obstetrics, ophthalmology, hydrotherapy, etc.

Consult: Bonnet, "Attitude Toward Osteopaths," in *Columbus Medical Journal* (1902); "Education of Osteopaths," in *Southern Journal of Osteopathy* (1900).

OSTERHAUS, ôs'têr-hous, PETER JOSEPH (c.1820—). A German-American soldier, born in Coblenz, Germany. After serving for some time as a Prussian army officer, he emigrated to the United States and settled in Saint Louis. At the outbreak of the Civil War he was appointed a major of the Second Missouri Volunteers, and during the first year of the war was employed in Missouri and Arkansas, where he took a conspicuous part in the battles of Wilson's Creek

(August 10, 1861) and Pea Ridge (March 7-8, 1862). In 1863 he commanded a division before Vicksburg, and at Chattanooga (November 23-25) he aided General Hooker in the capture of Lookout Mountain. He was then assigned to General Sherman's army, and after the capture of Atlanta was given command of the Fifteenth Corps, one of the two corps into which the army was consolidated. He was mustered out of the service on January 15, 1866, and the same year was appointed United States Consul at Lyons, France, but subsequently made his home in Germany.

OSTERMANN, ôs'têr-mân, ANDREI IVANOVITCH, Count (1686-1747). A Russian diplomat, born in Bochum, Westphalia, where he was christened Heinrich Johann Friedrich. He studied at Jena, whence he fled, because he had killed his opponent in a duel, to Holland, and there met Peter the Great and entered the new Russian Navy. He enjoyed Peter's favor, negotiated the treaties of the Pruth in 1711 and of Nystad in 1721, became baron, and in 1725 Vice-Chancellor to Catharine I., who made him a member of the regency during Peter II.'s minority. Under the Empress Anna Ivanovna he was appointed Minister of Foreign Affairs (1730), and he kept the good will of Anna Leopoldovna when she became Regent, only to fall into disfavor with Elizabeth, who charged him with urging her exclusion from the succession and with the suppression of Catharine's will. He was sentenced to death, reprieved on the scaffold (1742), and banished to Siberia.

OSTERMANN-TOLSTOY, ALEXANDER IVANOVITCH (1770-1857). A Russian general. He entered the army when he was a boy, fought bravely in the Turkish campaign of 1790, and in 1805 commanded the Russian corps which, with Swedish and English divisions, attempted to make a diversion in Northern Germany. As commander of the Fourth Army Corps in 1812 and 1813, he fought at Bautzen, where he was wounded, and he lost his left arm at Kulm.

OSTERODE, ôs'te-rô'de. A town in the Province of East Prussia, Germany, on Lake Drewenz, about 75 miles south-southwest of Königsberg (Map: Prussia, D 3). It is an ancient town with a castle built by Teutonic knights in 1270, a gymnasium, and a seminary for teachers. It has railway shops, machine works, saw mills, distilleries, a municipal slaughter-house, etc., and trades in grain, lumber, and cattle. Population, in 1900, 13,163.

OSTERODE. A town in the Province of Hanover, Prussia, situated in the Harz, 34 miles by rail northwest of Nordhausen. Its Church of Saint Ægidius, founded originally in the eighth century and rebuilt in 1578, contains interesting tombs of the princes of Grubenhagen. There is a large grain storehouse from which in times of scarcity the miners in the Harz Mountains are supplied at reduced prices. The manufactures of the town include woolen, cotton, and knit goods, machinery, metal works, cigars, leather, paint, etc. Population, in 1900, 7099.

OSTHOFF, ôst'hôf, HERMANN (1847—). A German comparative philologist, with Brugmann (q.v.) the head of the 'new grammarians.' He was born at Billmerich in Westphalia; studied at Bonn, Tübingen, and Berlin, and, after teaching in a gymnasium at Cassel, became in 1877 professor

of Sanskrit and comparative grammar at Heidelberg. He was one of the founders and editors of *Morphologische Untersuchungen auf dem Gebiete der indogermanischen Sprachen* (1878-90), and wrote: *Zur Geschichte des schwachen deutschen Adjectivums* (1876); *Das Verbum in der Nominalkomposition* (1878); *Zur Geschichte des Perfekts im Indogermanischen* (1884); *Vom Suppletivwesen der indogermanischen Sprachen* (1899); and *Etymologische Parerga* (1901).

OSTIA. An ancient city of Latium, at the mouth of the Tiber, 15 miles from Rome. It is said to have been founded by Ancus Marcius, and was regarded as the oldest Roman colony. It first acquired importance from its salt works, the establishment of which is attributed to Ancus Marcius, and afterwards was the port where the Sicilian, Sardinian, and African corn shipped for Rome was landed. Its name first occurs during the Second Punic War. It was long the principal station of the Roman navy; but its harbor was exceedingly bad, and gradually the entrance became silted up with alluvial deposits, so that vessels could no longer approach it, but were compelled to ride at anchor and disembark their cargoes in the open roadstead. At length the Emperor Claudius dug a new harbor or basin two miles north of Ostia, and connected it with the Tiber by a canal. It was named the *Portus Augusti*, and around it soon sprang up a new town called *Portus Ostiensis*, *Portus Urbis*, *Portus Romæ*, and often simply *Portus* (modern Porto). The work of Claudius was carried further by Trajan. After the fall of the Roman Empire Ostia declined rapidly, and in the eighth century it was a mere ruin. During the Middle Ages a village—the modern Ostia—was built about half a mile above the site of the ancient town; but it has not more than about a thousand permanent inhabitants, who still carry on the manufacture of salt. Ostia has the reputation of being the seat of the earliest bishopric save that of Rome, and the Cardinal Bishop of Ostia (and Velletri) is Dean of the Sacred College. The ruins of the ancient Ostia extend for a mile and a half along the banks of the Tiber, and are nearly a mile in breadth.

OSTIAKS. A name which seems to have been applied at first to the primitive Finnic peoples of the middle cis-Uralian upland valleys by the Russians and afterwards extended to trans-Uralian tribes as far as the Yenisei. The etymology of the name is uncertain, and its ethnological value has been different with different writers and at different periods. According to Sommier, the Ostiaks of the Obi are short in stature, spare in form as contrasted with the robust or even fat Samoyeds, with brachycephalic head-form and a considerable percentage of dolichocephaly. Their skin is quite white; the hair and eyes are brown. The Ostiaks are reported to be a disappearing people, their only resources being hunting and fishing. The Ostiaks of the region of the Naryn, etc., are merely Samoyeds. The mass of the Ostiaks dwell between Obdorsk and Surgut—the Tas Ostiaks beyond Surgut are of mixed race. The Voguls and Ostiaks of the eastern slope of the Urals, who both call themselves Manzi, are very closely related by language, mythological ideas, and social institutions. Some intermixture with the Russian immigrants into Western Siberia has taken place. Consult: Seebohm, *Siberia in Asia* (London, 1882); Pat-

kanoff, *Die Irtysch-Ostjaker und ihre Volkspoesie* (Saint Petersburg, 1897); Abercromby, *Prehistoric and Proto-Historic Finns, both Eastern and Western* (London, 1898); Martin, *Sibirica* (Stockholm, 1897).

OSTIARIUS (Lat., doorkeeper, sexton). The name of the lowest of the four minor orders in the Roman Catholic Church. In this definite sense, the earliest mention known of it occurs in a letter of Pope Cornelius of the year 251; it seems to have been included with the other minor orders by his predecessor, Pope Fabian (236-251). By the end of the sixth century the ordination of this office was symbolized by the bishop delivering to the candidate the keys of the church with the words, "So act as one that must give account to God for the things which these keys guard." The duties attached to the office are those which are now performed by the sacristan (q.v.).

OSTIENSIS, PORTA (Lat., Gate of Ostia). A gate in the wall of Aurelian at Rome through which the Via Ostiensis passed. It dates from the time of Honorius, and its threshold is twelve feet above the level of the time of Aurelian, on account of the accumulation of rubbish leveled by Honorius. The gate was thrown open to the Goths by the Isaurians in 549. It was walled off in 1407 by King Ladislas of Naples, but was reopened in 1410, and is now the Porta di San Paolo.

OSTIENSIS, VIA (Lat., Road of Ostia). An ancient road leading from Rome to Ostia on the left bank of the Tiber, and continued southward as the Via Severiana, joining the Via Appia at Tarracina.

OSTINATO, ó'stè-nā'tò (It., stubborn). In music, a term applied to a constantly recurring short theme with constant changes in the other voices. Such themes are generally given to the bass, hence *basso ostinato*. It is a characteristic of the *chaconne* and *passacaglia* that they are always built upon such *basso ostinato*. In the compositions of the Gallo-Belgic school (see MUSIC, SCHOOLS OF COMPOSITION) the *ostinato* plays a very important part, as entire masses were written upon some short popular melody which as an *ostinato* was given to the tenor, while the other voices executed constantly new contrapuntal variations.

OSTRACISM (Gk. *δοσρακισμός*, *ostrakismos*, from *δοσρακίζειν*, *ostrakizein*, to ostracize, from *δοσρακόν*, *ostrakon*, potsherd). A method of political procedure in ancient Athens, whereby a citizen whose presence seemed dangerous to the State might be exiled for a time. It was said to have been introduced by Clisthenes in his reform of the Athenian constitution after the expulsion of Hippias (B.C. 510), but the first use of it seems to have been made in B.C. 488-487, when Hipparchus, son of Charmus of Collytus, was exiled, on account of his connection with the Pisistratidæ. Two others of this party followed, and in B.C. 485-484 Xanthippus, father of Pericles, was a victim, while a year or two later Aristides was banished. After the Persian wars the process was less frequently employed, though it was still used when party strife waxed hot and it seemed necessary to secure a definite verdict in favor of one policy. Among the ostracized were Themistocles, Cimon, Thucydides, son of Melesias, and Hyperbolus, whose ex-

ile really resulted in the abandonment of the system. The vote had been intended to decide between Nicias and Alcibiades, but they combined their forces against the much less influential Hyperbolus. Ostracism did not inflict any stigma upon a man, nor were his property or civil rights in any way disturbed. It simply required him to leave the country for ten years in order that he might exercise no influence on the course of politics. It thus afforded a means of deciding between rival leaders and their policies, and insured to the victor an opportunity to carry out his plans undisturbed by violent opposition. Every year, in the sixth prytany, the assembly voted whether a vote of ostracism should be taken during the year. If the decision was affirmative, a day was chosen in the eighth prytany, the market was fenced off, and through ten gates the members of the ten tribes entered to deposit the potsherds on which was written the name of the man whose ostracism was sought. To make the decision valid, at least 6000 votes were required, but of these a plurality seems to have sufficed to ostracize. Besides the Histories of Greece by Grote, Curtius, Busolt, Holm, and E. Meyer, consult: Gilbert, *The Constitutional Antiquities of Athens and Sparta*, English translation (London, 1895); Hermann, *Lehrbuch der griechischen Antiquitäten, I., Staatsaltertümer*, by Thumser (Freiburg, 1892); Busolt, *Griechische Staats- und Rechtsaltertümer* (Munich, 1892).

OSTRAC'ODA (Neo-Lat. nom. pl., from Gk. *οστράκωδης*, *ostrakōdēs*, like a potsherd, from *οστράκον*, *ostrakon*, potsherd + *εἶδος*, *eidos*, form). An order of crustacea in which the body is compressed and wholly protected by a bivalved shell or carapace. Besides the two sessile eyes and a median one, the former sometimes wanting, there are two pairs of antennæ, a pair of mandibles, two pairs of maxillæ, and two pairs of legs. The body is not divided into segments and the abdomen is rudimentary. The two valves are closed by a two-headed adductor muscle, the valves being joined together along the hinge-margin by an elastic ligament. In swimming, or in walking over the bottom, the valves gape

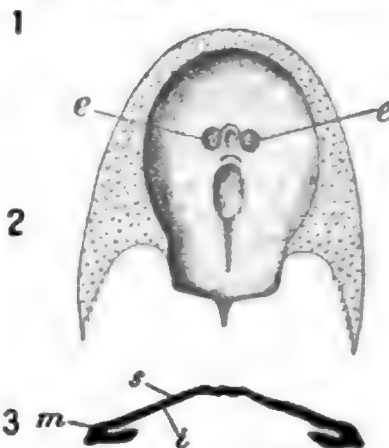
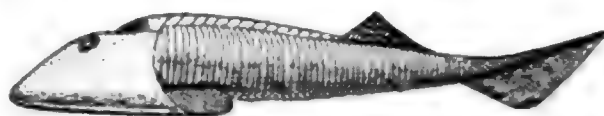


AN OSTRACOD (*Cypris*).

partly open, the slender legs protruding. Respiration is aided by a comb-like bristly plate attached to the first pair of maxillæ, but there are no true gills. The young of the fresh-water *Cypris* hatches in a modified nauplius stage, but already inclosed in a thin shell covering the entire body. In the marine forms there is no metamorphosis, development being direct. Ostracods feed on animal matter; they abound in the fresh water, but the larger number are marine, and exist at all depths. Many of the littoral as well as deep-sea forms are covered with thick shells more or less tuberculated, pitted, or otherwise ornamented. Fossil Ostracoda first appear in the Cambrian rocks. The order attained its maximum development in the Ordovician period, and in the Cretaceous modern forms began to appear. See CRUSTACEA.

OSTRACODERMI (Neo-Lat. nom. pl., from Gk. *οστρακόδερμος*, *ostrakodermos*, having a skin like a potsherd, from *οστράκον*, *ostrakon*, potsherd + *δέρμα*, *derma*, skin). A group of plectognath

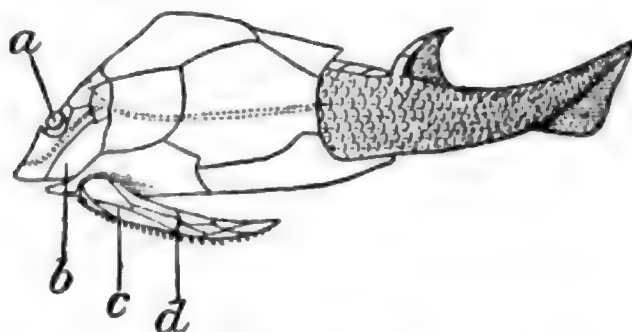
fishes which are without spines in the dorsal fin, and have the body inclosed in an angular box, or carapace, formed by polygonal bony scutes firm-



CEPHALASPIS.

1, restoration of *Cephalaspis Murchisoni*, about one-fourth natural size; 2, diagram of lower aspect of dorsal shield, showing inferior rim; e, e, position of eyes, with the interorbital ridge; 3, diagrammatic section of dorsal shield: l, inferior lamina; m, margin; s, superior lamina.

ly joined at their edges; they are the trunk-fishes (q.v.).



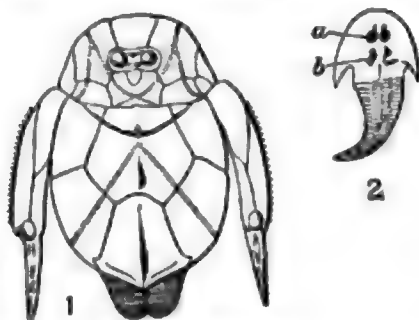
PTERICHTHYS.

Restoration of *Pterichthys Milleri*, of the Old Red Sandstone: a, orbit of eye; b, gill cover; c, one of the pair of lateral appendages; d, joint in appendage. The dotted lines indicate grooves for the sensory canal.

FOSSIL FORMS. Ostracodermi are the most primitive subclass of Paleozoic fossil fishes, characterized by the heavy calcareous plates that cover the head and forward part of the trunk, and by the absence of the lower jaw. These primitive fish-like vertebrates are supposed to be the ancestral forms from which the higher groups of fishes, and also all the other types of vertebrates, have descended by evolution. They appear first in the Upper Silurian rocks of Europe and North America, and they continue through to the top of the Devonian in both countries. The simplest forms are *Cyathaspis* and *Palæaspis*, found in the Upper Silurian and Devonian, and *Pteraspis* of the Devonian. *Cephalaspis*, one of the best known members of the group, has a horseshoe-shaped head-shield, and is found in the Silurian and Lower Devonian of Great Britain and in the Upper Devonian of Eastern Canada.

The highest members of the subclass, represented by *Bothriolepis* and *Pterichthys*, have dermal skeletons of far more complex nature than those seen in the other members of the group.

The heavy plates are more numerous and are symmetrically arranged, and attached to the sides of the head-shield is a pair of fin-like appendages, which are not, however, homologous to the fins of fish, though they closely resemble these latter. The hinder portion of the body was cov-



OSTRACODERMI.

1, restoration of *Bothriolepis hydrophila* of the Old Red Sandstone; 2, *Auchenaspis Egertoni*: a, orbits; b, post-orbital depression.

ered by small ganoid scales. Consult: Woodward, *Outlines of Vertebrate Palæontology for Students of Zoology* (Cambridge, 1898); Von Zittel and Eastman, *Textbook of Palæontology*, vol. ii. (New York, 1903). See CEPHALASPIS; CYATHASPIS; PTERASPIS; PTERICHTHYS.

OSTRAU, ós'trou. Two neighboring towns of Austria. See MÄHRISCH-OSTRAU and POLNISCH-OSTRAU.

OSTRICH (OF. *ostruche*, *austruche*, Fr. *austruche*, Sp. *avestruz*, from Lat. *avis struthio*, ostrich bird, from *avis*, bird, and *struthio*, from Gk. *στρουθίων*, *strouthiōn*, ostrich, *στρουθιοκάμηλος*, *strouthiokamēlos*, ostrich, camel-sparrow, so called from the long neck of the bird, from *στρουθός*, *strouthos*, bird, sparrow). The ostrich is the largest of living birds, long renowned for its beautiful plumes and its remarkable speed. Whether all ostriches belong to the same species is still an open question, for although four have been described, the differences suggested are very slight and may prove inconstant. There is, however, only a single genus, *Struthio*, and a single family, the *Struthionidæ*. The relationship of this family to the rheas, emeus, cassowaries, etc. (qq.v.), is still undecided, but all are members of the order *Ratitæ*, distinguished from all other living birds by the absence of any 'keel' on the breastbone. (See BIRD.) Ostriches are natives of Africa and some parts at least of Southwestern Asia. The common ostrich or 'camel-bird' (*Struthio camelus*) is found on the dry open plains and deserts of Northern and Central Africa (except Egypt), while the ostriches of Southern Africa, Somaliland, and Asia have been described as distinct species. Fossil remains of the ostrich have been found in India.

The male is somewhat larger than the female, measures seven feet, more or less, in height, and weighs upward of 200 pounds. His plumage is strikingly loose, fluffy, and deep black in color; only the 'plumes' (quill feathers) of the wings and tail are white. The female is much less handsome (dull brownish gray), while the very young chicks are yellowish, marked with longitudinal streaks of blackish. The young male assumes his mature plumage in about three years. In the adult of both sexes the head and most of the neck are nearly bare, only a sparse down covering the skin. The feet and legs also are

bare far up on the tibiae. The bill is of moderate length, broad, flattened, and rounded at the tip, and with the nostrils opening considerably in front of the base. The ostrich is unique in several anatomical peculiarities; there are only two toes (the third and fourth), the outer of which is much smaller and has no claw; there is a small external tail; and the pubic bones unite in a ventral symphysis. The wings bear three digits, but are so small as to be useless for flight, though they assist greatly in running. The legs, however, are big and powerful, and able to deliver a kick almost equal to that of a horse. The alimentary canal has a very muscular gizzard, as well as a large crop. There is no gall bladder. The food of the ostrich is chiefly vegetable, though small mammals, reptiles, and insects are sometimes taken. Water can be spared from the diet for long periods of time, if melons or other juicy fruits are available. Coarse gravel and small stones are swallowed to assist in the grinding work of the gizzard. In spite of an imperfect syrinx, the ostrich has a loud voice, said to resemble the roar of the lion, though its most common sound is an angry hiss.

The ostrich is polygamous, one male consorting with from two to seven females. He scoops out a hollow in the sand in which his companions lay their eggs, each female laying about ten. The eggs are not left to the heat of the sand and sun, as is often stated, but are incubated during the greater part of the day by one of the females, and at night by the male. When the eggs are left during the heat of the day, they are covered up with sand. The eggs are large and thick-shelled, of a creamy-yellow shade, with numerous small pits in the otherwise very smooth surface. Each egg is about six inches long and weighs nearly three pounds, while its cubic contents approximates that of two dozen hen's eggs. The bird is extraordinarily keensighted, and on its native plains is extremely wary. Hunting the ostrich has been a popular sport with the Arabā from time immemorial. They rely on the speed of their horses and run the birds down, a feat which would be impossible were it not for the curious fact that the ostrich runs in more or less of a circle, and the horsemen are thus able to continue the pursuit while traveling only a fraction of the distance that the bird runs. At full speed the ostrich is said to make sixty miles an hour, and for a limited time it can completely distance the fleetest horse.

OSTRICH-FARMING. For many centuries ostriches have been partially tamed or domesticated on a small scale by some of the tribes of Central or Northern Africa, but it is only since about 1860 that any extensive efforts have been made to supply the demand for ostrich plumes from domesticated birds. First in Cape Colony, later in Algeria and Argentina, and finally in the Southwestern United States, ostrich-farming was taken up as a profitable employment, and at the opening of the present century millions of dollars' worth of fine ostrich plumes were sent to market annually from ostrich farms. A consular report in 1899 stated that 261,000 ostriches were owned in Cape Colony alone. The farms of Arizona and southern California long since passed the experimental stage. Their birds are either pastured in small flocks, or a cock and one or two hens are kept in areas inclosed with coarse wire-

netting fences six or seven feet high; these pastures are usually arranged in pairs, so that when the alfalfa, upon which the birds feed, is exhausted in one field, the birds may be driven into the other. They also receive grain. The birds rarely fall ill, and are quite prolific in captivity, a male and two females having been known to produce 188 eggs in a year, about 80 per cent. of which yielded chicks. Artificial incubation is usually practiced, ordinary incubators with unusually large trays being used. When six or seven months old, the birds undergo their first plucking, and thereafter at intervals of about seven months new crops of plumes may be gathered. The plumes are cut off, not pulled out, but after a few days the dead stumps are removed to make room for the new feathers. The price of the plumes varies very greatly with the quality, but each bird on a well-managed farm will yield from \$30 to \$60 worth at a plucking. As the ostrich lives to be as much as eighty years old, there is an opportunity for large profit from each one.

Consult: Mosenthal and Harting, *Ostriches and Ostrich Farming* (London, 1879); Martin, *Home Life on an Ostrich Farm* (London, 1891); Paul, "Ostrich Farming in California," in *Cosmopolitan Magazine*, vol. xi. (New York, 1891); Newton, *Dictionary of Birds* (New York, 1896), where many further references may be found.

OSTRICH FERN (*Struthiopteris*). A genus of ferns whose fertile fronds have somewhat the appearance of an ostrich plume, and whose sterile ones attain a height of even ten feet, the whole plant forming a beautiful vase-like cluster. There is one species (*Struthiopteris germanica* or *Onoclea struthiopteris*) known in America and Europe, and there is probably another in Japan. The American species thrives best in northern latitudes in alluvial soil.

OSTROG, ôs-trôg'. A town in the Government of Volhynia, Russia, about 90 miles west of Zhitomir (Map: Russia, C 4). It has a gymnasium, a teachers' seminary, and ruins of an old castle. Leather is the chief product; there is some trade in grain, wool, and leather. Ostrog was formerly the residence town of a Polish principality of the same name, and is noted as the place where the first Bible in the Slavonic language was printed in 1581. The town came into the possession of Russia in 1795. Population, in 1897, 14,530, largely Jewish.

OSTROGOSH, ôs-trô-gôsh'. A town of South-Central Russia, in the Government of Voronezh, situated 50 miles south of Voronezh. It has a high school and numerous churches, manufactures tobacco and soap, and carries on trade in cattle and agricultural products. Population, in 1897, 21,897.

OSTROGOTHS. See **GOTHS**.

OSTROLENKA, ô'strô-lyên'ká. A town in the Government of Lomza, Russian Poland, situated on the Narev, 22 miles southwest of Lomza (Map: Russia, B 4). Its chief industry is the manufacture of small articles from amber which is found in the vicinity. The town is noted as the scene of two important battles. On February 16, 1807, the Russians under Essen were defeated by the French under Savary, and during the uprising of 1830-31 the Poles were defeated by the Russians after an heroic struggle

in which the former lost about 9000 men (May 26, 1831). Population, in 1897, 8697, chiefly Poles and Jews.

OSTROVSKI, ôs-trôf'ské, ALEXANDER NIKOLAYEVITCH (1823-86). A Russian dramatist. He was born in Moscow. In 1843 he accepted a position in the Commercial Court, and to this is largely due his minute knowledge of mercantile scheming and fraud which plays such an important part in his comedies. After making his debut with *Pictures of Family Happiness* in 1847, he attracted considerable attention by excerpts from his comedy *We Can Settle with Our Own People*, and left his post for literature. The complete work produced a sensation, and forty-three comedies followed. Yet, for many reasons, Ostrovski felt the pinch of need until shortly before his death, and, while idolized at Moscow, he found scant recognition at Saint Petersburg. Just before his death he was appointed director of the Moscow theatres. The dream of his life—to be at the head of a school for dramatic acting—was realized; but the inordinate zeal with which he threw himself into the work wrecked his constitution. Among his dramas the best are: *Do Not Get Into Somebody Else's Sled*; *Poverty is Not a Fault*; *The Forest*; *A Profitable Position*; *The Guiltless Culprits*; and *The Storm* (1860). An English translation by Constance Storm of the latter play, generally considered his masterpiece, was given in the spring of 1900 at the Carnegie Lyceum, New York, by an independent company. His plays embrace all types of the middle classes. These he was able to draw with striking accuracy, because of his perfect objectivity. His works were published in ten volumes (9th ed., Saint Petersburg, 1885), and with a biography by A. Nos (Moscow, 1890; 10th ed., 1896-97). His translations (2 vols., Saint Petersburg, 1886) are masterpieces of their kind, and especially noteworthy among them is Shakespeare's *The Taming of the Shrew*. Several plays of his have been translated into French by Durand Grenville.

OSTROWO, ôs-trô'vô. A town in the Province of Posen, Prussia, 50 miles northeast of Breslau (Map: Russia, G 3). It is an important grain-trading centre, and has saw mills and brick kilns. Population, in 1890, 9700; in 1900, 11,800.

OSTUNI, ôs-tô'nê. - A city of Southern Italy, in the Province of Lecce, situated 19 miles northwest of Brindisi, on the Bari-Brindisi Railroad (Map: Italy, M 7). Several towers of the old city-wall are still to be seen. The city has a library containing a collection of antiquities. Oil and lime are manufactured. Population (commune), in 1881, 18,226; in 1901, 22,997.

OSTWALD, ôst'vált, WILHELM (1853-). An important German chemist, born at Riga. He was educated at Dorpat, became a lecturer there in 1878, in 1882 was a professor in the Polytechnicum of Riga, and in 1887 professor of chemistry in Leipzig. As an investigator in connection with physical chemistry and chemical affinity he became particularly well known. His researches have concerned, among numerous subjects, the electric conductivity of organic acids, the parallel existing between the volume of such acids and their power of chemical reaction, and the color of ions. Among his publications are his *Lehrbuch der Allgemeinen Chemie* (2 vols.,

1885-88; 2d ed. 1891 et seq.); a *Grundriss der allgemeinen Chemie* (2d ed. 1890), *Elektrochemie* (1896), and *Vorlesungen über Naturphilosophie* (1902). In 1887 he established with van't Hoff at Leipzig the *Zeitschrift für physikalische Chemie*, and in 1901 became editor there of the *Annalen der Naturphilosophie*.

OSUNA, ó-sū'nà. A town of Southern Spain, in the Province of Seville, situated in a fertile plain, 48 miles east of Seville (Map: Spain, C 4). It is well built, with plazas and promenades, and contains a large Gothic collegiate church. The chief manufactures are woolen textiles, soap, and hats. Population, in 1887, 19,376; in 1900, 17,826. Osuna is the ancient Urso, later Orsona, a Roman garrison town. It took the side of the Pompeians in the Civil War, and is noted for its long and brave defense against the soldiers of Caesar.

OSUNA, PEDRO TELLEZ Y GIBON, Duke of (1579-1624). A Spanish statesman. He was born at Valladolid, studied at Salamanca, and suffered exile in his youth for his liberal opinions. Under Philip III. he was appointed Viceroy of Sicily in 1611 and of Naples in 1616. He gave the country a wise administration, opposed the establishment of the Inquisition at Naples, and resisted the attempt of Venice to control the commerce of the Mediterranean. He was implicated in the conspiracy of Bedmar (q.v.) against Venice, and dispatched a fleet against that city in 1618, but met with defeat. He was recalled in 1620 on suspicion of planning to usurp the government of South Italy, was confined in the Castle of Alameda, and died there.

OSWALD, SAINT (c.605-642). King of the Northumbrians from 634 to 642. He was a son of Ethelfrid of Northumbria, and on the death of the latter in 617 he spent some years in exile with the Scots in Iona, during which time he was converted to Christianity. In time he and his brothers drove out the Anglian invaders, and after his brother Eanfrid was treacherously slain by the British King Caedwalla in 634, he ascended the throne after having defeated and slain his brother's murderer in battle. He married Cyneburh, a daughter of Cynegils, a West-Saxon King, and with her assistance and that of Saint Aidan (q.v.) introduced the Christian religion among the Anglo-Saxons. He was killed in a battle at Maserfelth against Penda (q.v.), King of Mercia, and was canonized by the Roman Catholic Church.

OSWALD, ELEAZER (1755-95). An American soldier and journalist. He was born in England. He became interested in the American Revolutionary cause and emigrated to America in 1770. In 1775 he served as captain under Arnold at Ticonderoga and at Quebec, where he assumed command and distinguished himself when Arnold was wounded. He was Arnold's secretary, and in 1777 was promoted to be lieutenant-colonel in Lamb's artillery regiment. He became a printer and publisher at Philadelphia and later at New York. In all political questions he was a bitter opponent of Hamilton. In 1792 the French Revolution enlisted his sympathy, and he commanded a regiment of artillery in the French army at the battle of Jemappes. After a fruitless secret mission to Ireland on behalf of the French Government, he returned to New York, where he died of yellow fever, September 30, 1795.

OSWALD, RICHARD (1705-84). A British diplomat. He was born in Scotland, and after spending several years in America became a London merchant. He was chosen by Lord Shelburne as one of England's representatives at the signing of articles of peace at the close of the Revolutionary War. He gave bail in the sum of £50,000 for Henry Laurens (q.v.).

OSWALDTWISTLE, -twis'l. A town in Lancashire, England, on the Leeds and Liverpool Canal, 3½ miles east-southeast of Blackburn (Map: England, D 3). It has manufactures of cottons and chemicals; there are collieries, potteries, and stone quarries. It owns its gas and water works, abattoirs, and maintains a technical school and an isolation hospital. Population, in 1891, 13,300; in 1901, 14,200.

OSWALD VON WOLKENSTEIN, ós'vált fón vól'ken-stín (1367-1445). A German poet. He was born at Gröden of a noble Tyrolese family, and lived an eventful life, fighting from boyhood until he was past fifty in almost every country of Europe, and in Persia and the Holy Land besides. The poetic manner of Oswald is sometimes strained and pedantic; and he is as much a predecessor of the *Meistergesang* as a follower of the Minnesingers. His poems were edited by Weber (1847). Consult: Weber, *Oswald von Wolkenstein und Friedrich mit der leeren Tasche* (Innsbruck, 1850); and Zingerle's biography and critique (Vienna, 1870).

OSWEGO. A city and the county-seat of Labette County, Kan., 159 miles south of Topeka; on the Neosho River, and on the Saint Louis and San Francisco and the Missouri, Kansas and Texas railroads (Map: Kansas, G 4). It is in an agricultural and stock-raising region, and has fine water power. Flour is manufactured, and coal is mined in the vicinity. The Library Association, founded in 1878, has 4000 volumes. Population, in 1890, 2574; in 1900, 2208.

OSWEGO. A city, port of entry, and the county-seat of Oswego County, N. Y., 36 miles north by west of Syracuse; the terminus of the Oswego Canal, on Lake Ontario at the mouth of the Oswego River, and on the New York, Ontario and Western, the Delaware, Lackawanna and Western, and the Rome, Watertown and Ogdensburg railroads (Map: New York, D 2). It is finely situated at a slight elevation above the lake, and is laid out with regular and broad streets. Fine drives skirt both sides of the river and the shore of the lake. There are six public parks. Oswego is the seat of a State normal and training school, and has the Gerritt Smith Library. Other prominent structures are the city hall, court house, United States Government Building, and the State Arsenal. A United States life-saving station is here; and the old French fort possesses an historic interest. Fort Ontario defends the harbor, which consists of an outer and an inner haven, protected by breakwaters and accessible for large steamers. There are three immense trestles that facilitate the extensive coal trade carried on by the port. Considerable quantities of grain and lumber also are handled. The foreign commerce of Oswego in 1901 consisted of exports valued at \$2,092,000, and imports to the amount of \$644,000. The city has excellent water power, and is noted for its manufactures, which include starch, knit goods, shade

cloth, car springs, boilers and engines, malt, yarn, matches, oil-well supplies, etc. In the census year of 1900 an aggregate capital of \$7,323,000 was invested in the various industries, which had a production valued at \$8,138,000. Under the charter of 1896, the government is vested in a mayor, elected biennially, and a common council. The members of the department of fire and police are chosen by popular vote. Appointments to other important offices are controlled by the Mayor, whose nominations to some departments are made, however, subject to the consent of the council. Oswego owns and operates the water-works. Population, in 1890, 21,842; in 1900, 22,199.

Established as a military station and trading post about 1724, Oswego was incorporated as a village in 1828, and was chartered as a city in 1848. Owing to its location, it was an exceedingly important post in King George's War and the French and Indian War. In 1755 Colonel Mercer built two strong forts here, and in August, 1756, General Montcalm attacked and captured the place, and demolished the works, 30 men being killed or wounded on each side, and 1700 English prisoners being taken. In 1759 Oswego was the centre of military operations in this part of the country, and the point from which General Amherst with 10,000 men started to meet Wolfe at Quebec. In 1766 Pontiac here met Sir William Johnson and formally submitted to the English. On May 6, 1814, a strong English force captured the fort after a sharp engagement. Consult Churchill, Smith, and Child, *Landmarks of Oswego County* (Syracuse, N. Y., 1895).

OSWEGO BASS. A local name in New York State for the large-mouthed black bass. See **BASS**.

OSWEGO TEA (*Monarda didyma*). An erect odorous herb of the natural order Labiatae. It has bright red, showy flowers, much visited by bees, for which it is often planted as a pasturage; hence the name bee-balm.

OSWESTRY, óz'és-trí. A municipal borough and market-town in Shropshire, England, 15 miles northwest of Shrewsbury (Map: England, C 4). The town has good public buildings. Its chief trade is agricultural; it has railway works, manufactures of machinery and agricultural implements, breweries, and tanneries. Coal mines and limestone quarries are worked in the neighborhood. It owns its water-works and markets, has installed a modern system of sewage disposal, and maintains library, gymnasium, and isolation hospital. An early British town, it was the scene of frequent conflicts between Saxons and Welsh and Normans and Welsh. Oswald's Well and Old Oswestra, an early British encampment, are neighboring points of interest. Population, in 1891, 8500; in 1901, 9600. Consult: Spaul, "History of Oswestry Parish Church," in *Genealogical Magazine*, vol. i. (London, 1897); Lacey, "Municipal Work and Progress in Oswestry," in *Surveyor* (London, 1901).

OSYMANDYAS (Lat., from Gk. Ὀσμανδίας). The name of a King of Egypt who, according to Greek writers, invaded Asia with a large army, greatly distinguished himself by his victories, and conquered the Bactrians, who had revolted from him. Diodorus describes a magnificent monument, the Osymandeion, erected by this monarch in the Theban necropolis near the tombs

of the concubines of Ammon. The name Osymandyas is merely a corrupt Greek form of *User-ma'(t)-ré*, the prenomen of Rameses II., and there can be little doubt that the Osymandeion was in reality the Ramesseum, built by Rameses on the western bank of the Nile at Thebes. The exploits attributed to Osymandyas are as fabulous as those ascribed by the Greeks to Sesostria (q.v.). Consult: Diodorus, i., 47-49; Tzetzes, *Chiliades*, iii., 892; iv., 620; Budge, *A History of Egypt* (New York, 1902).

OTAGO, ó-tá'gò. The southernmost provincial district of South Island, New Zealand (q.v.). It is bounded on the north by the Province of Canterbury, and on the west, east, and south by the Pacific Ocean (Map: New Zealand, B 6). Area, about 25,487 square miles. Population, in 1891, 153,097; in 1901, 173,111. The most important gold-fields of New Zealand are in this province. Capital, Dunedin.

OTAHEITE, ó-tá'hé-té or ó'tá-hé'té. The former name of an island in the South Pacific. See **TAHITI**.

OTALGIA (Neo-Lat., from Gk. ὠταλγία, earache, from ὠς, *ous*, ear + ἄλγος, *algos*, pain). Neuralgia of the ear. The pain is non-inflammatory, and occurs in all degrees of severity. It may arise from disease of the nerves of the ear, or may be transmitted to them reflexly from other sources. Decaying teeth are a fruitful source of otalgia; it is sometimes a symptom of ulcer or cancer of the tongue, rheumatism of the temporo-maxillary joint, etc. When patients complain of *carache*, the pain is far more commonly due to *otitis media*, or inflammation of the tympanic portion of the ear, a much more serious affection. See **OTITIS MEDIA**.

OTARU, ó-tá'ru. The second seaport of Yezo, Japan, situated on the western coast of the island, 22 miles by rail west of Sapporo (Map: Japan, G 2). It is important principally on account of its herring fisheries, which give occupation to a large proportion of the inhabitants. Some flint implements of Aino origin are the only trace of the aborigines. Population, in 1898, 56,961.

OTARY (from Gk. ὠτάρης, *otaros*, large-eared, from οὖς, *ous*, ear). An eared seal. See **SEAL**.

OTAVALO, ó'tá-vá'lò. A town of the Province of Imbabura, Ecuador, 26 miles northwest of Quito, at an elevation of 8422 feet above the sea (Map: Ecuador, B 3). The town is well built and has some cotton and woolen mills. It was founded in 1534 and almost totally destroyed by an earthquake in 1868. Its population is about 6000.

OTCHAKOV, ó-chä'kòf. A fortified seaport of Southern Russia, in the Government of Khereson, situated at the mouth of the Dnieper, 60 miles east of Odessa (Map: Russia, D 5). Its harbor is much frequented by coasting vessels. It was formerly an important Turkish fort, the last remnants of which were blown up by the Russians in the Crimean War. The present fortifications are modern, and command the entrance to the Dnieper. Population, in 1897, 10,784.

OTFRIED, ót'fròt (c.800-c.870). An Alsatian poet and theologian. As a student at the Abbey of Saint Gall he was a friend of Solomon, after-

wards Bishop of Constance; he then studied at Fulda under Rabanus Maurus. Next Otfrid became priest and monk in the wealthy abbey of Weissenburg, where he acted as a notary (851). His fame is due wholly to his Frankish or Theodisc (Deutsch) poem on the Gospels. Not understanding Latin hymns, the Frankish folk kept up their heathen songs. Otfrid made up his mind to do away with this habit by putting Christian songs into Frankish, declaring that he would break the Devil's wickedness, cast down foul legends, and rid his people of the songs that only awoke worldly longings, that wounded the ears of the righteous and saddened the heart. Otfrid's *Liber Evangeliorum Domini Gratia Theodisce Conscriptus* begins with dedications to Louis the German and to Bishop Solomon in Frankish verses, and to Liutbert, Archbishop of Mainz, in Latin prose. The poem is fifteen thousand verses long and in strophes like the Latin hymns. It is remarkable because it uses rhyme instead of the alliteration customary in Old Germanic poetry, and because it has a regular, even a Latin rhythm. Poetically, it is inferior to the *Heliand*, a work of similar character. On the ground that we have five senses, and that each sense stirs us to its special sin, Otfrid divided his poem into five parts: (1) The nativity of John the Baptist; (2) the meeting of the first disciples, the first miracles, the spread of Christ's teachings; (3) the story of astounding miracles that shook the Jewish faith; (4) the Passion; (5) the Resurrection, the Ascension, and the Judgment. It is doubtful whether this poem, ended in 856, ever accomplished Otfrid's aim; yet it is for the philologist and the student of cultural history a work of great value. Of Otfrid's other writings only a few bits are left. The best manuscript of his *Liber Evangeliorum* is at Vienna. Consult: Piper, *Otfrids Evangelienbuch* (Freiburg, 1884); Kelle's *Text* (Regensburg, 1856-69); *Glossary* (ib., 1879-81); Erdmann's *Text* (Halle, 1882-83); translations by Rapp (Stuttgart, 1858), Rechenberg (Chemnitz, 1862), and Kelle (Prague, 1870). Consult also: Lachmann, in his *Kleinere Schriften* (Berlin, 1876); Schütze, *Beiträge zur Poetik Otfrieds* (Kiel, 1887); and Tesch, *Zur Entstehungsgeschichte des Evangelienbuches von Otfrid* (Greifswald, 1890).

OTHELLO, THE MOOR OF VENICE. A tragedy by Shakespeare, written probably in 1604, printed in quarto 1622, and in folio 1623. It was produced probably in 1605, and positively in 1610 according to the diary of the Prince of Württemberg's secretary. Shakespeare found the story in "Un Capitano Moro," one of the Italian novels in Cinthio's *Hecatomithi*, a collection published in 1565. A French translation appeared in 1584, but no English version was extant. The general plan of the Italian story was followed in the tragedy, but none of the names were used except a modified form of Desdemona. The history of Venice gives an account of one Moro, a Governor of Cyprus, whose wife died on the return voyage under mysterious circumstances, and this may be the historical basis of the tale. The title Moor means an Arab.

OTHTMAN, ōth-män' (Ar. *Uthmān, ibn 'Af-fān*). The third Caliph of the Moslems. He was born about 574. He belonged to the family of the Prophet, and was cousin german of Abu Suf-

yan. An early convert to Islam, he was one of its most zealous supporters, and linked himself still more strongly to Mohammed by becoming his son-in-law, marrying first his daughter, Rukaiya, and after her death, her younger sister, Umm Kulthum. He was elected to succeed Omar in the Caliphate late in the year 644. The choice was not made without much unseemly strife, Othman's most formidable opponent being Ali. The worldly motives that entered into the policy of Othman soon brought on serious difficulties. The able and energetic leaders who had been appointed by Omar were superseded by members of Othman's own family, and of that of Abu Sufyan. Egypt revolted, and the Caliph was compelled to reinstate Amru in the government of that country, and several other rebellions were only quelled by a similar restoration of the previous governors. Zealous Moslems deplored the folly of their chief, and were indignant at seeing the chair of the Prophet occupied by Othman while Abu Bekr, and even Omar, were accustomed to seat themselves two steps below it. Emboldened by the knowledge of his vacillating and cowardly disposition, they showered upon him reproaches and menaces; the bearer of their remonstrances having been bastinadoed by Othman's order, a general revolt ensued. Othman averted the crisis by unconditional submission; but having soon after attempted to put to death Mohammed, the son of Abu Bekr, the latter made his appearance at Medina at the head of a troop of malcontents, and forcing his way to the presence of Othman, stabbed him to the heart (656). It was under Othman that the second revision of the Koran was made, and an authentic copy prepared which served as the standard and prototype. See CALIPH; MOHAMMEDANISM.

OTHTMAN or **OSMAN I.**, surnamed **AL-GHAZI**, i.e. the Conqueror (1259-1326). The founder of the Ottoman power. He was born in Bithynia, his father, Ertogrul, having been the chief of the Turks in Phrygia. On the death of the latter, in 1288, his tribe chose his son Othman (i.e. the 'young bustard') as his successor. Othman conquered all the west of Asia Minor—Niema (1304), Marmora (1307), and Brusa, taken just before his death by his son Orkhan (1326). He had the usual failing of Oriental despots, being of a dissimulating and treacherous nature when it served his aims. At the same time he was wise and politic. Othman held his Court at Kara-Hissar, and struck money in his own name, but it is doubtful whether he ever took the title of Sultan. From him are derived the terms Ottomans and Osmanlis, which are employed as synonymous with Turks. Consult Hammer-Purgstall, *Geschichte des osmanischen Reiches* (4 vols., 2d ed., Pesth, 1834-36). See TURKEY.

OTHTMAN II. (1605-22). A Turkish Sultan, son of Achmet I. He succeeded his uncle, Mustapha I., in 1618, ruled with much energy, and made war on Sigismund III. of Poland. Defeated at Khotin, the Sultan swore to take vengeance on the Janissaries for the miscarriage of his plans, and was killed in a revolt of that body when he was only seventeen.

O'THO I., THE GREAT (912-73). The founder of the Holy Roman Empire of the German nation (*Heiliges römisches Reich deutscher Nation*). He was the eldest son of Henry the Fowl-

er, King of Germany, and was early recognized as the successor to the crown. In 936, on the death of his father, who left him the Duchy of Saxony, he was elected and crowned as King of the Germans, though his brother Henry, who had been born in the purple, was the favorite of many. Immediately upon the news of the death of King Henry, the various conquered Slavic tribes arose, and amid these foreign wars, civil strife soon raged, which centred around King Otho's brother Henry. Otho with the assistance of Hermann Billung repulsed the Slavs and Hungarians, leaving their total subjugation to a more favorable time. Meanwhile, however, Duke Eberhard of Franconia, feeling himself injured by Otho, conspired with Henry, the brother of Otho, Gisbert of Lorraine, and others, and was supported by Louis IV. of France. But, though the danger for a long time was great, Otho finally triumphed; in 939 Eberhard and Gisbert were killed, and Henry became reconciled to his brother. A new assignment of the duchies was thereupon carried out by Otho, who gave them to faithful relatives and devoted followers, and bound them closer to the Crown than they had ever been. Meanwhile Otho's fame had spread and he embraced the opportunity for interfering in Italian affairs when he was summoned by Queen Adelaide, the widow of King Lothair, to protect her from her importunate suitor, Berengar II. In 951 Otho answered the call, Berengar was defeated, and Adelaide became Otho's second wife. Berengar II. was permitted by Otho to rule as his feudatory. But though Otho thus was master of Northern Italy, he was unable to take Rome, which was held by Alberic II. (q.v.), and in 952 he returned to Germany, where a rebellion, incited by Liudolf, son of his first wife, soon threatened to overturn his throne, especially as the Hungarians, taking advantage of the internal strife, invaded Germany in 954. But the rebels were finally overcome, and the Hungarians were decisively defeated in 955 in the battle on the Lechfeld, which ended their raids forever.

In 954 Alberic II. died, and his son Octavian became Pope as John XII. Against him Berengar took up arms, whereupon Otho sent his son Liudolf into Italy. Liudolf died in 957, and four years later the German King himself crossed the Alps for the second time and put an end to the rule of Berengar. The gates of Rome were opened to him, and in 962 he received from John XII. the Imperial crown, thus founding the Holy Roman Empire of the German nation and establishing that close connection between Italy and Germany which formed so important a feature of mediæval history. Otho lost no time in asserting his Imperial prerogatives, and having called a council, effected the deposition of John, whose licentiousness had become a burden to Italy and a scandal to Christendom, and caused Leo VIII. to be elected in his place. This resulted in renewed wars, in all of which Otho was victorious. In order to obtain control over the whole of Italy, Otho sought the hand of the Greek princess Theophano for his son and presumptive successor. An embassy to Constantinople in 968 failed, as we know from the account of one of the ambassadors, Liudprand (q.v.). Thereupon Otho began to make inroads into the Italian provinces of the Byzantine Empire (Apulia and Calabria), which resulted, in 972, in the marriage of the

later Otho II. and Theophano, though the coveted provinces were never surrendered. On May 7, 973, the great Emperor died, and was buried at Magdeburg, which he had made the seat of an archbishop. Otho had restored the prestige of the Imperial power, but it rested on no firm foundation. He was compelled, on account of the absence of a strong middle class, to depend on a party among the higher clergy and great nobles, who, under weaker successors, turned against the Crown. Consult: Vehse, *Kaiser Otto der Grosse* (3d ed., Leipzig, 1867); Köpke and Dönniges, *Jahrbücher des deutschen Reichs unter Otto I.* (Berlin, 1838-39); Köpke and Dümmler, *Kaiser Otto der Grosse* (Leipzig, 1876); Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. i. (5th ed., Brunswick, 1881).

OTHO II. (955-83). Holy Roman Emperor from 973 to 983. He was a son of Otho the Great, during whose lifetime (967) he had been crowned as Emperor. In 972 he was married to the Byzantine Princess Theophano. At first Otho was content to rule under the regency of his mother, the Empress Adelaide; but differences having arisen between them, his mother withdrew from all share in the administration. Civil war broke out through the machinations of Henry II. of Bavaria, who formed a secret alliance against the young Emperor; but Otho put down the rebellion in 977. The next scene of war was Lorraine, which the French King, Lothair, had seized as a former appanage of his crown; but here, after a partial defeat, Otho succeeded in reasserting his power in 978, and not content with his advantage, devastated Champagne, pursued and captured Lothair, and advanced upon Paris, one of the suburbs of which he burned. Scarcely was this war ended when the disturbed condition of Italy called Otho across the Alps. His presence put a stop to the insurrection at Milan and Rome, where he reestablished order; and having advanced into Lower Italy, he defeated the Saracens, drove back the Greeks, and after establishing his supremacy in Apulia and Calabria, which he claimed in right of his wife, Theophano, made himself master of Naples and Salerno, and finally of Taranto, in 982. The Greek Emperor, alarmed at the successful ambition of Otho, called the Saracens again into Italy, who gave him battle with overwhelming numbers. The result was a total defeat of the Emperor at Cotrone. Otho himself narrowly escaped capture by the Saracens, only to find himself on a Greek ship, where he was virtually a prisoner; but as the vessel neared Rossano, a friendly port, he contrived to escape. Otho now hastened to Verona, where a diet was held, which was numerously attended by the princes of Germany and Italy, and at which his infant son Otho was recognized as his successor. This diet is chiefly memorable for the confirmation by Otho of the franchises and privileges of the Republic of Venice, and the enactment of many new laws. Otho's death at Rome, December 7, 983, arrested the execution of the preparations against the Greeks and Saracens, which had been planned at the Diet of Verona, and left the Empire embroiled in wars and internal disturbances. Consult: Giesebrecht, *Jahrbücher des Deutschen Reichs unter der Herrschaft Kaiser Otto II.* (Berlin, 1840); and *Geschichte der deutschen Kaiserzeit*, vol. i. (5th ed., Brunswick, 1881).

OTHO III. (980-1002). Holy Roman Emperor from 983 to 1002. He was the son of Otho II. and his wife, Theophano, and on his father's death, in 983, was immediately crowned King of the Germans at Aix-la-Chapelle. From this time till 996, when he received the Imperial crown at Rome, the government was administered with extraordinary skill and discretion by three female relatives of the boy King—viz. his mother, Theophano, who died in 991; his grandmother, Adelaide; and his aunt, Matilda, Abbess of Quedlinburg. The princes of the Imperial family disputed the right of these royal ladies to the custody of the young monarch. Henry of Bavaria, the nearest agnate, having seized the person of Otho, tried to usurp the supreme power; but, opposed by the majority of the other princes of the Empire, he was compelled to release him, in consideration of receiving back his forfeited duchy. Otho early showed that he had inherited the great qualities of his forefathers. In 996 he was crowned Emperor by his relative, Gregory V., whom he had raised to the Papal throne, and, having settled the affairs of Italy, returned to Germany. The rebellion of Crescentius, who drove Gregory from the Papal throne, compelled Otho to return to Italy, where success, as usual, attended his measures. Crescentius, who had thrown himself into Sant' Angelo, was seized and beheaded, together with twelve of his chief adherents; the Antipope, John XVI., imprisoned; Gregory restored; and on the speedy death of the latter, Otho's old tutor, Gerbert, Archbishop of Ravenna, raised to the Papacy under the title of Sylvester II., as the first Pope of French nationality. (See SYLVESTER II.) Otho, elated with his success, took up his residence in Rome, where he organized the Government, erected new buildings, and showed every disposition, notwithstanding the ill-concealed dissatisfaction of the Romans, to convert their city into the capital of the Western Empire. Together with Sylvester he dreamed of reëstablishing in full the old Roman Empire, but the insurrection of the Romans frustrated his plans, and, escaping from the city at the risk of his life, he withdrew to Ravenna to await the arrival of reinforcements from Germany; but before they had crossed the Alps, Otho died in 1002 at the age of twenty-two. Consult: Wilman, *Jahrbücher des Deutschen Reichs unter Kaiser Otto III.* (Berlin, 1840); Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. I. (5th ed., Brunswick, 1881).

OTHO IV. (c.1175-1218). Holy Roman Emperor from 1198 to 1214. He was the son of Henry the Lion, Duke of Bavaria and Saxony, and Matilda, sister of Richard the Lion-hearted. His father was outlawed by Frederick Barbarossa in 1180, and in the following year was stripped of most of his dominions. Otho and his brother succeeded to a small fragment, the later Brunswick and Lüneburg. Otho was educated at the English Court and participated in Richard's wars against Philip Augustus of France. In 1197 the Emperor Henry VI. died, leaving an infant heir, Frederick II. A majority of the German princes offered the crown to Philip, Duke of Swabia, brother of Henry (1198), but the Guelphs set up Otho as rival King. A civil war resulted, and by 1206 Otho was apparently defeated, but Philip was assassinated in 1208 by Otho of Wittelsbach. Otho of Brunswick was recognized by Innocent III., who crowned him

Holy Roman Emperor at Rome in 1209. In 1210 Otho was excommunicated by the Pope because he had seized some Papal territory, and in 1211 some of the German princes deposed Otho in favor of Frederick II., King of Sicily and Naples. After an unsuccessful struggle, and after the defeat at Bouvines (q.v.) by Philip Augustus in 1214, Otho withdrew to his estates in Brunswick, where he passed the last part of his life in penitential exercises. He died May 10, 1218. Consult Winkelmann, *Philip von Schwaben und Otto IV. von Braunschweig* (Leipzig, 1873-78).

OTHO, MARCUS SALVIUS (32-69). Emperor of Rome, from January 15 to April 17, A.D. 69. He was descended from an ancient Etruscan family. He was a favorite companion of Nero, who appointed him Governor of Lusitania, in which office he acquitted himself creditably. On the revolt of Galba against Nero (68), Otho joined himself to the former; but being disappointed in his hope of being proclaimed Galba's successor, he marched at the head of a small band of soldiers to the Forum, where he was proclaimed Emperor, and Galba was slain. Otho was recognized as Emperor over all the Roman possessions, with the exception of Germany, where a large army was stationed under Vitellius. The first few weeks of his reign were marked by an indulgence toward his personal enemies, and a devotion to business, which, though at total variance with his usual habits, excited in the minds of his subjects the most favorable hopes. But the tide of rebellion raised in Germany by Valens and Cæcina during the reign of Galba had by this time gathered strength, and, these commanders having prevailed upon Vitellius to join his forces to theirs, the combined army poured into Italy. Otho possessed several able generals, who repeatedly defeated the rebels; but the prudence of some among them in restraining the enthusiasm of their troops, who wished to follow up their victories, was considered as cowardice or treason, and produced dissensions in Otho's camp. This state of matters, becoming known to the generals of Vitellius, encouraged them to unite their armies and fall upon the forces of Otho. An obstinate engagement took place near the junction of the Adda and the Po, in which the army of Otho was completely routed, and the survivors went over on the following day to the side of the victor. Otho, though by no means reduced to extremity, resolved to make no further resistance, settled his affairs with the utmost deliberation, and stabbed himself, April 17, A.D. 69.

OTHO OF BAMBERG, bām'bĕrk, SAINT (c.1069-1139). Apostle to the Pomeranians. He was born in the County of Bregenz, became Court chaplain to the Polish Duke Ladislas Hermann, and through his diplomatic duties made the acquaintance of the Emperor Henry IV., who made him his Chancellor, and in 1102 appointed him Bishop of Bamberg. He introduced Christianity into Pomerania, and after his death was canonized.

OTHO OF FREISING, frī'zīng (c.1111-58). The greatest of the German chroniclers of the Middle Ages. He was an uncle of the Emperor Frederick Barbarossa, was educated at Paris, and, attracted by the ascetic life of the Cistercians, he entered their monastery at Morimond

in 1133. Four years thereafter he was elected abbot, and on the same day became also Bishop of Freising. He always labored hard for his diocese, but also participated in the politics of his day. He joined the Second Crusade, led by Conrad III. of Germany, and in 1150 returned to Europe. Between 1143 and 1146 he wrote his *Chronica*, to which he planned to add the *Gesta Friderici Imperatoris*, but died before the work was finished. His works have been edited by Wilman in the *Monumenta Germaniæ Historica, Scriptores*, vol. xx. (Hanover, 1868); consult, also, the German translation by Kohl in *Geschichtsschreiber der deutschen Vorzeit, XII. Jahrhundert*, vol. ix. (Leipzig, 1894).

OTHO OF NORDHEIM, nōrt'hīm (?-1083). A well-known German noble, who played an active rôle in the struggles of the reign of Henry IV. Otho was descended from an old Saxon family, whose seat was near Göttingen. In 1061 Agnes of Poitiers, who was Regent during the minority of her son, Henry IV., gave the vacant Duchy of Bavaria to Otho, in order to gain his aid against the powerful interests arrayed against her. But the Empress was an incapable woman, and in consequence Otho of Nordheim united with the powerful prelates to bring about her downfall. The conspirators obtained possession in 1062 of the young ruler's person and deposed the Empress from the regency. Henry IV. never forgave this deed. When the young King assumed the government in person, Otho was one of the most powerful of the great nobles, and his downfall appeared necessary in order to permit the full development of the Imperial power. In 1070 Otho was suddenly charged with planning a new conspiracy in order to make himself King. Probably the accusation was false, but Otho was found guilty, deprived of his duchy, and was compelled to submit to Henry. He never gave up, however, the attempts to recover his lost territories, and hence was involved in and led the numerous uprisings of the Saxons against Henry IV. In 1077 Otho helped to elect Rudolph of Swabia as German King in opposition to Henry, and when Rudolph fell in battle, in 1080, he supported Hermann of Luxemburg, though he had hoped to obtain the election himself. Otho is important because he is typical of the entire class of great German nobles, who were ever ready to oppose any attempt on the part of the emperors to strengthen their government. Consult: Vogeler, *Otto von Nordheim* (Minden, 1880); Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. iii. (5th ed., Leipzig, 1890).

OTIC GANGLION (from Gk. *ὠτικός*, *ōtikos*, relating to the ear, from *οἰς*, *ous*, ear). One of the four cranial sympathetic ganglia, the other three being Meckel's (q.v.), the ophthalmic (q.v.), and the submaxillary (q.v.). The otic or Arnold's ganglion is a small oval, flattened mass, of reddish gray color, situated immediately below the foramen ovale. (See SKULL.) It is connected with the inferior maxillary branch of the fifth nerve, from which it may receive a motor and possibly also a sensory root. It communicates with the glossopharyngeal nerve, from which it probably derives a sensory root, and with the facial nerve, from which it gets a motor root. Communication with the sympathetic is effected through a filament from a plexus surrounding the middle meningeal ar-

tery. It distributes branches to the tensor tympani and tensor palati muscles.

OTIS, BASS (1784-1861). An American portrait painter, born in New England. He was probably self-taught, and at first painted portraits in New York City. Afterwards, in 1812, he settled in Philadelphia. His "Interior of a Smithy" (1819) is in the Pennsylvania Academy of Fine Arts. It is his only known genre picture. Most of his work was portraiture, and this includes President Jefferson, engraved for Delaplaine's *Portrait Gallery*; Alexander Lawson; the painter Jarvis; himself; and Dr. Physick, of which he made a mezzotint engraving.

OTIS, ELWELL STEPHEN (1838—). An American soldier. He was born at Frederick, Md., but early removed with his family to a farm near Rochester, N. Y., and graduated at the University of Rochester in 1858. Three years later he graduated at the Harvard Law School, and then opened an office in Rochester; but in 1862 he entered the military service of the Federal Government as a captain in the 140th New York Volunteers, and served with them throughout the Civil War, rising to the rank of lieutenant-colonel. He participated in many of the battles of the Army of the Potomac, including Gettysburg and the Wilderness, and was mustered out in 1865 with the brevet rank of brigadier-general of volunteers. The next year he was appointed lieutenant-colonel of the Twenty-second Infantry in the Regular Army, and by successive promotions became colonel in 1880, brigadier-general in 1893, major-general of volunteers in 1898, and major-general in the Regular Army in 1900. In 1898 he was sent to the Philippines, where he relieved Major-General Wesley Merritt as commander of the United States forces and Military Governor of the islands, and in February, 1899, he was brevetted major-general in the Regular Army for "military skill and most distinguished services in the Philippines." He was a member of the first Philippines commission in 1899. In 1900 he was recalled to the United States and assigned to the command of the Department of the Lakes, and in March, 1902, was retired from the service.

OTIS, FESSENDEN NOTT (1825-1900). An American surgeon, born at Ballston Spa, N. Y. He was educated at Union College and at the New York Medical College and the College of Physicians and Surgeons. In the latter institution he was lecturer on genito-urinary diseases (1862-71), and then clinical professor of that subject. He invented many surgical instruments, of which the more important are the urethrometer, the dilating catheter, and an evacuator for use after lithotomy. His works include many monographs on his especial branch, including *Urethral Strictures* (1877) and *Genito-Urinary Diseases* (1883).

OTIS, GEORGE ALEXANDER (1830-81). An American military surgeon, born in Boston, Mass. He graduated at Princeton in 1849, and in medicine at the University of Pennsylvania in 1851. In September, 1861, he was appointed surgeon of the Twenty-seventh Massachusetts Volunteers. With them he served until 1864, when he was appointed surgeon of United States Volunteers, and was assigned to duty as curator of the Army Medical Museum and custodian of the Division of Surgical Records at Washington.

On the conclusion of peace he accepted an appointment as assistant surgeon in the medical corps, and continued his duties at the museum, which, owing to his zeal and energy, came to possess the most valuable surgical and anatomical collections in the world. He compiled the surgical volumes of the *Medical and Surgical History of the War* (1870-81), contributed frequently to medical publications, and for three years edited the *Richmond Medical Journal*. Among his writings are *Excision of the Head of the Femur for Gunshot Injury* (1869) and *Amputation of the Hip-Joint in Military Surgery* (1867).

OTIS, HARRISON GRAY (1765-1848). An American lawyer and politician. He was born in Boston, graduated at Harvard in 1783, was admitted to the bar three years later, and soon became one of Boston's most eloquent orators. In 1796 he was elected to the State Legislature, and the next year was sent to Congress as a Federalist. After the expiration of his term he was chosen to fill a number of State offices, and became one of the most popular politicians in Massachusetts. His popularity was greatly diminished, however, by the active part he took in the Hartford Convention (q.v.), though he was afterwards elected United States Senator (1817) and Mayor of Boston (1829). His brilliant oratorical powers made him a leader in the Senate, where he opposed the further extension of slavery. Criticism of the Hartford Convention led him to publish a series of *Letters in Defense of the Hartford Convention and the People of Massachusetts* (Boston, 1824). Consult Loring, *The Hundred Boston Orators* (Boston, 1854).

OTIS, JAMES (1725-83). An American statesman of the Revolutionary period. He was born, February 5, 1725, at West Barnstable, Mass.; graduated at Harvard in 1743, and studied law in the office of Jeremiah Gridley. He practiced for two years at Plymouth, but settled in 1748 in Boston, where he soon rose to the front rank in his profession. In 1761, when he was Advocate-General, application was made to the Massachusetts Supreme Court for writs of assistance, i.e. general search warrants for the discovery of smuggled goods imported into the colony. Otis was convinced of the illegality of these writs, and resigned his office rather than argue in their defense. He was immediately engaged to argue against them, which he did in a speech of great force and eloquence. It was of this speech that John Adams said "American independence was then and there born." The judges reserved their decision, but no more writs were enforced, though some were issued. The resignation of Otis and his plea in behalf of the popular side of the writs-of-assistance controversy gave him a high reputation for patriotism, ability, and eloquence, which he more than maintained in the Legislature, to which he was elected the same year. Taking an active part in the legislative discussions upon taxation and representation, he became still more conspicuous by publishing in the following year, 1762, his *Vindication of the Conduct of the House of Representatives*, which has been considered one of the sources from which all the arguments against Parliamentary taxation were later drawn, and the basis of all subsequent treatises on free speech in America

and France. This was followed, in 1764, by his *Rights of the British Colonies Asserted and Proved*. His apparent recognition of Parliamentary supremacy in this pamphlet, however, served to qualify the regard in which he had been held by the extremists. In a third pamphlet, entitled *Considerations on Behalf of the Colonists*, published the following year, he reestablished himself in the esteem of the radicals. On June 6, 1765, he made a motion, which was carried, that a congress of representatives from the various colonies should be convened. In pursuance of this measure a circular letter was sent, inviting the colonies to join in a congress, and the Stamp Act Congress, which met in New York in the fall of 1765, was the result. Otis took part in the proceedings of this body, and served on the committee which framed an address to the House of Commons. He was chosen Speaker of the Massachusetts General Court in 1766, but the Governor interposed his negative then, as also in the following years. In 1768, after the passage through Parliament of Charles Townshend's bill for the taxation of the colonies, the Massachusetts General Court sent a second circular letter to the other colonies, calling on them to join in some common plan for protection. It was in answer to the message of Bernard, the Royal Governor, demanding that the circular be recalled, that Otis made a notable speech, condemned by the partisans of the Crown as "the most violent, insolent, abusive, and treasonable declaration that perhaps was ever delivered." Only seventeen members voted to recall the circular. In 1769 the customs commissioners accused him in England of treason. This coming to his notice, he publicly denounced the commissioners in the *Boston Gazette*. Meeting Robinson, one of the commissioners, in a coffee-room the next night, he became involved in a dispute with him. An affray resulted, in which Otis received a cut on the head, which is supposed to have been the cause of his subsequent insanity. He sued Robinson, and recovered £2000 damages, but relinquished this sum in consideration of a written apology from Robinson. After a short residence in the country for the benefit of his health, he returned to the Legislature in 1771. He was insane for the greater part of his subsequent life, with the exception of a short interval, when he went back to Boston and resumed the practice of his profession. The last two years of his life were spent at Andover, where he was killed by lightning, May 23, 1783. He published in 1760 a treatise on *The Rudiments of Latin Prosody; with a Dissertation on Letters and the Principles of Harmony in Poetic and Prosaic Composition*. Of his public career the elder Adams said: "I never knew a man whose love for his country was so sincere; never one who suffered so much; never one whose services for any ten years of his life were so important or so essential to the cause of his country as those of Mr. Otis from 1760 to 1770." His *Life* has been written by William Tudor (Boston, 1823); also by Francis Bowen (Boston, 1847). Also consult Tyler, *Literary History of the American Revolution* (New York, 1897).

OTITIS MEDIA (Neo-Lat., inflammation of the middle ear). An inflammation of the structures of the tympanic cavity of the ear. It may be acute or chronic. There is an effusion of

fluid into the middle ear, which may be serous (the catarrhal form) or this may become infected with pus-producing organisms (the purulent form). It arises from exposure to cold or wet, the introduction of fluids into the middle ear through the Eustachian tube while bathing, or through douching the nose, or by extension of inflammatory processes from the nose and throat. It often begins in this way during the course of the infectious fevers, particularly in scarlatina, when it is of the purulent type. The symptoms of the acute form are sudden and intense pain in the ear, increased by coughing, sneezing, or swallowing, *tinnitus aurium*, or singing or buzzing noises heard by the patient, and more or less deafness. If the disease goes on unchecked, suppuration takes place, and the membrane of the tympanum ulcerates, and allows of the discharge of pus. Inflammation of the dura mater and abscesses in the brain may result. The chronic form of the disease may be *catarrhal* (without suppuration) or *purulent*; in the latter there is a persistent discharge (see OTORRHOEA) of pus from the external ear. The catarrhal form often comes on insidiously and results in complete or partial deafness in the ear affected, unless arrested by treatment. The management of so serious an affection must be left solely in the hands of the medical practitioner. See EAR, section on *Diseases*.

OTO, ō'tō. A small tribe of Siouan stock formerly holding the territory west of the Missouri and south of the Platte, in southeastern Nebraska, and now residing, together with the Missouri, upon a reservation in eastern Oklahoma. The two tribes speak the same language and have been confederated since the early part of the nineteenth century. They formerly lived in circular earth-covered log houses, and about a century ago, before they were joined by the Missouri, had several villages, with an estimated population of 800. Both tribes have dwindled rapidly, the two together numbering only 460 in 1875 and 370 in 1900.

OTOCYON (Neo-Lat., from Gk. *ōtōs*, ear + *kyōn*, dog). A genus of wild dogs, which differs from other genera of Canidae primarily in having an additional molar in each jaw, and other peculiarities of dentition. The genus contains only one species, *Otocyon Megalotis* of Africa. See LALANDE'S FOX-DOG.

OTOMACO, ō'tō-mā'kō. A savage tribe, apparently constituting a distinct linguistic stock, living in the forests of the Orinoco, about the junction of the Meta, in Central Venezuela. They are in a very low state of culture, but are monogamous and allow their women an equality in tribal ceremonies. They are addicted to the eating of a certain oily clay.

OTOMI, ō-tō'mē (Nahuatl *otomitl*, wanderer). An ancient people of Central Mexico, antedating the coming of the Aztec, by whom they were subjugated. They call themselves *Hia-hui*, and their tribes, constituting a distinct linguistic stock, occupied most of Queretaro and Guanajuato, with considerable portions of Hidalgo, Michoacan, and Mexico State. They are rather below medium stature and darker in color than the neighboring tribes, but appear to have been fully up to the standard in intelligence, living by agriculture, wearing cotton clothing of their own weaving, skillful in the working of gold, copper,

and stone, and noted for their songs and musical ability, and their religious ceremonials. They defeated several Spanish expeditions against them and were not finally reduced to submission until 1715. They still form a considerable and valuable portion of the population of the States named, and retain their own language, which, by reason of its monosyllabic character and peculiar sounds, was at one time erroneously thought to be connected with the Chinese.

OTÓN, ō-tōn'. A town of Panay, Philippines, in the Province of Iloilo, situated on the south coast, six miles west of Iloilo (Map: Philippine Islands, G 9). Population, 13,363.

OTORRHOEA (Neo-Lat., from Gk. *ōtōs*, ear + *rhoia*, *rhoia*, a flow, from *ρῆναι*, *rhēnāi*, to flow). A purulent or muco-purulent discharge from the external ear. It may be acute or chronic, and, while it may be due to a polypus or an abscess in the canal, it is, as a rule, an evidence of otitis media (q.v.). The treatment is that of the inflammation of the middle ear, which causes it. See EAR, section on *Diseases*.

OTRANTO, ō-trān'tō (Lat. *Hydruntum*). A town on the southeast coast of Italy, in the Province of Lecce, 24 miles southeast of Lecce by rail (Map: Italy, N 7). It has a cathedral, recently restored, and a castle. The chief industries are fishing and the manufacture of fishing nets and oil. During the Middle Ages it was the chief port of Italy on the Adriatic, whence passengers took ship for Greece. It was destroyed by the Turks in 1480. Population (commune), in 1901, 2401.

OTRANTO, STRAIT OF. The passage connecting the Adriatic with the Ionian Sea (Map: Italy, N 7). It is a construction of the large arm of the Mediterranean which separates the Italian from the Balkan Peninsula, and has a minimum width of 45 miles between the town of Otranto in Italy and Cape Linguetta in Turkey.

OTRANTO, THE CASTLE OF. A novel by Horace Walpole. See CASTLE OF OTRANTO.

O'TRIG'GER, Sir LUCIUS. In Sheridan's *Rivals*, an Irish fortune-hunter, honest and always ready for an opportunity to fight.

OTSE'GO BASS. A landlocked variety of the common whitefish (q.v.), found in Otsego Lake, at the head of the Susquehanna River.

OTSEGO LAKE. A small lake in Otsego County, central New York (Map: New York, E 3). It is the main source of the Susquehanna River. Cooperstown lies at its southern end.

OTTAVA RIMA, ōt-tā'vā rē'mā (It., octuple rhyme). The name given by the Italians to a stanza, composed of eight five-foot lines, rhyming ab ab ab cc. This stanza has been employed by English poets, notably by Fairfax in his translation of Tasso's *Jerusalem Delivered*, by Spenser in *Muioptmos*, and by Byron in *Don Juan*. It is also the basis of two well-known English verse-schemes. The seven-line stanza (ab ab b cc) called rhyme royal, which was employed by Chaucer and his followers and was revived by later poets, as William Morris, is the *ottava rima* with the fifth line dropped out. The so-called Spenserian stanza—that of the *Faerie Queene*—is also a modification of the *ottava rima*. Consult Alden, *English Verse* (New York, 1903).

OTTAWA, ô'tâ-wâ. An important Algonquian tribe originally living about the upper Ottawa River, Canada, and carrying on an active trade by water between the Eastern tribes and those of the lakes. They were the allies and friends of the French and the Huron, by which they incurred the hatred of the Iroquois. After the dispersion of the Huron, about 1645, the Iroquois turned against the Ottawa, who were compelled to abandon their country and seek refuge on Manitoulin Island in Lake Huron. After a short stay there they removed, about 1660, to La Pointe (Wis.), on the south shore of Lake Superior, where the Huron had already preceded them. Here the Jesuits resumed their mission work, but a few years later the two tribes were again driven out by the Sioux, the Huron retiring to Mackinaw, while the Ottawa returned to Manitoulin Island. Within the next fifty years they had spread over the whole of Lower Michigan and into adjacent parts of Ohio and Illinois, besides holding Manitoulin and some territory on the Canadian side of Lake Huron. They took an active part on the French side in all the colonial wars, including that headed by Pontiac, who was himself of that tribe. They joined the English side against the Americans in the Revolution and War of 1812. Several smaller bands have been removed to the West, but the great body of those in the United States are still living in small settlements scattered over Lower Michigan, having no regular reservation. Those in Canada are all within Ontario Province.

In their general characteristics the Ottawa closely resemble the Ojibwa, and according to tradition these two tribes and the Pottawatomi formed one body before their westward migration. The number of their clans is disputed, but the principal one seems to have been the Otter. Owing to their being scattered in numerous small bands over a large territory, intermixed with other tribes, no reliable estimate of their separate population has ever been made, but it is probably at present about 5000.

OTTAWA. The capital of the Dominion of Canada and of Carleton County, Ontario, at the junction of the Ottawa and Rideau rivers, on the Canadian Pacific, the Canadian Atlantic, the Ottawa and New York, and several other railroads, 101 miles west of Montreal (Map: Canada, H 2). It communicates by steamer on the Ottawa with Montreal, and by the Rideau Canal with Lake Ontario at Kingston. At the west end of the city the Ottawa rushes over the magnificent cataract known as the Chaudière Falls; and at the northeast end, divided by Green Island, there are two other cataracts, over which the Rideau falls into the Ottawa. The scenery around Ottawa is scarcely surpassed by any in Canada. The immense water power is made use of in foundries, factories, flour-mills, and in several saw-mills, which give Ottawa its principal trade in enormous quantities of sawed timber. A railway bridge and a road bridge which has supplanted the suspension bridge over the Chaudière Falls connect Ottawa with Hull (q.v.), in the Province of Quebec. Four bridges span the Rideau River.

Ottawa's streets are wide and laid out at right angles. Among its chief features are the Parliament and departmental buildings on Parliament Hill, 125 feet above the river, magnificent struc-

tures built of Canadian and New York sandstone, which cover nearly four acres, and cost about \$4,000,000. The style of architecture is the Italian Gothic; the south front of the quadrangle is formed by the Parliament building, 500 feet long. Other buildings include the Basilica or Roman Catholic Cathedral of Notre Dame, Christ Church Cathedral, the city hall, post-office, Rideau Hall, the Governor's residence, numerous churches, the Ottawa Roman Catholic University, the Coligny Ladies' College, a collegiate institute and normal school, and several charitable and benevolent institutions. The Public or Parliamentary Library contains over 200,000 volumes, and there are also an interesting museum and a national art gallery. The city maintains several fine parks, has water, gas, and electric lighting plants, electric street railroads, and a modern system of sewerage. It is the residence of the Governor-General of Canada, the seat of a United States consul-general, and the see of the Roman Catholic Archbishop of Ottawa, and of the Anglican Bishop of Ontario. Ottawa was founded in 1827 by Colonel By, from whom it was named Bytown; was incorporated as a city under its present name in 1854; and was selected by Queen Victoria as the capital of Canada in 1858. Population, in 1891, 44,156; in 1901, 59,902.

OTTAWA. A city and the county-seat of La Salle County, Ill., 85 miles southwest of Chicago; at the junction of the Fox and Illinois rivers, on the Illinois and Michigan Canal, and on the Chicago, Rock Island and Pacific and the Chicago, Burlington and Quincy railroads (Map: Illinois, D 2). It is the seat of Pleasant View College (Lutheran), and of Saint Francis Xavier Academy. It has a high school library, Illinois Appellate Court, Odd Fellows' and Reddick's public libraries; the Ryburn Memorial Hospital; and Washington, Shabbana, Ellis, and Allen parks. Ottawa controls important commercial interests, and possesses valuable natural advantages in deposits of coal, clay, and glass sand. Its extensive manufactures include glass ware, chimney glass, pottery, fire brick, tile, sewer pipe, organs, pianos, carriages, wagons, buggies, agricultural implements, collars and harness, etc. The government is administered, under a general law of 1871, by a mayor, elected every two years, and a council which confirms the executive's appointments of subordinate officers. The school officials are independently elected by popular vote. The municipality owns and operates the water-works and owns the electric light plant, the power being furnished by a private company. Ottawa was incorporated as a town in 1837. Population, in 1890, 9985; in 1900, 10,588.

OTTAWA. A city and the county-seat of Franklin County, Kan., 55 miles southwest of Kansas City; on the Marais des Cygnes River, and on the Atchison, Topeka and Santa Fe, the Southern Kansas, and the Missouri Pacific railroads (Map: Kansas, G 3). It is the seat of Ottawa University (Baptist), organized in 1865; and has a free Carnegie Library, Forest Park, and, among prominent buildings, the county courthouse, First Baptist Church, First Methodist Episcopal Church, and Rohrbaugh Theatre. The city controls important commercial interests in a trade in grain, wool, and live stock. The principal industrial plants are the railroad machine shops of the Southern Kansas, large nurseries,

flouring mills, grain elevators, a foundry, carriage factories, soap works, a creamery, etc. The government is administered under a charter of 1867, which provides for a mayor who holds office for two years, and a council. Population, in 1890, 6248; in 1900, 6934.

OTTAWA. A village and the county-seat of Putnam County, Ohio, 52 miles south-southwest of Toledo; on the Blanchard River, and on the Detroit Southern, the Cincinnati, Hamilton and Dayton, and the Findlay, Fort Wayne and Western railroads (Map: Ohio, B 3). It is the centre of a farming and stock-raising country which has valuable forests. There are manufactures of lumber in various products, flour, clay, shingles, etc. Population, in 1890, 1717; in 1900, 2322.

OTTAWA RIVER. The principal tributary of the Saint Lawrence. It rises 160 miles north of Ottawa, on the Laurentian divide, and flows first west, then southeast and east, until after a course of about 600 miles it falls into the Saint Lawrence by two mouths, which form the island of Montreal (Map: Canada, E 3). During its course it widens into numerous lakes of considerable size, and is fed by many important tributaries, such as the Madawasca and Rideau on the right, and the Gatineau and the Rivière du Lièvre on the left. These, with the Ottawa itself, form the means of transit for perhaps the largest lumber trade in the world, while the clearing of the lumber has opened the country for several thriving agricultural settlements. The navigation has been greatly improved, especially by the construction of dams and slides to facilitate the passage of timber over falls and rapids. The Ottawa is connected with Lake Ontario at Kingston by the Rideau Canal, and is navigable for 250 miles. For a great part of its course it forms the boundary between the provinces of Ontario and Quebec.

OTTENDORFER, OSWALD (1826-1900). A German-American journalist. He was born at Zwittau, Moravia, studied jurisprudence at Vienna, and was among those German youth who, after participating in the revolutionary troubles of 1848, sought refuge in America. Coming to New York, he acquired control of the *New-Yorker Staats-Zeitung*, which, at first Democratic in politics, but after 1871 independent, has taken rank as the foremost German-American daily. He largely endowed various institutions in his native town of Zwittau, and to New York presented a fully equipped free library. Some years previous to his death ill health necessitated his retirement from active journalistic work.

OTTER (AS. *otor*, *ottor*, *oter*, OHG. *ottar*, Ger. *Otter*, otter; connected with OChurch Slav. *rydra*, Lith. *udra*, otter, Gk. *ὑδρῶς*, *hydros*, *ὑδρα*, *hydra*, water-snake, Skt. *udra*, otter, also with Gk. *ὕδωρ*, *hydōr*, Skt. *udan*, water, and ultimately with Eng. *water*). The otters are a small but cosmopolitan subfamily (Lutrinæ) of furbearing carnivores (Mustelidæ), with aquatic habits. The North American otter (*Lutra Canadensis*) is found in most parts of the continent north of Mexico, though no longer numerous in well-settled districts. It is about four feet in length, of which the tail is one third. The color is rich brown. The body is long, and rather stout, the legs short with rounded webbed feet, the tail broad and horizontally flattened, and the skull wide and depressed. The eyes are small

and supplied with a nictitating membrane. The teeth are strong and very sharp. The whole structure is thus adapted to an aquatic life and the capture of fish. The otter makes its home in some hole in the bank, or under the roots of a tree, furnished with a bed of leaves and grass, where the female brings forth from one to three young ones, in the early spring. Although ill-shaped for walking on land, otters wander about a great deal at night, crossing from one stream to another, and doing much hunting in the woods and thickets; and young and old are fond of romping games in grassy places in summer, as well as in the snowbanks of winter. The otter is one of the most playful of animals, and many writers have described its favorite pastime of sliding on the inclines of snow or in summer on some steep clayey slope entering a body of water. In either case the otter lies on its belly with its fore feet bent backward, and gives the body a shove by means of its hind feet. In a short time the sliding place becomes very slippery and the otters show great delight in sliding down and then climbing back to repeat the performance. In captivity otters are rather surly and snappish, and when brought to bay in their native haunts they will fight savagely, and it requires a special breed of dogs (see HOUND) to hunt them successfully. In India and the Far East the otter is frequently kept in a half-domesticated state and used as a fish-catcher. A collar is placed around the neck and to this a long line is attached. The otter is then sent into the water, and as otters always bring their prey to shore to devour it, as soon as he has captured a fish he returns to his master with it.

The European otter (*Lutra vulgaris*) is widely distributed throughout Europe and Asia. It is much smaller than the American species and somewhat lighter in color. It is frequently seen along the seashore and fishes in the sea. Other species of *Lutra* occur in Southeastern Asia, in Africa, and in South America.

The fur of the otter is highly prized and is an important article of commerce. The flesh has a very fishy taste, and has been accounted by many Roman Catholics as fish and not meat, so that it might be used in Lent and on fast days. A discussion of this mediæval view is one of the entertaining disquisitions in Walton's *Complete Angler*.

Consult British and East Indian books of zoology and sport; Thomas, *Proceedings of the Zoological Society* (London, 1889); Stone and Cram, *American Animals* (New York, 1902). See Plate of MINOR CARNIVORES. Compare COYPU.

OTTER (or ANCON) SHEEP. An aberration or sport of the ordinary breed of sheep, which by artificial selection became the founder of a distinct breed. Seth Wright, a farmer of Dover, Mass., kept a flock of 15 ewes and one ram. In 1791 one of the ewes produced a male lamb, which after growing up was reserved for breeding purposes, the original ram being killed. In the first season "two lambs only were yeanned in his likeness," but the number grew, until there resulted a small flock of the strongly marked sport, called 'otter breed,' and named 'ancon,' by Dr. Shattuck, from the crookedness of its short fore legs, causing them while walking to appear like elbows. The body was longer than normal, the legs shorter and crooked, and the breed appears to have

been perpetuated on account of its being less able than ordinary sheep to jump over fences. The interest in this sport is due to the fact that one prepotent sire impressed his peculiarities on his offspring and became the founder of a new breed. When an ancon ewe was mated with a common ram, the increase resembled "wholly either the ewe or the ram." Moreover, frequent instances happened where common ewes had twins by ancon rams, when one exhibited the complete marks and features of the ewe, the other of the ram. The ancons were observed to keep together, separating themselves from the rest of the flock when put into inclosures with other sheep. This fact is a noteworthy instance both of the results of isolation (q.v.) and of preferential mating. After the introduction of Merinos, which are equally gregarious, quiet, and orderly, the ancon breed became extinct; in fact, it was difficult for Humphreys to procure one in 1813 for dissection by Dr. Shattuck. Without doubt the breed immediately after the above date was bred out or swamped by intercrossing with the ordinary breed of sheep. See CROSS-FERTILIZATION; PREPOTENCY. Consult D. Humphreys, "On a New Variety in the Breeds of Sheep," in the *Philosophical Transactions of the Royal Society* for 1813 (London, 1813).

OTTER, WILLIAM DILLON (1843—). A Canadian soldier. He was born in the Province of Ontario, and was educated at Upper Canada College, Toronto. He saw service in the Fenian raids in 1866, and from 1883 to 1889 was commandant of the School of Infantry in Toronto. During the second Riel rebellion, in 1885, he commanded a column under General Middleton, and was in command at the battle of Cut Knife Creek. In 1886 he was appointed commanding officer of the Second District, and in 1896 an inspector of infantry. His most notable service was during the Boer War in South Africa, in which he was in command of the First Canadian contingent.

OTTERBEIN, PHILIP WILLIAM (1726-1813). A clergyman, founder of the United Brethren in Christ (q.v.). He was born at Dillenburg, Germany, and studied the classics and theology at his father's school at Herborn. After being ordained at The Hague he sailed for America to take up the work of the ministry in the German Reformed Church. He first settled at Lancaster, Pa., where he remained till 1758. He then held pastorates at Tulpehocken, Pa., Frederick, Md., and York, Pa. In 1774 he accepted a call to a new congregation in Baltimore, and remained there until his death. In 1768 he became associated with Martin Boehm, a Mennonite preacher, and their labors resulted in the organization of the Church of the United Brethren in Christ. The common belief that he was its first bishop or superintendent is denied by Harbaugh (*Fathers of the German Reformed Church*, Lancaster, Pa., 1857), who maintains that Otterbein, who never really left the German Reformed Church, bears the same relation to the new organization that Wesley does to Methodism. Consult his *Life* by Drury (Dayton, Ohio, 1884).

OTTERBEIN UNIVERSITY. A coeducational college at Westerville, Ohio, founded in 1847, under the control of the United Brethren in Christ. It has a preparatory department, a college with two courses, classical and philosophical,

and graduate, normal, art, and music departments. It had, in 1903, a library of 11,000 volumes, a student attendance of 365, and 29 instructors. Its endowment was about \$100,000, and the gross income \$60,000; the value of the college property was estimated at \$250,000, and that of the buildings and grounds at \$95,000.

OTTERBURN, BATTLE OF. A battle commemorated by the ballad of Chevy Chase (q.v.).

OTTER CREEK. A stream rising in south-central Vermont, and flowing northwestward 90 miles through a picturesque country, emptying into Lake Champlain near its southern extremity (Map: Vermont, A 5). It is navigable eight miles to Vergennes, and supplies good water power.

OTTER-DOG, or OTTER-HOUND. See HOUND.

OTTER SHELL. A large edible mactroid clam (*Lutraria maxima*) of the Northwestern American coast.

OTTER SHREW. A West African insectivore or kind of shrew (*Potamogale velox*), which resembles an otter, lives in clear streams, and swims with great rapidity and strength, the union of the second and third toes serving the purpose of webbing. It is larger than a weasel, dark-brown in color, and has a long compressed tail, of much assistance in swimming. It has been described as living upon fish, but little is known of its habits or food. With a small and somewhat similar Madagascar animal (*Geogale aurita*) it constitutes the family Potamogalidæ.

ÖTTINGEN, Ötting-en, ARTHUR VON (1836—). A German physicist and writer on the theory of music. He was born in Dorpat, and, after studying there and in Berlin, became professor (1865) of physics in the University of Dorpat, whence, in 1893, he went to Leipzig as docent, becoming full professor in 1894. While he was in Dorpat, Oettingen devoted himself especially to meteorology and thermometric studies; founded a meteorological observatory in 1866, and wrote: *Die Korrektur der Thermometer, insbesondere über Bessels Kalibriermethode* (1865) *Meteorologische Beobachtungen, 1866-75* (1868-77); and on musical theory, *Harmoniesystem in dualer Entwicklung* (1866). He was an editor of Oswald's *Klassiker der exakten Wissenschaften*, and, with Feddersen, of the third volume of Poggendorf's *Biographisch-literarisches Handwörterbuch, 1858-93* (1898). His later work includes *Elemente des geometrisch-perspektivischen Zeichnens* (1901).

ÖTTINGER, Ötting-er, EDUARD MARIA (1808-72). A German author and humorist, born in Breslau. He published several comic papers and wrote many novels, among which may be mentioned: *Der Ring des Nostradamus* (3d ed., 1853); *Ein Dolch oder Robespierre und seine Zeit* (3d ed., 1862); and *König Jerome Napoleon und sein Capri* (2d ed., 1861). He also published several historical and bibliographical works, including *Bibliographie biographique* (2d ed., 1854) and *Geschichte des dänischen Hofes* (1857-59).

OTTO. The name of German rulers. See OTHO.

OTTO I. (1815-67). King of Greece from 1833 to 1862. He was the second son of Louis I., King of Bavaria, and was born at Salzburg, June

1, 1815. In August, 1832, he was offered the throne of Greece by the Greek National Assembly, and in the following year he began his reign under a regency. In June, 1835, he assumed personal power, and in the following year he married in Germany the Princess Amalie of Oldenburg. A monetary crisis, which was provoked partly by false administrative measures, threw the affairs of Greece into confusion, and materially weakened the King's popularity. A national reaction against the Germanizing tendencies of the Court followed, and resulted, in 1843, in a military revolution, which forced a constitution upon the King. The Bavarian ministers were dismissed, but the King and his Greek advisers attempted in various ways to curtail the privileges which the new Constitution had conferred on the people. The equivocal position in which he was placed during the Crimean War between the allied powers on the one hand, and his subjects, who were strongly in favor of Russia, on the other, increased the difficulties of his situation. The Queen's pro-Russian sympathies made her for some time a favorite; but the belief that Otto's absolute measures were due to her instigation turned the tide of popular hatred so strongly against her that attempts were made on her life. The general discontent at last found vent in insurrections at Nauplia and Syra in 1862, which were soon suppressed. A more formidable insurrection in the districts of Acarnania, Achai, and elsewhere broke out in October of the same year, and in a few days extended to the whole of Greece. Otto fled to Salamis, from which place he issued a proclamation declaring that he quitted Greece to avoid civil war. He never formally renounced his right to the Greek throne. He died at Bamberg, July 26, 1867.

OTTO, JULIUS (1804-77). A German composer. He was born at Königstein, in Saxony, and studied music in Dresden and Leipzig. From 1830 to 1875 he was teacher of music and cantor at the Kreuzkirche in Dresden. His popular songs include the cycles for male voices, "Gesellen- und Burschenfahrten," and "Soldatenleben." He wrote three oratorios, *Des Hailands letzte Worte*, *Die Feier der Erlosten am Grabe Jesu*, and *Hiob*; but his male choruses and pianoforte compositions embody his best work.

OTTO, PAUL (1846-93). A German sculptor, born in Berlin, where he frequented the Academy and the studio of Karl Begas. Awarded the first prize in a competition for the Tegetthoff monument in Vienna, in 1873, he went to Italy, and during a thirteen years' sojourn in Rome produced, among other works, the marble statues for Berlin of "Wilhelm von Humboldt" (garden in front of the University) and of "Chodowiecki" (Vestibule of Old Museum), and the polychrome statue of a "Vestal" (1886, National Gallery). His "Luther Monument," with many accessory figures (Neuer Markt, Berlin), in the competition for which he had carried off the first prize (1886), was completed after his death by Toberentz.

OTTOKAR II. (c.1230-78). King of Bohemia from 1253 to 1278. He was a son of Wenceslas I. and Princess Kunigunde of the House of Hohenstaufen. In 1251, after the extinction of the line of Babenberg, he obtained possession of the Duchy of Austria and married

Margaret, the sister of the deceased Duke. He came to the Bohemian throne on the death of his father, and the next year he took part in a crusade against the heathen Prussians, whom he defeated; he founded Königsberg in their territory. In 1260 he gained a victory over the Hungarian King, Béla IV., on the Marchfeld, and annexed Styria in 1261. The same year he procured a divorce from Margaret, and married the Russian Princess Kunigunde, who was a grandchild of Béla. The duchies of Carniola and Carinthia fell to him in 1269, and he made some small additional acquisitions in 1271 and 1272. Ottokar was now one of the most powerful princes in Europe. When Rudolph of Hapsburg (q.v.) was elected Emperor, Ottokar refused to recognize him. After long negotiations he was put under the ban of the Empire and defeated in battle (1276), and was compelled to give up all his possessions except Bohemia and Moravia. He soon renewed the war and perished on the Marchfeld, August 26, 1278. Ottokar founded cities and encouraged commerce and manufacturing. He attempted to weaken the feudal nobility and to destroy their castles. Consult: Lorenz, *Geschichte Königs Ottokar II.* (Vienna, 1866); and Huber, *Geschichte Oesterreichs*, vol. i. (Gotha, 1885).

OTTOKAR OF STYRIA (c.1250-c.1310). A German chronicler, sometimes erroneously called Ottokar 'of Horneek.' He wrote in about eighty-three thousand verses, filled with descriptions of tourneys, fêtes, and battles, a very valuable history of Styria from 1230 to 1309, which has especial importance as supplementing our knowledge of Rudolph of Hapsburg, Ottokar of Bohemia, Adolphus of Nassau, and Albert I. It is edited by Seemüller in the *Monumenta Germaniae Historica*, vol. v., pts. 1 and 2 (Hanover, 1890, 1893). Consult Busson, "Beiträge zur Kritik der steirischen Reimchronik," in the *Sitzungsberichte* of the Vienna Academy (1885-92).

OTTOMAN EMPIRE. A common designation for Turkey. The beginning of the Ottoman power is usually traced back to Ertogrul, chief of a Turkic tribe, who in the beginning of the thirteenth century established himself in the ancient Phrygia. From his son Othman, or Osman (1288-1326), the Empire derives its name. Notable successors of Othman were Amurath, or Murad I. (1359-89), who organized the Janizaries and took Adrianople in 1361; Bajazet I. (1389-1403), who was victorious over the Christians, but succumbed to Timur; Mohammed II. (1451-81), who took Constantinople in 1453; Bajazet II. (1481-1512), celebrated for his magnificence; his son Selim I. (1512-20), who conquered Syria and Egypt; Solyman II. (1520-66), under whom the Empire attained its zenith, and Mohammed IV. (1648-87), whose able minister, the celebrated Kiuprili (q.v.), by repeated victories, vigorously sustained the declining fortunes of the Empire. Under the succeeding monarchs the Empire underwent a rapid diminution before the steady advance of the Austrian and Russian armies, until its preservation in the nineteenth century came to depend upon the goodwill of certain European powers and the jealousies of all. The Ottoman Empire remains, with Russia, the only despotism in Europe in spite of reforms begun under Mahmud II. (1808-39), and the charter of liberties granted by his

successor Abd-ul Medjid in the celebrated Hattı-Sherif of Gulhane in 1839. See **TURKEY**.

OTTO OF ROSES. See **ATTAR OF ROSES**.

OTTUMWA, ô-tûm'wâ. A city and the county-seat of Wapello County, Iowa, 81 miles southeast of Des Moines, on the Des Moines River, and on the Iowa Central, the Wabash, the Chicago, Burlington and Quincy, the Chicago, Milwaukee and Saint Paul, the Chicago, Rock Island and Pacific, and other railroads (Map: Iowa, E 4). Among the notable structures of the city are the United States Government building, opera house, Y. M. C. A. building, the Union railway station, public library, the public school buildings, and the court-house. Ottumwa is the centre of productive coal fields, and has abundant water power—two important factors in the development of its extensive manufactures. The industrial establishments include iron works, foundries, a large pork-packing plant, agricultural and mining implement works, furniture factories, etc. The city has good transportation facilities and important commercial interests. Settled in 1849, Ottumwa was incorporated two years later. The government, under a charter of 1892, is vested in a mayor, biennially elected, and a council, a small minority of whose members are elected at large. Population, in 1890, 14,001; in 1900, 18,197.

OTUMBA, ô-tûm'ba. A town of Mexico, in the State of Mexico, 31 miles northeast of the capital, on the Mexican Railway (Map: Mexico, K 8). It is on the site of the ancient Indian village Otompan, where Cortés, in one of the bloodiest battles of the Conquest, defeated the Aztecs after his disastrous retreat from the City of Mexico. Its population, in 1895, was about 2000.

OT'WAY, THOMAS (1652-85). An English dramatist, author of *The Orphan* and *Venice Preserved*, two plays long famous on the British stage. He was born March 3, 1652, at Trotton, near Midhurst, Sussex. Leaving Oxford without a degree, he went to London to seek his fortune in 1671. He appeared on the stage, but made a signal failure; next he applied himself to dramatic composition. In 1675 *Alcibiades*, his first tragedy, was printed; and in the following year he produced *Don Carlos*, a play which was extremely popular. His first comedy, *Friendship in Fashion*, appeared in 1678, and met with general appreciation. After a time spent with the army in Holland, he produced the tragedy of *Caius Marius* in 1680. In the same year *The Orphan* met with an extraordinary, and, in some respects, a deserved success. In 1681 *The Soldier of Fortune*, and in 1682 the finest of all his plays, *Venice Preserved*, were produced. From this time till his death, the poet had much to endure from poverty and neglect. Debts accumulating upon him, he retired to an obscure public-house on Tower Hill, for the purpose of avoiding his creditors, and here, at the early age of thirty-three, he died, April 14, 1685. Otway's power lay chiefly in depicting the pathos of affection, and he may have been inspired by his own unhappy infatuation for Mrs. Barry, the actress. Otherwise, although he achieved a brilliant reputation during his lifetime, and though he is described by Dryden as having a power of moving the passions which he himself did not possess, Otway's plots are artificial, and his work is of

inferior artistic value. Consult: Johnson, *Lives of the Poets* (new ed., London, 1896); *The Works of Thomas Otway, with Life*, by Thomas Thornton (ib., 1813); Ward, *History of English Dramatic Literature* (ib., 1899); Gosse, *Seventeenth Century Studies* (ib., 1883); Noel, *Best Plays of Thomas Otway* (ib., 1888); De Grisy, *Etude sur Thomas Otway* (Paris, 1868); Mosen, *Ueber Thomas Otways Leben und Werke* (Jena, 1875); Löwenberg, *Ueber Otway's und Schiller's "Don Carlos"* (Lippstadt, 1886).

OTZEN, ô'tsen, JOHANNES (1839—). A German architect, born at Sieseb, Schleswig. He studied architecture in Hanover, and from 1867 to 1870 was second clerk in the Board of Inspection of Public Works for the Province of Schleswig. In 1870-79 he was an architect in Berlin, in 1879 was appointed professor of mediæval art in the Polytechnic Institute there, and in 1885 director of an advanced course at the Academy. He designed numerous structures, particularly churches, in Berlin and elsewhere, including Saint John's at Altona (1873) and the Church of the Holy Cross in Berlin (1888), and published *Die Baukunst des Mittelalters* (1879-83), and other works.

OUAKARI (South American name), or **UA-KARI**, wâ-kû'rê. One of three species of Brazilian monkeys closely related to the sakis, distinguished by their long silky hair and stump-like tails. The best known species is the bald ouakari (*Brachyurus calva*), which is about eighteen inches in length, and has whitish fur, with the head nearly bald and the naked skin of the face brilliant scarlet. These monkeys inhabit forests of limited and local areas, often flooded for weeks at a time, and have exclusively arboreal habits, and subsist almost wholly upon fruits. Bates, in his *Naturalist on the Amazons* (London, 2d ed., 1892), gives a most interesting account of their habits and behavior in captivity. See **MONKEY**.

OUBLIETTE, ɔ̃'blé'té' (Fr., from *oublier*, to forget, from Lat. *obliviisci*, to forget). A deep pit or well under a dungeon, having an opening only at the top, into which prisoners were thrown to die. There are but few authenticated instances of its employment.

OUDE, oud. A province of British India. See **ODDH**.

UDENARDE, or **UDENAAARDE**, ou'denâr-de (Fr. *Audenarde*). A town in the Province of East Flanders, Belgium, on the east bank of the Scheldt, 15 miles southwest of Ghent (Map: Belgium, B 4). Its chief building is a fine Gothic council house built from 1525 to 1529. There are manufactories of linen and cotton and extensive tanneries. At Audenarde, on July 11, 1708, the French under Vendôme were defeated by the Allies under Marlborough and Prince Eugene. Population, in 1900, 6204.

ODDH, oud, or **AJODHYA**, â-jôd'yâ. A suburb of Faizabad (q.v.), Odh, India.

ODDH, or **OUDE**, oud (Hind. *Awadh*). A province of British India, forming a chief commissionership administratively connected with the United Provinces of Agra. It lies south of the Himalayas, one of whose minor ranges separates it from Nepal, while on the east, south, and west it is bounded by the United Provinces of Agra, the southern boundary being formed by

the Ganges (Map: India, D 3). Area, 24,217 square miles. The northern part, at the foot of the mountains, consists of dense and unhealthy forest-jungle; the remainder belongs to the alluvial valley of the Ganges, several of whose large tributaries traverse the province lengthwise from northwest to southeast. Though there are hot and sultry months and a long rainy season, the climate is the most healthful in the Ganges Valley.

AGRICULTURE. Agriculture is the only extensively developed industry. The fertile plains produce abundantly when sufficiently watered. Nearly a third of the cultivated area, or 2,700,000 acres, is irrigated, the supply of water being drawn principally from wells and reservoirs. About one-fourth of the cultivated land is cropped twice during the year. Rice, wheat, millet, pulse, and other cereals constitute the greater portion of the crop acreage. Sugar cane, opium, and oil seeds cover a much less area, but are commercially important. Cattle and buffaloes are used as beasts of burden, and but few of the other domestic animals are raised.

TRANSPORTATION AND COMMERCE. A railway traverses the province from east to west. A branch line connects it with Cawnpore on the Ganges, and this point, although outside the province, is its chief collecting and distributing centre. Wheat, oil seeds, and opium are the most important exports. Some trade is maintained with the adjoining territory of Nepal on the north. Most of the manufactured products required are imported from European countries.

POPULATION. Oudh is one of the most densely populated portions of India, the number of inhabitants in 1901 having been 12,884,000, or 532 to the square mile. The Hindus outnumber the Mohammedans about 7 to 1. The Hindu and Mohammedan religions practically absorb the whole population; Christianity has not secured much hold, the census of 1901 returning 9312 Christians, of whom only 2274 were native converts. Lucknow, the capital, with a population (1901) of 263,900, is the fifth largest city of India, and the only large city in the province.

HISTORY. Oudh is believed by Sanskrit scholars to be the ancient *Kosala*, the oldest seat of civilization in India. The country was conquered by a Mohammedan army about 1195, was annexed to the realm of Delhi, and subsequently was made a province of the Mogul Empire. In the first half of the eighteenth century Oudh practically emancipated itself from the rule of the Great Mogul, and for over a century had its own dynasty. The Nawab Vizier, Sujah-ud-Dowlah, played a prominent rôle in the days of Clive and of Hastings. The misrule of the princes brought about the annexation of Oudh by the East India Company in 1856. When the mutiny of 1857 broke out, Oudh became one of the great centres of rebellion.

Consult: Butler, *Description of the Kingdom Oude* (London, 1853); Sleeman, *A Journey Through the Kingdom of Oude in 1819-50* (ib., 1858); *Gazetteer of Oude*, vols. i.-iii. (ib., 1877-78); Irwin, *The Garden of India; or Chapters on Oudh History and Affairs* (ib., 1880).

UDINOT, ʊdɛnɔʔ, CHARLES NICOLAS, Duke of Reggio (1767-1847). A Marshal of France. He was born at Bar-le-Duc, in the Department

of Meuse, France, April 25, 1767. He entered the army at the age of seventeen, and distinguished himself in 1790 by suppressing a popular insurrection in his native district. He rose quickly, in 1794 became general of brigade, and added to his reputation in the war against Prussia and Austria. He became general of division in 1799, and was given important commands by Napoleon. In 1805 he received the command of ten battalions of the reserve, afterwards known as the Oudinot Grenadiers. He was present at Austerlitz (1805) and Jena (1806), and defeated the Russians at Ostrolenka February 16, 1807. He contributed to the success of the French at Friedland, June 14th, and after the Peace of Tilsit was rewarded with the title of count and a large sum of money. At Wagram (July 6, 1809) he fully sustained his reputation as a general, and soon after was made Marshal of France and Duke of Reggio. In 1810 he was charged with the occupation of Holland. He was engaged in the disastrous Russian campaign of 1812, when he earned praise by his skillful tactics by which the crossing of the Beresina was protected. He subsequently took part in the various battles of 1813 between the French and the Allies, being defeated at Grossbeeren (August 23, 1813), and fighting valiantly at Leipzig. He was one of the last to abandon Napoleon. During the Hundred Days he remained on his estates. After the second Restoration he became a Minister of State, major-guard of the Royal and commander-in-chief of the National Guard, and a peer of France. In 1823 he commanded the First Army Corps in the invasion of Spain, and was for some time Governor of Madrid. After the Revolution of July, 1830, Oudinot retired to his estates, and only at rare intervals appeared in the Chamber of Peers. He died in Paris, September 13, 1847. His *Souvenirs* were published in 1894. His son, NICOLAS CHARLES VICTOR UDINOT, Duke of Reggio (1791-1863), was a general in the French Army. He distinguished himself in Algeria and in the Revolution of 1848, and later became commander-in-chief of the Army of the Alps. In April, 1849, he was appointed general of the French expedition against Rome, and forced the city to surrender unconditionally on July 2. After the coup d'état, December 2, 1851, he was arrested and imprisoned. He was soon set at liberty, and spent the remainder of his life in retirement. He was the author of several books on military matters. He died July 7, 1863.

UDRY, ʊdriʔ, JEAN BAPTISTE (1686-1755). A French painter, born in Paris. He studied under his father, Jacques Oudry, and under Serre and Largillière; was received at the Academy in 1719, and became a professor there in 1743. He was appointed animal painter to the King, Louis XV., and painted his favorite dogs and incidents of the chase. In 1734 Fagon put him in charge of the Beauvais factories, and afterwards he was made superintendent of the Gobelins, for which he executed many designs. Several of his works are to be found in the Louvre and in the provincial museums. He also painted historical scenes and portraits, but less successfully.

OUGHTRED, WILLIAM (1575-1660). An English divine and mathematician, born at Eton.

He entered King's College, Cambridge, in 1592, where he became a fellow in 1595. He was rector at Albury, near Guildford in Surrey (1610), and about 1628 engaged by the Earl of Arundel to tutor his son in mathematics. Oughtred was among the first to use modern symbols of operation, particularly \times for multiplication and $::$ for equality in the algorism of proportion. Abbreviations for sine and cosine are found in his work on trigonometry. His principal mathematical works are: *Clavis Mathematicæ* (1631); *Trigonometria* (1657); *Solution of All Spherical Triangles* (1657); *Canones Sinuum, Tangentium, Secantium et Logarithmorum*, etc. (1657); *Opuscula Mathematica Hactenus inedita* (1677).

UGREE, ʊˈgrɪ. A town of Belgium, in the Province of Liège, situated three miles south of Liège. It is an important industrial centre with coal mines, blast furnaces, rolling mills, and machine shops. Population, in 1900, 12,835.

UIATCHOUAN, wɛ-ɪˈtʃwæn. An affluent of Lake Saint John (q.v.), Canada.

UIDA, ʊ-ɪˈdɑ, Fr. pron. ʊ-ɪˈdɑ. An English authoress. See RAMÉE, LOUISE DE LA.

OULESS, ʊˈlɛs, WALTER WILLIAM (1848-). An English portrait painter, born at Saint Heliers, Jersey. He studied at the Royal Academy, began to exhibit there in 1873, and was elected a member in 1881. His work includes the portraits of many of his notable contemporaries, and he is ranked among the first of the English portrait painters.

OUNCE (Fr. *once*, Sp. *onza*, It. *onza*, *lonza*; perhaps, by loss of initial *l*, supposed to represent the definite article, from Lat. *lynx*, Gk. *lynx*, according to others the *l* is ultimately connected with Pers. *yōz*, panther). A large cat (*Felis uncia*), which resembles the leopard, but has much rougher and longer hair, and a longer and much more bushy tail; the general color is also paler, the rosette-like spots are less sharply defined, and there is a black spot behind the ears. Its range is very extensive, for it is found in Persia, Northern India, Tibet, China, Siberia, and even Saghalien. It frequents rocky ground, and is adapted to cold climates, so that in the warmer countries of its range it is found at considerable elevation. It feeds chiefly on goats, sheep, and other quadrupeds, but rarely attacks man. See PLATE of WILD CATS, under CAT.

In South America 'ounce' and its equivalents usually refer to the jaguar (q.v.).

OUNCE. See WEIGHTS AND MEASURES.

OUR AMERICAN COUSIN. A comedy by Tom Taylor, produced in 1858. The leading characters are Lord Dundreary, created by Sothorn, and Asa Trenchard, the Yankee, by Joseph Jefferson. At a performance of this play at Ford's Theatre, Washington, Lincoln was assassinated.

OURAY, ʊ-ɪˈrɑ (1820-80). An Indian chief, born in Colorado, where his people, the Uncompahgre Utes, bore in their special tribal title, which is probably a corruption of 'un compadre,' the evidence of their friendship to the whites. Ouray himself was engaged in a fierce struggle with the Sioux in his early manhood, and his only son was captured by his enemies, never to be restored; but he was always the 'white man's

friend,' spoke and wrote Spanish, and adopted civilized habits, living for many years on a farm which he cultivated himself. His influence with his people was firm, and the tribe never broke a treaty. Even in 1879 he was successful in his attempts to restrain them from rising at the time of Meeker's murder. Ouray visited Washington several times, and brought about the sale of the Ute reservation in Colorado.

OURIQUE, ʊ-rɪˈke. A small town in Southern Portugal, noted for the great victory over the Moors won by Alfonso I. in 1139. This victory secured for him the kingship of Portugal. It afterwards became famous in legend. The Christian forces were said to have been 13,000, the Moorish 406,000. Christ was said to have appeared to Alfonso, promising victory and the royal title.

OUR MUTUAL FRIEND. A novel by Charles Dickens (1865). It contains two stories. The principal plot concerns John Harmon, who, under the disguise of Rokesmith, keeps watch of his large fortune and marries Bella Wilfer. The other story centres around Lizzie Hexam, the bargeman's daughter, and her lover, Eugene Wrayburn. Mr. Boffin, the 'Golden Dustman,' and his wife connect the two stories. The minor characters are Silas Wegg, Jenny Wren, and old Betty Higden.

OURO PRETO, ʊ-ro prɪˈto (Port., black gold, from the color of the argentiferous rocks in the neighborhood). A city and formerly the capital of the State of Minas Geraes, Brazil, situated on the western slope of the Serra do Espinhaço, 170 miles north of Rio de Janeiro (Map: Brazil, J 8). It is a very picturesque town, with quaint buildings; but, being founded as a mining town, its location was selected only with a view to easy accessibility to the mines. It is built on the side of a very steep hill, and is shut in by a mountain on one side and a narrow gorge on the other, so that it has no room for expansion. For this reason the State Government was removed in 1894 to Belo Horizonte or Minas (q.v.). Its gold mines, which formerly yielded rich returns, are now almost abandoned, and the town has greatly declined. Previous to 1894 its population was 26,000; in 1899 it was only 14,000.

OUSE, ʊz. The chief river of Yorkshire, England (Map: England, G 4). It rises by two headstreams in the Pennine Hills on the border of Westmoreland, and flows southeastward until it joins the Trent to form the Humber (q.v.). Its total length is 130 miles, and it is navigable for large vessels 45 miles to York.

OUSE, GREAT. A river of England, rising in Bedfordshire, and flowing northeast into the Wash at King's Lynn (Map: England, G 4). It is 160 miles in length, and navigable for about 50 miles.

OUSELEY, ʊz-ɪl, FREDERICK ARTHUR GORE (1825-89). An English Church composer and musical theorist, born in London. After his graduation from Oxford, he entered holy orders and became a curate in London; after which he was appointed precentor of Hereford Cathedral in 1855, and incumbent of Saint Michael's, Tenbury, in 1856. He was one of the founders, and later warden, of Saint Michael's College, Tenbury, an institution for the instruction of boys

in classics and choral singing, and bequeathed to it his valuable music library. He took the degree of doctor of music at Oxford in 1854, and the next year became professor of music there. He published a number of musical collections, *A Treatise on Harmony* (1868), and *A Treatise on Counterpoint, Canon, and Fugue* (1869). He was also the author of the oratorios *The Martyrdom of Saint Polycarp* (1855) and *Hagar* (1873); considerable salon music; a number of anthems; and edited, with Dr. Monk, *Anglican Psalter Chants* (1872). He died at Hereford.

OUSELEY, GIDEON (1762-1839). The Wesleyan apostle of Ireland. He was born at Dunmore, Ireland, February 24, 1762, of a family distinguished in English history. In his youth he was reckless, but in 1791 became religious under the influence of Wesleyan soldiers stationed at his native place. He soon became an evangelist, preaching with fervor and boldness in the streets and churchyards, fairs and markets, and at the wake-houses. Without dismounting from his horse he preached from three to five times a day. After preaching thus for seven years he was received into the Wesleyan Conference, and in 1799 appointed a missionary to Ireland. He was often roughly treated by the Irish, but being a master of the language, and thoroughly acquainted with the Irish character, he succeeded in converting thousands. At the age of seventy-four, after fifty years of devoted labor, he was still as active as ever on the highways and in the market-places, preaching fourteen, sixteen, and sometimes twenty sermons a week. He was the author of several polemical publications, of which the most important is *A Short Defense of the Old Religion* (1812; reprinted as *Old Christianity Against Papal Novelties*, 5th ed. 1827). He died in Dublin, May 13, 1839. Consult his *Life* by Arthur (London, 1876).

OUSELEY, Sir WILLIAM (1767-1842). A British Orientalist. He was born of Irish parentage at Monmouthshire, England. He went to Paris in 1787, and there commenced his Oriental studies. In 1788 he entered the army as cornet of dragoons, and after seeing active service under the Duke of York, in 1794 left the army to continue the study of Persian and other Oriental literature at the University of Leyden. The fruits of his studies were embodied in four works published between 1795 and 1804, the earliest of which gained for him in 1797 the honorary degree of LL.D. from Trinity College, Dublin, and of Ph.D. from the University of Rostock. In 1800 he received the honor of knighthood from the Viceroy of Ireland. He perfected his colloquial knowledge of Persian by several months of residence in the London household of the Persian Ambassador, Mirza Abul Hassan, and as private secretary to his brother, Sir Gore Ouseley, who had been appointed British Ambassador to Persia, went to that country in 1810, where he remained until 1813. He was elected member of several learned societies, and was a prolific contributor to the *Translations* of the Royal Society of Literature. He died at Boulogne. His principal works are: *Persian Miscellanies* (1795); *Oriental Collections* (1797-79); *Tales of the Bakhityar Nama and the Ten Virgins* (1801; new ed. 1883); and *Travels in Vari-*

ous Countries of the East, More Particularly Persia in 1810, 1811, 1812 (1819-23).

OUSTER (OF. *ouster*, *oster*, Fr. *ôter*, to remove, *oust*, from Lat. *haurire*, to draw). The deprivation or exclusion of the rightful owner from the possession or enjoyment of land. Such dispossession may be effected by an entry on the lands under a claim of title, or by a person remaining on lands after his title or right to possession of them has ceased, to the exclusion of the owner, or one next entitled to possession. The exclusion from possession or enjoyment of land of one tenant in common by a co-tenant would constitute an ouster. An ouster is distinguished from a trespass, which is a temporary encroachment on, or invasion of, the real estate of another, usually without a claim of right. The remedy for an ouster is an action to recover possession of the property. See DISSEISIN; EJECTMENT; TRESPASS.

OUTAGAMIES, ō'tā-gām'iz. See SAC AND FOX INDIANS.

OUTCROP. A term applied in geology to the edges of strata which appear at the surface. The outcrop of a mineral vein is sometimes called the apex.

OUTLAWRY. An ancient common-law process for compelling the appearance of a person before a court of justice. Its origin dates back to the reign of King Alfred, and it was probably devised as the most efficient means of securing the punishment of a culprit. The courts and officers of the peace were not well organized at that time, and it was not difficult for a criminal to elude the King's officers. However, a decree of outlawry against an alleged criminal bound every honest person to attempt to capture him if he crossed his path. The outlaw was deprived of all rights as a citizen, or even as a human being. He was considered as a wild beast, the decree at a later date bearing the words, *Caput gerat lupinum* (Let him bear the wolf's head), which signified that it was the right, and even the duty, of any person to knock him on the head as if he were a wolf. To harbor or render assistance to an outlaw was a capital crime, punishable with death. Outlawry was, therefore, equivalent to a sentence of death, and, in addition, the outlaw was deprived of all property rights, his land escheated to the King, or under the feudal system to his lord, his chattels being always forfeited to the King. The law in this respect continued the same until the thirteenth century, when the reform of prohibiting the public from wantonly killing an alleged outlaw, unless in an attempt to capture him, was introduced. Even at that time, if on the trial the mere fact of outlawry was established, the sentence was death. However, toward the end of the thirteenth century, the penalty of death was no longer inflicted in cases of 'minor outlawry,' that is, where the process had issued in a civil cause, or in a prosecution for a crime less than felony or treason. The decree of outlawry at that time was issued in so many cases where the accused person had not intentionally disobeyed a summons from a court, or had never been informed that he was accused, that it became customary for the King, when such a case was brought to his attention, to 'inlaw' the person. This was effected by a decree removing the ban of outlawry, and the accused could then

appear and stand trial for the offense originally alleged to have been committed by him. However, the person who was thus again given the protection of the law was considered a new person, as if he had just been born, and was not thereby restored to his former property rights.

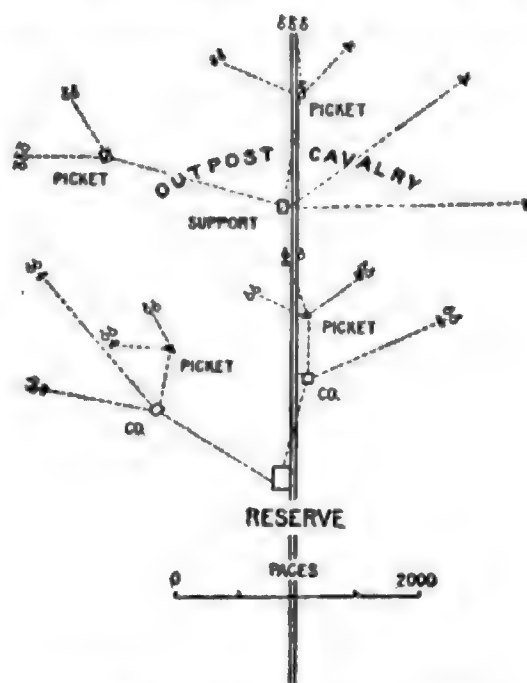
The outlaw's blood was said to be 'corrupt,' and a child born to him after the decree was incapable of inheriting, not only from the father, but from any one else. By the statute, 5 and 6 Edw. VI., c. 11, a person outlawed for treason while abroad was permitted to return to the country within a year and a day and stand trial, but no provision of this sort in regard to felony has ever been made. The 'Forfeitures Act,' 1870, 33 and 34 Vict., c. 23, reserved forfeitures of lands and chattels to the Crown in cases of outlawry for treason and felony. Outlawry for misdemeanors may still be imposed, but such a judgment amounts only to a conviction for contempt of court, although it entails a forfeiture of chattels to the Crown. The sovereign alone can pardon an outlaw. The process of outlawry has not been used in England since 1859, but the above statutes still remain in force.

The process of outlawry is entirely obsolete in the United States, and it is doubtful if it has ever been employed since the War of the Revolution. The term outlaw has been loosely applied in some criminal statutes to designate bandits or wandering marauders, who habitually live by crime, but it has not the signification it bears under the laws of England. See **CRIME: FELONY**. Consult Legge, *The Law of Outlawry* (London, 1779); Blackstone, *Commentaries*.

OUTPOSTS. The security of troops at a halt, that is, in camp, bivouac, or cantonment, is insured by means of outposts, or detachments thrown out from the main body to protect it from surprise. These are either separate detachments, at important points, or a continuous chain. The latter is rarely necessary in war, because the armies are seldom in such close contact as to require it. For a few days before and after a decisive engagement it may be necessary, but during the course of the operations between battles there is no such immediate danger, especially for the infantry. The cavalry is, of course, constantly in touch with the enemy, and the best protection for it is the patrols close up to the enemy, with the main body of cavalry retired a mile or so for rest, the reconnaissance squadrons remaining assembled out in front covered by a few posts and patrols in their immediate vicinity. If the distance to the reconnaissance squadrons is very great, *outpost squadrons* are sent out to cover the intervening space, and as a rule they will be sufficient. Only occasionally, as on the night after a battle, is it necessary to add an *outpost reserve*, or main body. Each outpost squadron has a particular section of ground assigned to it, for the security of which it is responsible, and for observation *pickets* are pushed out, from which *vedettes* are sent to the front as *sentinels*. In the arrangement of pickets and vedettes, particular attention is given to gaining a good outlook over the surrounding landscape and the main roads must be observed. In general, security is better insured by constant communication between the reconnaissance detachments

and behind the pickets than it can be by a continuous line of posts; these outposts require no special outpost commander, the squadrons acting independently.

If the screening cavalry in this way insures its own safety, it necessarily relieves the other troops in rear from a great part of this duty. In many cases the troops in rear can entirely dispense with outposts; again, when there is no chance of a battle taking place within a day or so, each subdivision may be left to look after its



THEORETICAL DISPOSITION OF OUTPOSTS.

own security. The strength and energy of the enemy is always an important factor, as well as the feeling of the inhabitants of the country, and when the enemy is very near, a connected line of outposts is demanded, composed, in general, of mixed troops. At the end of a march the advance guard, either in whole or in part, takes charge of the outpost duty. On resuming the march a new advance guard is formed, the old being relieved after the new has advanced beyond its lines. See **ADVANCE GUARD**.

The entire outposts in this case are under one or more outpost commanders, depending on the length of the line and the character of the ground. The main line is composed of outpost companies or supports, for which a *reserve* is provided when necessary, and this is placed either in rear or on the same line, depending on the point where support is most desired. If there is no outpost cavalry available, patrols (q.v.) must be sent out by the outpost companies, but the latter must have a few cavalymen as messengers, or in their stead cyclists. On coming into position a picket ahead on the road is usually sufficient, but at night other pickets and sentinels may be required.

OUTRAM, *W'tram*, Sir JAMES (1803-63). A British-Indian soldier and statesman. He was born at Butterley Hall, Derbyshire, and was educated at Udnay, Aberdeenshire, and afterwards at Marischal College, Aberdeen. He received his commission, and was sent to India as a cadet in 1819. He gained distinction in his conduct of the campaign of the wild Bhils of Khandesh

against the Dang tribes; the restoration of order in the Mahi Kanta; the Afghan campaign of 1839, during which he acted as aide-de-camp to Lord Keane, and in which he performed his famous perilous ride from Khelat, through the Bolan Pass. He was political agent at Gujarat, and afterwards commissioner in Sindh, and upon the annexation of Oudh was made resident and commissioner, by Lord Dalhousie. Owing to ill health, he returned to England in 1856, but with the outbreak of the Persian War he was sent with the British forces to the Persian Gulf, with diplomatic powers as a commissioner—after which he returned to India. At the commencement of the Indian Mutiny in 1857 he was commissioned to take charge of the forces marching to the relief of Lucknow, but refused to take precedence of his friend Havelock, and took up only his civil appointment as chief commissioner of Oudh, serving under Havelock as a volunteer. After the relief of Lucknow he led a skillful movement up the left bank of the river Gumti, which led to a final and complete victory over the insurgents. He was next made chief commissioner of Oudh, in 1858 was made lieutenant-general, and in 1860 received the thanks of Parliament. He took his seat as a member of the Supreme Council of India in Calcutta, but was compelled by ill health to return in 1860 to England. India founded an institution in his honor and presented him with valuable gifts, besides erecting a statue of him at Calcutta. He died at Pau, France, March 11, 1863. He is known as the 'Bayard of India,' and was conspicuous for his fair play and generous championship of the natives of India.

OUTRE-MER, ʊʊ'tr'mār, A PILGRIMAGE BEYOND THE SEA. Sketches of foreign travel by H. W. Longfellow (1835).

OUVRARD, ʊʊ'vrār', GABRIEL JULIEN (1770-1846). A French financier, born near Clisson, in the Department of Loire-Inférieure. During the early years of the French Revolution he amassed a large fortune, and under the Directory he became one of the principal creditors of the State. Contracts with the Spanish Government netted him immense profits and his income from other sources was enormous. Between 1802 and 1804 his loans to the Government amounted to nearly 300,000,000 francs. He subsequently furnished the means for Napoleon's great military undertakings. The enmity of the Emperor brought about the dissolution of the company of which Ouvrard was the head and the arrest of the banker, who from 1810 to 1813 remained in prison. Later in life he suffered imprisonment for illegal transactions on the Bourse, and after his release went to England, where he died. His *Mémoires* appeared in Paris in 1826.

OUZEL, ʊʊ'z'l, or **OUSEL** (A.S. *oslc*, OHG. *amsala*, *amasla*, Ger. *Amsel*, ouzel, of uncertain etymology). An old name of the English black-bird. It is also applied to other birds, chiefly of the thrush family. Thus, one British thrush (*Merula torquata*) is called the 'ring-ouzel.' The European dipper is very generally known as the 'water ouzel,' and in the United States the term is restricted to our dipper (q.v.) of the Rocky Mountain region.

OVALLE, ʊʊ-väl'yā. The capital town of the province of the same name, Chile, on the right bank of the Limarí River, 170 miles north of

Valparaíso, and on the railway from La Serena to San Marco (Map: Chile, D 10). It is a well-built town, in a well-irrigated valley, and was founded in 1831. Its population, in 1885, was 5426.

OVALS OF CASSINI, kās-sē'nē. See **CASSINIAN OVAL**.

OVALS OF DESCARTES, dā-kärt'. See **CARTESIANS**.

OVAMPO, ʊʊ-vām'pō. A Bantu people living on the northern boundary of German Southwest Africa. They are divided into a number of tribal groups each ruled by an hereditary chief. They are tall, robust, well-proportioned, with regular features; they are very peaceful and kind in disposition and superior in intelligence to other South African tribes. They do not live in villages, but in family communities. The houses are very low, conical structures, designed mainly for sleeping purposes. They also have granaries and chicken houses set up on posts. They raise corn and have great herds of cattle. The men go naked; the head is shaved except a small hair lock. They wear sandals like the Bechuana. The women wear a waist cloth and a small apron. Their hair is impasted with grease mixed with red clay. Beads and large brass rings are worn as ornaments. To the women falls the duty of building the houses and a large part of the agricultural work. The men hunt wild animals and work in iron and copper, in which art they are very skillful. They are fond of dancing to the music of a drum and a kind of guitar. In ceremonial greeting of friends they anoint the face and breast of the visitor with butter.

Consult: Andersen, *The Okovango River* (London, 1861); Stanford, *Africa* (London, 1895).

OVANDO, ʊʊ-vān'dō, NICOLAS DE (c.1460-c.1518). A Spanish Governor of the West Indies, born in Valladolid. He was a commander of the religious Order of Alcántara, stood high in the favor of King Ferdinand and Queen Isabella, and in September, 1501, was appointed to succeed Francisco de Bobadilla (q.v.) as Governor of the West Indies. Leaving the port of San Lucar, February 13, 1502, with a company of 2500 persons—the largest company which had hitherto been sent to the West Indies—he arrived at Santo Domingo April 15th, and remained as Governor until replaced by Diego Columbus in 1509. He proved a successful ruler over the Spaniards, founded a number of new settlements, and did much to restrain turbulence and disorder. Toward the Indians, however, he was despotic and cruel. He prosecuted several ruthless wars against them, his soldiers putting captives to death after subjecting them to hideous tortures; and virtually enslaved many thousands of them, through the establishment of the *encomienda* system, whereby they were distributed in lots of 50 or 100 among the Spaniards.

OVAR, ʊʊ-vār'. A town of Portugal, in the Province of Beira, 20 miles south of Oporto, at the head of one of the branches of the curious lagoon or bay called Rio d'Aveiro (Map: Portugal, A 2). (See **AVEIRO**.) It is a prosperous and increasing town and carries on an extensive fishery and a considerable trade in wine, grain, and fruit. Population, in 1900, 10,582.

O'VARIOTOMY. See **OVARY**.

OVARY (from Lat. *ovum*, egg; connected with Gk. *ὄν*, *όν*, OChurch Slav. *aye*, *yaye*, OHG. *ei*, Ger. *Ei*, AS. *æg*, Eng. *egg*). One of the pair of organs which in the female of any species produce the *ova*, or female reproductive bodies. They are analogous to the testes in the male. They may be described as two oval flattened bodies, an inch and a quarter to an inch and a half long, three-quarters of an inch in width, and nearly half an inch thick, in the human subject, situated on either side of the uterus, to which they are connected by ligaments and by the Fallopian tube. On making a section of an ovary, numerous vesicles are observed in its interior. These are the ovisacs of the future *ova* or germs, and are termed the *Graafian vesicles*. Before impregnation they vary in number from 10 to 20, and in size from that of a pin-head to that of a pea; but on microscopic examination great numbers of minute undeveloped vesicles are also found to be present. At each monthly period a ripe Graafian vesicle bursts and the ovum contained in it makes its way by the ciliary motion of the epithelial lining of the tube along the Fallopian tube to the uterus, where if not impregnated it is disintegrated or passes off with the menstrual discharge.

Of the morbid conditions to which the ovary is liable by far the most important is the formation of tumors. These may be either solid tumors or cystic tumors. The cystic tumors, which consist of a sac containing a fluid or semi-fluid substance, are of much more frequent occurrence than the solid tumors. They are known as *ovarian cysts*. Two principal varieties of cysts are usually encountered, the first of which is a small cyst which has its origin from degeneration of the Graafian follicle. It usually grows to the size of a fist and but rarely attains the size of a man's head. The second variety is the large multilocular cyst made up of innumerable cysts of small size which as they grow partially fuse together and form the larger loculi or subdivisions which compose the fully developed tumor. This variety of cyst has its origin from abnormal growth and development of the glandular epithelium of the ovary. Besides these two varieties of cysts a third variety of cyst, known as the *dermoid cyst*, also occurs not infrequently. It presents when opened a characteristic pulpy substance with which are mingled hair, nails, teeth, and pieces of cartilage, bone, etc.

Of the solid tumors of the ovary carcinomata and sarcomata are the most important.

The modern treatment of ovarian tumors is by ovariectomy, a surgical operation for removal of the tumors, as soon as their existence is recognized. Tapping of ovarian cysts by puncture is now only occasionally employed, and then only as a palliative measure.

OVARY. In flowering plants (angiosperms), that usually bulbous portion of the pistil which contains the ovules. The name was given under the mistaken impression that the ovules correspond to eggs, for which reason the term *ovulary* has been suggested to avoid confusion with the ovary of animals, a totally different structure. See FLOWER.

OVATION. See TRIUMPH.

OVEN-BIRD. A bird that builds a domed nest somewhat like an old-fashioned outdoor oven. The name belongs primarily to certain

species of South American tree-creepers of the genus *Furnarius* and family *Dendrocolaptidae*, which are small, non-oscine, passerine birds with short wings, feeble power of flight, and plain brownish colors. These birds are numerous in Argentina, and are familiar about village gardens and farms. Both sexes take part in the construction of the nest, which is generally in an exposed situation, remarkably large and of the shape of a dome, with a small entrance on one side. It is made of clay, mixed with a little hair or grass, well plastered together, and becomes quite firm as the clay dries in the sun. Its building sometimes requires several months. Internally, it is divided into two chambers by a partition reaching nearly to the roof, the eggs (pure white) being placed in the inner chamber on a bed of soft grass and feathers. The outer chamber seems to be intended for the male. Such nests are made by *Furnarius rufus* (the hornero or 'baker') and some others, and a new one is constructed each year; but other species of the same genus nest quite differently.

In the United States the name 'oven-bird' is given to the golden-crowned 'water-thrush' (q.v.) (*Seiurus aurocapillus*), one of the larger wood-warblers. It is rather more than six inches long, olive green above, white, streaked with black, beneath, and with the centre of the crown pale rufous. During the summer it is found throughout North America, except west of the Rocky Mountains, and it winters from Florida and Texas southward. The nest is rather large, roofed over, with the entrance on one side. It is composed of rootlets, grasses, leaves, etc., and is made on the ground. The eggs are four or five, white, spotted with brown. The oven-bird is remarkable for uttering a sweet chattering song in the air at twilight, after the manner of the skylark; but it is better known by its customary accelerated call. Another peculiarity of the bird is that it walks with a see-sawing motion accompanied by a rhythmical nodding of the head. Consult for the South American oven-bird, Hudson, *The Naturalist in the La Plata* (London, 1892); Selater and Hudson, *Argentine Ornithology* (London, 1888); Newton, *Dictionary of Birds* (New York, 1893-96); and for the American oven-bird, standard ornithologies and Burroughs, *Wake Robin* (Boston, 1872, and later).

O'OVERBECK, JOHANNES ADOLF (1826-95). A German archæologist and art-historian; nephew of Friedrich Overbeck, the painter. He was born at Antwerp, and studied at Bonn, where he was privat-docent from 1850 to 1853. From the latter year until his death he was professor of archæology and director of the archæological museum at Leipzig. His publications include: *Kunstarchäologische Vorlesungen* (1853); *Pompeji in seinen Gebäuden, Alterthümern und Kunstwerken* (1855); *Die Geschichte der griechischen Plastik* (1857-58; 4th ed. 1894); *Die antiken Schriftquellen zur Geschichte der bildenden Künste bei den Griechen* (1868); and *Griechische Kunstmythologie* (1871-89).

OVERBECK, JOHANN FRIEDRICH (1789-1869). A German historical painter, the leader of the revival of Christian art in the nineteenth century. He was born at Lübeck, July 4, 1789, received a careful education, and in 1806 went to Vienna to study at the Academy. His opposition to the pseudo-classic notions then prevailing at

that institution resulted in his expulsion in 1810, in company with several like-minded fellow students. They proceeded to Rome, where they became known as the Nazaries, because of their artistic views. (See PRE-RAPHAELITES.) To Overbeck, the high priest of this creed, art was a religious question, and he held that "the true home of art is within the soul before the altar of the Church." Becoming more and more absorbed in this ecclesiastic romanticism, he embraced the Catholic faith and dedicated his life to Christian art. As his part of a commission from the Prussian Consul Bartholdi to decorate a room in his house with frescoes illustrating "The History of Joseph," Overbeck painted "Joseph Sold by His Brethren" and the "Seven Years of Famine." The entire cycle was successfully transferred to the National Gallery in Berlin in 1887. Its success brought a new commission to decorate the Villa Massimi with scenes from Dante, Ariosto, and Tasso, of which Overbeck painted "Jerusalem Delivered" (completed by his devoted disciple Führich). Of his oil paintings of this period the New Pinakothek in Munich possesses three: "Italia and Germania" (1820), "Portrait of Vittoria Caldoni" (1822), and a "Holy Family" (1825). The latter, an inspired transcript of Raphael's forms, is one of Overbeck's most charming compositions. More important and on a larger scale is "Christ's Entry into Jerusalem," painted intermittently from 1809 to 1824, and now in the Marienkirche at Lübeck. In this composition Flemish influence appears curiously blended with the Pre-Raphaelite, a healthy realistic element being added by the introduction of contemporary portraits of relations, fellow-artists, and friends.

Meanwhile a large school gathered around him, the influence of which extended throughout Europe. A sojourn at Perugia occasioned his finest and largest fresco, "The Vision of Saint Francis" (1830), in the Church of Santa Maria degli Angeli, near Assisi, suggestive, in its purity and rare charm, of the best Pre-Raphaelites. Among the fruits of the painter's first return to his native land in 1831 were "The Triumph of Religion in the Arts" (1831-40, Städelsches Institut, Frankfurt), accompanied by a written explanation containing a confession of his art faith, and the "Assumption" (1846-55, Cologne Museum). The impressive "Pietà" (1846, Marienkirche, Lübeck) was the outgrowth of a father's grief over the death in 1840 of his only son, a promising lad of eighteen.

Overbeck's greatness is, however, not to be sought in his paintings, but in his drawings, the most noteworthy including "Christ Blessing Little Children," "The Preaching of Saint John," "Rest in Egypt," "The Raising of Lazarus," and especially the cycles of "The Gospels" (40 cartoons, 1843-52), "Via Crucis," or "The Stations" (14 water-color drawings, 1857), and "The Seven Sacraments" (7 cartoons, 1861). Productive to the last, he died peacefully at Rome, November 12, 1869, and was buried in the Church of San Bernardo.

Overbeck's work cannot be judged by ordinary standards. His artistic creed, that the mental conception constitutes the chief merit of an art work, that outline or form is the direct vehicle of such idea, and that color and its accessories are subordinate elements, shows conclusively that he must not be viewed as a colorist. Yet in spite

of its defects his art is vital in thought, form, and composition, and his works are undeniably the most perfect artistic manifestations of the great Catholic reaction dating from the beginning of the nineteenth century. Consult the biographies by Atkinson (London, 1882) and Howitt (Freiburg, 1886); also Valentine, in Dohme, *Kunst und Künstler des 19. Jahrhunderts* (Leipzig, 1883-85); Zahn, in *Zeitschrift für bildende Kunst* (ib., 1871); Pecht, in *Allgemeine deutsche Biographie*, xxv. (ib., 1887); Portig, "Friedrich Overbeck und die religiöse Malerei der Neuzeit," in *Unsere Zeit* (ib., 1887); and Rosenberg, *Geschichte der modernen Kunst*, ii. (ib., 1889).

OVERBURY, Sir THOMAS (1581-1613). An English author and courtier, whose mysterious death has given a peculiar interest to his history. He was the son of Sir Nicholas Overbury, and was educated at Queen's College, Oxford, from which he graduated in 1598. While on a visit to Scotland in 1601 he met Robert Carr, who became the favorite of James I. of England. Through his influence Overbury rapidly rose in power. He wrote poems, the best of which is one called "A Wife." Among his intimates were men like Ben Jonson. About 1610 Carr, who had meanwhile become Viscount Rochester, fell in love with Frances Howard, Countess of Essex. Overbury was opposed to Rochester's marrying this abandoned woman, and in consequence she intrigued, until in 1613 Overbury was arrested and placed in the Tower. In this place he was poisoned by Richard Weston, a tool of the Countess, and died September 14, 1613. Rochester married the divorced Countess in December, 1613. The murder became public in 1616, and the guilty parties were imprisoned for several years. There is an edition of Overbury's works by Rimbault (London, 1856).

OVERCOMERS. A name given to a peculiar religious society which originated in Chicago about twenty-five years ago and emigrated to Jerusalem, where they are now living. They do not use the name Overcomers themselves, but prefer to be called the 'American Colony in Jerusalem.' They reject marriage and hold communistic views about property; the Bible, they claim, has been always misunderstood, and the true interpretation of it, which they alone possess, will regenerate the world. They have made a small number of converts, chiefly from the foreign population of Western States.

OVER DARWEN. Ōvēr dār'wen. A town in England. See DARWEN.

OVERFLOW BUG. A carabid beetle (*Platynus maculicollis*) of California, which occasionally becomes so numerous as to be a nuisance, although from its carnivorous habits it is ordinarily beneficial. In 1880 they were extremely abundant throughout central and southern California, and the name overflow bug was probably given to them at that time. When crushed they gave off an offensive odor, and were called in some parts of California 'grease-bugs.'

OVERLAND ROUTE. A popular term for the shortest route from Great Britain to India. The itinerary is via Paris, Lyons, the Mount Cenis Tunnel, Modena, to Brindisi, thence by steamer to Port Said, through the Suez Canal and the Red Sea to Bombay, the time occupied being from twenty to twenty-one days.

OVERSEERS OF THE POOR. Unpaid parish officers in England, whose chief duty it is to assess the poor rates and collect them. Overseers were first authorized in 1572 (14 Eliz., ch. 5), but no specific duties were assigned. In 18 Eliz. they are called "collectors and governors of the poor." In 1597 (39 Eliz., ch. 3) it was enacted that in each parish the church warden, ex-officio, and "four other substantial householders" be appointed overseers, to assess the poor rates and oversee their distribution. In 1601 (43 Eliz., ch. 2, the foundation of the present poor law) the number was placed at from two to four, and the time of appointment, Easter. This was later changed to March 25th, or within fourteen days thereafter. The duties assigned them were: (1) to raise the necessary means for poor relief by taxation of the inhabitants; (2) to undertake the entire work of relief; and (3) to carry out all other measures necessary for executing the law.

For nearly a century after the reign of Elizabeth the overseers were the sole poor law authorities. Gradually it was found necessary to place them under the supervision of the justices, and to compel them to make public reports of their doings. By Gilbert's Act (22 George III., ch. 83) paid guardians of the poor were created to have charge of actual relief, and only the function of assessing and collecting the poor rate was left to the overseers. In 1819 the Select Vestry Act (59 George III., ch. 12) authorized parishes to control the overseers by appointing select vestries and to employ paid assistant overseers. Many parishes availed themselves of this permission. The Poor Law Amendment Act (4 and 5 William IV., ch. 76) made radical changes in the poor law and in its administration, but it continued both the overseers and the guardians, subjecting the overseers to the legal and reasonable orders of the guardians and of the justices. Overseers are appointed by the justices of the peace, and service is compulsory and unpaid. Certain persons, however, are exempt from appointment. Among them are members of Parliament, clergymen, barristers and solicitors, physicians, and officers of the army and navy. Overseers must be householders in the parish.

In discharging their function of assessment and collection of the poor rate the overseers are required each year to list the property of the parish and specify the amount due from each household. The assessment is signed by two justices of the peace and then collected. Rarely, save in emergency cases, do the overseers now have anything to do with the distribution of the money. Accounts are audited yearly by a paid official, the poor law auditor.

Miscellaneous duties have been imposed upon the overseers in recent years. They make lists of voters for members of Parliament and lists of persons qualified to serve as constables. They appoint persons to enforce the compulsory vaccination acts, to see to the burial of dead paupers and of bodies cast on the shore, and they carry out the nuisance removal act where there is no local board of health, etc. See PAUPERISM, section on England. Consult for detailed history of overseers of the poor, Nicholls, *History of the English Poor Law* (London, 1854; vol. iii. by Mackay, London and New York, 1899).

OVERSKOU, THOMAS (1798-1873). A Danish dramatist, born at Copenhagen. He was an

actor in his youth, and early began to write for the stage. After a failure with a comedy, he successfully produced three dramas, followed by other plays, some of which are still performed. Of these, *Ostergade og Vestergade* and *Capriciosa* are the best known. He also wrote a history of the Danish Theatre, *Den danske Skueplads i dens Historie fra dens Begyndelse til vor Tid* (1854-76).

OVERSTONE, SAMUEL JONES LOYD, Baron (1796-1883). One of the ablest authorities on banking whom England has produced. He was educated at Eton and Cambridge. On completing his studies he entered the banking and mercantile firms of Lubbock, Forster & Co., and Lubbock & Co., of which his father was the head, and upon the retirement of his father became the head of the house, which was later merged in the London and Westminster Bank. He entered Parliament in 1816 as a member for Hythe and continued to represent this constituency till 1823. In 1833 he was defeated in his candidacy for Parliament at Manchester, and did not seek to reënter public life. During his Parliamentary career Loyd had shown himself a careful student of banking questions, and in 1833 he was examined at length before a Parliamentary committee on banks of issue. He published his testimony and followed it in 1837 with a pamphlet of *Reflections Upon the State of the Currency*. In these writings he gave forcible expression to the opinions which have been known to economists as those of the Currency School. The essence of this doctrine is that the issue of bank notes cannot be left to free competition, that it should be strictly limited to institutions offering a definite guaranty of solvency in a definite coin reserve duly provided by law and attested by publication of balance sheets. The views which he expressed were not popular, but they won many adherents and eventually found expression in the Bank Act of 1844. In 1848 and in 1857, after the suspensions of the Bank Act, he was called upon to defend the act before Parliamentary committees. In 1850 he was raised to the peerage under the title of Baron Overstone and Frothingay.

OVERT ACT (OF., open). In criminal law, an open or positive act in furtherance of an intention to commit a crime, and which will apparently result in the crime, unless prevented or interrupted by circumstances not foreseen by the person doing the act. A mere intention to commit crime, except in case of a conspiracy, is not a penal offense, and therefore it is always necessary to show some overt act in order to sustain a criminal prosecution. An overt act is to be distinguished from a mere preparation to commit a crime, which in the absence of statute is not a criminal offense. For example, the purchase of a gun with intention of killing another is an act of such an uncertain nature that it cannot be said that it would directly result in murder if not prevented or circumvented in some way, and would not be considered an overt act. But pointing a loaded gun at another and pulling the trigger would be an unmistakable attempt to kill, even if the powder failed to explode, as the design would be effected but for an accident. In order to maintain a prosecution for treason in England some overt act must be shown, a treasonable intention not being sufficient to constitute the offense. In order to convict one so accused it is

necessary to prove the act by at least two witnesses. See CRIME; TREASON. Consult the authorities referred to under CRIMINAL LAW; CONSPIRACY.

OVERTONE. See HARMONICS.

OVERTURE (OF. *overture*, Fr. *ouverture*, opening, from OF. *overt*, Fr. *ouvert*, open, from OF. *ovrir*, Fr. *ouvrir*, to open, from OF. *avrir*, *aüvir*, to open, from Lat. *ad*, to + *deoperire*, to open, from *de*, off + *operire*, to cover, from *ob*, before + **verire*, to open; connected with Lith. *verti*, OChurch Slav. *vrěti*, Skt. *var*, to open, Ocean *vērā*, gate; the OF. *ovrir* may, however, be a variant of *avrir*, to open, from Lat. *aperire*, to open). In a general sense, an introduction, especially to an opera. The first operas had no overtures. They either began directly with the action or were preceded by a prologue which was sung. With the development of instruments it became customary to open an operatic performance with an instrumental prelude. These introductions, however, were nothing more than arrangements of popular madrigals for instruments. The oldest form of the overture originated in France, and here we can distinctly see the influence of the vocal style. Lully (1633-87) established this. Alessandro Scarlatti (1659-1725) began with an *Allegro*, which was followed by a *Grave* and ended with another *Allegro* or *Presto*. This form is known as the *Italian overture*. At that time, however, it was simply designated as *Sinfonia*. Such *Sinfonie* were soon used for concert performances, and composers began to write instrumental *Sinfonie*. It was but a step to the separation of the three parts into as many distinct *movements*. Hence the modern *Symphony* (q.v.). The modern overture may be divided into three distinct classes. (1) The *concert overture*, a work in sonata-form (q.v.). But there is no repetition of the first or exposition section. To this class belong the overtures of Beethoven, such as *Egmont*, *Coriolanus*. (2) The *opera overture*, consisting of a combination of various (generally the most melodious) themes from the opera. This was chiefly cultivated by Rossini, but with a more serious and artistic purpose by Weber. (3) An overture built upon themes from the opera, but with the definite purpose of giving a résumé of the action. The most famous example of this kind of overture is that to *Tannhäuser*, in which Wagner makes use of two principal themes, the chorus of the elder Pilgrims and the Venus-music. In this third class of overtures we may also place the preludes of Wagner's later dramas, which they lead directly, without a close, into the first act. See LEITMOTIVE; PRELUDE.

OVERWEG, ō'vēr-vāk. ADOLF (1822-52). A German explorer. He was born in Hamburg, and studied geology at the universities of Bonn and Berlin. In 1850 he joined Barth and Richardson in their explorations of Central Africa. He reached Lake Chad with a boat which had been brought overland from Tripoli, and devoted five weeks to exploring that lake, being the first European who had ever sailed upon its waters. He then tried to penetrate the country of Yakoba, northwest of the Benue, but his health was shattered and he returned to Kuka, near which place he died. His reports appeared in *Monatsberichte der Gesellschaft für Erdkunde* (1851-52), and in *Zeitschrift für Allgemeine Erdkunde* (1853).

OVID (PUBLIUS OVIDIUS NASO) (B.C. 43-A.D. 18). A Roman poet. He was a descendant of an old equestrian family, and was born on March 20, B.C. 43, at Sulmo (now Sulmona), in the country of the Paeligni. He was educated for the bar, and under his masters, Arellius Fuscus and Porcius Latro, he became highly proficient in the art of declamation. His genius, however, was essentially that of the poet, and the writing of verses began to absorb the time he was supposed to spend in the study of jurisprudence. By the death of his elder brother, Ovid inherited all his father's property, and went, for the completion of his education, to Athens. He afterwards made a tour of Asia and Sicily with the poet Macer. It is uncertain whether, on his return to Rome, he ever practiced as advocate. Although by birth entitled to aspire to the dignity, he never entered the Senate; his weakness of body and indolence of habit prevented him from ever rising higher than the position of a decemvir, who convoked and presided over the court of the centumviri. While his public life was unimportant, his private life was that of a gay and licentious man of letters. The restraint of marriage was always distasteful to him; twice married in early life, he soon divorced each of his wives; while he carried on an intrigue with a lady whom he celebrated as Corinna, and who has been thought to have been no other than Julia, the accomplished daughter of Augustus. Before his thirtieth year, he married a third time, and became the father of Perilla, of whom he was tenderly fond. Up to his fiftieth year he resided chiefly at Rome, in a house near the Capitol, and occasionally visited his Paelignian estate. His society was much courted, and his large circle of distinguished friends included Augustus and the Imperial family. By an edict of the Emperor, however, he was, in A.D. 8, commanded to leave Rome for Tomi, a town near the delta of the Danube, and on the very boundary of the Empire. The sentence did not condemn him to an *exsilium*, but to a *relegatio*—or, in other words, he did not lose his citizenship, and he was not cut off from all hope of a return. The cause of this sudden banishment is a mystery, since the reason assigned in the edict—the publication of his *Ars Amatoria*—was a mere pretext, the poem having been in circulation for ten years before. His cognizance of a love affair of Julia's daughter, and the consequent displeasure of Augustus or of Livia, have been adduced with various degrees of plausibility as the cause of a sentence to which Ovid himself only mysteriously refers. The misery of his life on the inhospitable and barbarous shore of the Euxine is commemorated by the poems in the composition of which he found his solace. He became a favorite with the people of Tomi, before whom he publicly recited some poems in honor of Augustus. But his devotion to the Emperor, and the entreaties addressed to the Imperial Court by himself and his friends, failed to shorten the term or to change the scene of his banishment, and he died, an honored citizen of Tomi, A.D. 18, in his sixtieth year. His works which have come down to us, either in whole or in part, appeared in the following order: (1) *Amorum Libri III.*, a revised and abridged edition of an early series. (2) Twenty-one *Epistolæ Heroidum*. (3) The *Ars Amatoria*. (4) *Remedia Amoris*. (5) *Nux*,

the remonstrance of a nut-tree against the ill-treatment it received from the wayfarer, and even from its owner. (6) *Metamorphoseon Libri XV.* This is deservedly Ovid's best known work. It seems to have been written between the poet's fortieth and fiftieth years, and treats of all the transformations recorded in legend from the creation down to the time of Julius Cæsar, whose change into a star forms the last of the series. (7) *Pastorum Libri XII.*, the first six of which are all that remain. The poem is a Roman calendar versified, and describes the appropriate festivals and mythic legends from materials supplied by the old annalists. (8) *Tristium Libri V.*, written during the first four years of the poet's banishment. They are mainly descriptive of his miserable fate, and are full of appeals to the clemency of Augustus. (9) *Epistolarum ex Ponto Libri IV.*, similar in substance to the *Tristia*. (10) *Ibis*, a short satire against some traducer of Ovid. (11) *Consolatio ad Liviam Augustam*, held spurious by some critics. (12) *Medicamina Faciei* and *Halicuticon*, dubiously genuine, and of which we possess but fragments. Several of his works are entirely lost, the one best known to antiquity being *Medea*, a tragedy.

The poetical genius of Ovid has always been admired. A masterly facility of composition, a fancy vigorous and rarely at fault, a fine eye for color, and a versification very musical in its flow, are the merits which have made him a favorite, in spite of his occasional slovenliness and falsity of thought. The best early edition of Ovid's entire works is Burmann's (Amsterdam, 1728). Of modern editions, the best is that of Merkel revised by Ehwald (Leipzig, 1889-94). The editions of single poems, especially the *Metamorphoses*, are very numerous. An important edition of the *Heroides*, with ample commentary and Greek translation by Planudes, by Palmer, should be mentioned (Oxford, 1898). Ovid has been a favorite with English translators; the *Amores* were done into English verse by Christopher Marlowe; the *Ars Amatoria* by Congreve and Dryden; the *Tristia* by Arden (New York, 1821); and many translations of the *Metamorphoses* were collected by Garth (1st ed., London, 1810, frequently reprinted).

OVIDIO, ô-vê'dê-ô, FRANCESCO D'. See D' OVIDIO.

OVIDUCTS. See FALLOPIAN TUBES.

OVIEDO, ô'vê-â'nô. The capital of the Province of Oviedo (the ancient Asturias, q.v.), in Northern Spain (Map: Spain, C 1). It is situated on the railroad between Leon and Gijon, 16 miles southwest of the latter. The town has been much modernized, fine wide streets have been laid out, and in the new suburb to the north of the old town there are parks, gardens, and promenades, and many attractive buildings. The principal building and the pride of the Oviedans is the cathedral, the beautiful Gothic tower of which dominates the whole city. The educational institutions include the university, with faculties of law, philosophy, and science. In 1900 there were 234 students in attendance. It occupies a square, one-story building, and has a well-equipped meteorological observatory and a museum of natural history. Besides the university there are a provincial institute, a seminary, a school of arts, a normal school, a provincial archaeological museum, and a public library of 40,000 vol-

umes. The industries are represented by a large number of tanneries, and manufactures of cloth, chocolate, flour, and bricks. There are large national establishments for the manufacture of firearms, as well as gunpowder factories and cannon foundries. Population, in 1887, 42,716; in 1900, 48,374.

OVIEDO Y VALDÉS, é val-dâs', GONZALO FERNANDEZ DE (1478-1557). A Spanish chronicler, born in Madrid. He was sent by Ferdinand to San Domingo, in the West Indies, in 1514, as intendant and inspector-general of the trade of the New World. During his long residence in San Domingo he spent his leisure in acquiring an extensive knowledge of the West Indies. After his return to Spain he published at Toledo, in 1528, a *Sumario de la historia general y natural de las Indias Occidentales*, and dedicated it to Charles V. He afterwards made some additions to the work, which was republished at Seville in 1535, in twenty-one volumes, under the title *La Historia general y natural de las Indias Occidentales*. He left some other books in manuscript, including incomplete manuscripts of *Chronicles of Ferdinand and Isabella* and of *Charles V.* An edition of the *Historia general* was published by the Academy, under the editorship of Amador de los Rios (1851-55). Oviedo died in Valladolid. Besides his *History of the West Indies*, we mention *Las Quinquagenas*, a valuable gossiping and anecdotal account of all the principal personages of Spain in his time. This still remains in manuscript in the royal library at Madrid. A *Life of Cardinal Ximenes* is also attributed to him.

OVIPAROUS ANIMALS (Lat. *oviparus*, producing eggs, from *ovum*, egg + *parere*, to bring forth). Animals that deposit their eggs either before or immediately after fertilization, so that development of the embryo takes place outside of the body. The term was formerly used in contrast with 'viviparous,' or bearing the young 'alive.' This distinction is no longer maintained, partly because the egg is also alive, and partly because there are all possible gradations between oviparity and viviparity, even inside of the group of mammals; for the lowest mammals (duckbill and echidna) lay slightly developed eggs provided with a tough membrane or 'egg-shell.' Thus arose the term 'ovoviviparous,' applied to animals of which the egg is hatched within the body of the mother, so that the young is excluded alive, although the fœtus has been inclosed in an egg almost to the time of parturition. Some fishes are 'ovoviviparous,' and so are some reptiles. These distinctions are much less important than was formerly supposed.

OVIS, OVINÆ. See SHEEP.

OVISACS. See OVARY.

OVOLO (It., from ML. *ovolum*, diminutive of Lat. *ovum*, egg). A convex molding much used in classic architecture and in succeeding styles. (See MOLDING.) In Roman architecture, the ovolo is an exact quarter of a circle; in Greek architecture, the curve is sharper at the top and quirked.

OVULATION. See OVARY.

OVULE (Fr. *ovule*, from ML. *ovulum*, little egg). The structure which in seed-plants (spermatophytes) becomes a seed. The name refers to the old mistaken belief that the ovule of a

plant represents the egg of an animal, and that it is fertilized and so produces a new plant. The name has been so long in use that it is still retained, although its real meaning makes it very inappropriate. Really it is a spore-case (sporangium, q.v.), and is entirely sexless. In gymno-

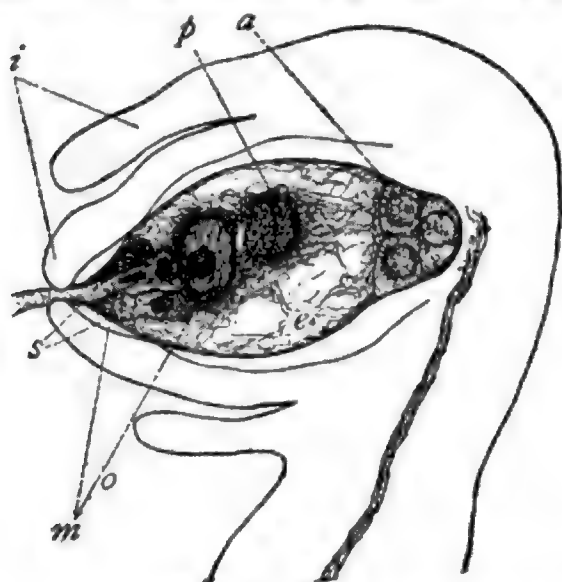


FIG. 1. OVULE.

Showing integuments (i), embryo-sac (e), antipodal cells (a), polar nuclei fusing (p), synergids (s), egg (o), and pollen tube (m) containing male cells.

sperms (pines and their allies) the ovules are freely exposed, while in angiosperms (flowering plants) they are inclosed in the bulbous part (ovary) of the pistil, but in both cases their structure is the same. The central body of an ovule (Fig. 1) is the *nucellus*, and enwrapping it there are one or two coats called the *integuments*. At the apex of the nucellus the integuments leave a small passageway (*micropyle*, 'lit-

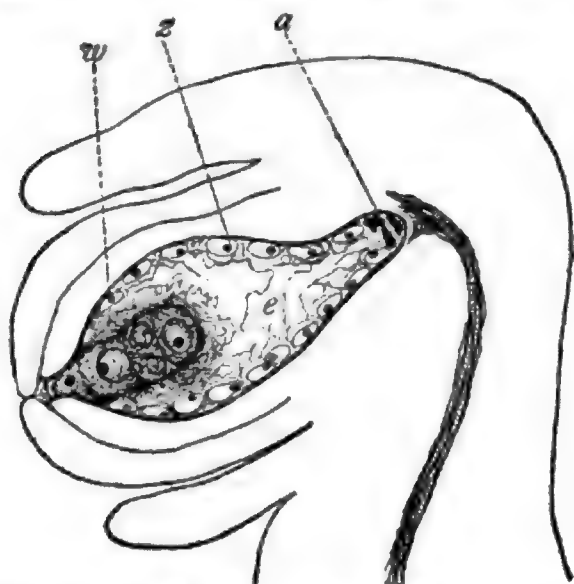


FIG. 2. AN OLDER OVULE.

Showing embryo-sac (e), antipodal cells degenerating (a), the developing endosperm (z), and young embryo (w).

tle gate'). for the entrance of the pollen-tube (see FERTILIZATION); and near the base of the ovule they become indistinguishable from the nucellus, this region of blending being called the *chalaza*. Frequently the ovule has a slender stalk, called the *funiculus*. Within the nucellus a single large spore (*megaspore*, q.v.) is formed, which still bears its old name *embryo-sac*. This spore is

peculiar in not being shed from its sporangium (ovule), and this fact results in making a seed out of the ovule. It is the business of this spore to germinate and produce a female plant (gametophyte), that is, a plant which produces eggs. This female plant thus imprisoned within the seed was long ago named the *endosperm* (Fig. 2). See SEED.

In the true flowering plants (angiosperms) the ovules are exceedingly variable as to number and position within the ovary, which may contain one or a very large number of ovules, and these may be attached to the wall of the ovary, in which case they usually occur in definite lines; or they may be found attached to a central axis which projects more or less into the ovary cavity. Three well-marked forms of ovules have been distinguished, and they are usually characteristic of great groups of plants. The most common form is the *anatropous* (inverted) ovule, in which the ovule has completely turned over and its funiculus (stalk) appears as a ridge along one side of it, the micropyle (apex of ovule) thus being directed toward the base of the funiculus. Another form is the *campylotropous* ovule, in which the body of the ovule itself has become curved, the micropyle thus being directed downward. The third form is the *orthotropous* ovule, in which there is no inversion or curving, but the axis of the ovule continues that of the funiculus, and the micropyle is directed upward.

OVUM, FERTILIZATION OF. See EMBRYOLOGY.

OWARI, ō-wā'rā, or BISHIU, bē'shō'. A populous and wealthy province of Japan, in the island of Hondo, one of the group known as the Tokaido or 'East Sea Circuit.' It lies south of Mino, west of Mikawa, east of Omi and Isé, and is bounded on the south by Owari Bay, into which the Kisogawa, which flows through the province, empties its waters. It has a fertile soil and is noted for its rich beds of clay, which are much used in the ceramic industries for which the province is noted. Near Nagoya (q.v.), the chief town, lies the village of Seto, where in 1297 the ceramic art of Japan had its origin, having been introduced by a native of the village, one Kato Shirozayemon (or briefly Toshiro), who had studied in China. From this circumstance *Seto-mono*, or 'Seto articles,' has become a synonym for all kinds of Japanese ceramic ware, just as 'chinaware' is synonymous with 'porcelain' wherever produced. Large quantities of blue ware are still produced at Seto. The province is also noted for its shippo or cloisonné enamels. Owari is included in the Ken or Prefecture of Aichi.

OWATONNA. A city and the county-seat of Steele County, Minn., 68 miles south of Saint Paul; on the Straight River, and on the Chicago, Milwaukee, and Saint Paul, the Chicago and Northwestern, and the Burlington, Cedar Rapids and Northern railroads (Map: Minnesota, E 6). It has Pillsbury Academy, Sacred Heart Academy, and the State Public School for Dependent and Neglected Children. Other fine structures are the court house, public library with 6300 volumes, the public schools, the opera house, and the city hospital. There are four steel bridges, and three parks: Central, Mineral Spring, and Dartt's. A productive farming district is tributary to Owatonna, and the city has also

noteworthy industrial interests, its plants including flouring mills, foundries and machine shops, a butter-tub factory, soap works, nurseries, and establishments manufacturing churns, gasoline engines, seeders, fanning mills, wagons, sleighs, automobiles, etc. Settled in 1855 and incorporated ten years later, Owatonna is governed, under a charter of 1875, by a mayor, elected annually, and a council. There are municipal water-works. Population, in 1890, 3849; in 1900, 5561.

OWE'GO. A village and the county-seat of Tioga County, N. Y., 21 miles west of Binghamton, at the confluence of the Susquehanna River and Owego Creek, and on the Erie, the Lackawanna, and the Lehigh Valley railroads (Map: New York, D 3). It is a summer resort and an attractive residential place, the home of several well-known men. It has a handsome court house, and the Coburn Free Library, containing over 8000 volumes. Considerable trade is carried on in farm produce and lumber. There are creameries, and manufactories of wagons, steel bridges, flour, silk and leather gloves, shirts, harness, and mica chimneys. The village, first incorporated in 1827, is governed under a charter of 1851, as amended in 1891, which provides for an annually elected president and council. Owego, meaning 'the place where the valley widens,' occupies the site of a small Indian village which was destroyed by General Clinton in 1779. In 1786 the first white settler came. Population, in 1900, 5039.

OWEN, D'én, DAVID DALE (1807-60). The second son of Robert Owen; born in Scotland. He came to the United States in 1823, took a degree from the Ohio Medical College, and for some years studied his profession and scientific branches in Europe. In 1833 he returned to the United States and was soon appointed State geologist of Indiana. Under the direction of the Legislature he made a geological survey of the State, and in 1839 was employed by the United States Government to make a survey of the mineral lands of Iowa, and in 1848 made similar surveys in Minnesota and adjoining Territories. The results of his work were published by order of Congress. He was employed from 1852 to 1857 in surveys of the same nature in Kentucky, and in 1857 was appointed State geologist of Arkansas.

OWEN (Lat. *Audoenus*), **JOHN** (c.1560-1622). An English epigrammatist. He was born at Llanarmon (Carnarvonshire), was educated at Winchester and at New College, Oxford, where in 1584 he became fellow, and from 1591 to about 1594 was a schoolmaster at Trelleck (Monmouthshire). Appointed then to the headmastership of the free school of King Henry VIII. at Warwick, he soon became known for his felicitous Latin epigrams, the first collection of which he published in 1606 as *Joannis Audoeni Epigrammatum Libri Tres*. He found a patron in John Williams, Bishop of Lincoln and Lord Keeper of the Great Seal. His work is uneven in quality, but at its best is caustically shrewd and pointed, and exceedingly skillful in its use of Latin idiom. What is perhaps his most frequently quoted line,

Tempora mutantur, nos et mutamur in illis

(bk. viii., 58, 1), is derived from Matthias Borbonius's compilation, *Delitiæ Poetarum Ger-*

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manorum (Frankfort, 1612), where in the form 'Omnia mutantur,' etc., it is attributed to the Emperor Lothair I. The best edition of the collected epigrams is by Renouard (Paris, 1794). There are English renderings by Vicars (1619), Hayman (1628), Harleete (1658), Pecke (1659), and Harvey (1677-78).

OWEN, JOHN (1616-83). An eminent non-conformist divine. He was born at Stadhampton, Oxfordshire, in 1616, of an ancient Welsh family. In 1631 he matriculated at Queen's College, Oxford, but in 1637 he was forced to leave the university because of opposition to Laud's statutes. When the Civil War broke out he warmly espoused the cause of the Parliament. He removed to London and published his *Display of Arminianism* (1643), which proved very acceptable to the Puritan party, and secured him the living of Fordham in Essex. From here he removed to Coggeshall, a neighboring vicarage. His views of Church government underwent a change, and from a Presbyterian he became an Independent, modeled his church on congregational principles, and wrote in advocacy of the latter. He preached before Parliament on the day following the execution of the King, but discreetly avoided a vindication of the act. In 1651 the House of Commons appointed him dean of Christ Church, Oxford, and the following year he was admitted vice-chancellor of the university. He was also returned to Parliament, but was unseated because of his orders. After Cromwell's death he was ejected from his deanery; but he had powerful friends at Court, and was allowed to preach, notwithstanding the Conventicle Act and the revocation of the Declaration of Indulgence, and in 1673 became pastor of a large Independent congregation in Leadenhall Street, London. In 1663 Owen was called to the First Church of Boston, Mass., but declined the call then, and when it was renewed in 1665. In 1669 he joined several other dissenting ministers in a protest against the treatment of the Baptists in Massachusetts, and in 1672 recommended a president for Harvard College, to which he had himself been called in 1670. Among his publications may be mentioned: *A Discourse Concerning Liturgies and Their Imposition* (1662); *Exercitations on the Epistle to the Hebrews* (1668-84), usually considered Owen's greatest work; *Truth and Innocence Vindicated* (1669), a reply to Parker's *Discourse on Ecclesiastical Polity: Justification by Faith* (1677); *Christologia* (1679). His works have been edited by Russell, with *Life* by Orme (28 vols., London, 1826), and by Gould, with *Life* by Thomson (24 vols., London, 1850-55).

OWEN, Sir RICHARD (1804-92). An English comparative anatomist, born at Lancaster, England, July 20, 1804. He studied medicine in Edinburgh, London, and also under Cuvier in Paris. He became a member of the Royal College of Surgeons in 1826, and practiced his profession in London, but was soon appointed assistant curator of the Hunterian Museum, and began to devote himself to the anatomy of animals. In 1834 he was appointed to the chair of comparative anatomy at Saint Bartholomew's Hospital, and in 1836 became the first Hunterian professor of anatomy and physiology in the College of Surgeons. This position involved the delivery of twenty-four annual lectures, but gave

him time for much original research, the published results of which brought him much renown, and won him the friendship of the most distinguished of his contemporaries, from the Queen and Prince Albert down. The last forty years of his life were spent at Sheen Lodge in Richmond Park, which was given him by the Queen.

The second period of his career began in 1856, when he resigned his professorship, and took the new post of superintendent of the natural history departments of the British Museum, which had previously been under the care of literary men with no special scientific training. He soon found that definite activity in the administration of the Museum was neither expected nor desired, and accordingly devoted himself with great energy to original research, making full use of the splendid collections under his hand. Having now little opportunity for dissection he spent most of his time on osteology and especially paleontology. A large amount of highly important work was accomplished, including the arrangement and revision of Hunter's manuscripts, and his own great book on the *Anatomy and Physiology of the Vertebrates* (1866-88). Owen is justly regarded as the greatest English comparative anatomist and paleontologist, and during the greater part of his life was considered Cuvier's successor in these fields. In 1883 he left the Museum, to which he had rendered priceless services, and spent the remaining years in retirement. He was made a K.C.B. in 1884. Of the innumerable works published during a literary activity of sixty-two years, at least the following should be mentioned: *Odontography* (1840-45); *Comparative Anatomy of the Invertebrate Animals* (1843); *British Fossil Mammals and Birds* (1846); *British Fossil Reptiles* (1849-84); *Experimental Physiology* (1882). Consult his *Life* by his grandson (London, 1894), which gives a complete list of his minor writings.

OWEN, ROBERT (1771-1858). An English social reformer, born May 14, 1771, at Newtown, Montgomeryshire, North Wales. He was the son of poor parents, and was apprenticed at ten years of age to a draper. He developed an unusual power of organization, and at nineteen years of age became manager of a cotton mill employing 500 hands. The enterprise was successful and Owen soon organized the Chorlton Twist Company, which later bought the large cotton mills at New Lanark of David Dale, whose daughter Owen married in 1799. Owen assumed the management in 1800, and New Lanark soon achieved wide reputation both for its industrial success and the prosperity of the employees. It was visited by the most prominent men of Europe. Owen opened pleasure resorts for the employees, stopped the employment of young children, and introduced a system of education far in advance of his time; improved the houses; furnished provisions at fair prices; and established insurance funds for sickness and old age. In 1813 he published his *New Views of Society, or Essays upon the Formation of the Human Character*, in which he held that character was wholly the result of the environment. Called before a Parliamentary committee in 1817 to testify regarding the causes of poverty and the means of avoiding it, he outlined the plan of a coöperative village, in which some 1200 persons should live in one large building with

public kitchens and dining rooms, each family having its own private apartments and the entire care of its children until the age of three, after which they should be brought up by the community. Work and the enjoyment of its results were to be in common. Federations of such coöperative townships were to embrace the world in one great republic. From this time it was his constant dream to found an ideal community. Disciples of Owen started a colony at Motherwell, and later at Orbiston and other places, but all failed. In 1824 Owen came to America and founded at his own expense a community in Indiana at New Harmony (q.v.). This likewise failed. In 1828 Owen went to Mexico, hoping there to carry out his schemes, but was disappointed. His connection with New Lanark ceased in the same year. In 1832 he sought to establish at London a "National Labor Equitable Exchange," but this did not prove a success. In 1835 he wrote the *New Moral World*. For the rest of his life he was an advocate of Socialism, and in his old age he became a believer in Spiritualism. He was not discouraged by his failures, but labored throughout his life to better conditions, expending his entire fortune on his social schemes. The words Socialism and Socialist were used during the discussions in connection with the association of all classes of all men founded under the auspices of Owen in 1835. Owen died in his native town, November 19, 1858. Consult his autobiography (London, 1857); Booth, *Robert Owen* (London, 1869); Sargent, *Owen and His Social Philosophy* (London, 1860); Jones, *Life of Robert Owen* (London, 1892).

OWEN, ROBERT DALE (1801-77). A social reformer, son of Robert Owen (q.v.); born at Glasgow, Scotland, November 9, 1801. He was educated at home and in Switzerland. He came to the United States in 1825, aided his father to found New Harmony in Indiana, went back, on the failure of that scheme, to England, but presently returned and became a citizen of the United States. From 1828 to 1832 he published with Francis Wright in New York *The Free Inquirer*, a socialistic and anti-Christian weekly. He then went to New Harmony, and in 1835 was elected to the Indiana Legislature, where he distinguished himself by securing appropriations for the public school system. He was a member of Congress in 1843-47 and took a leading part in the settlement of the Northwestern boundary, in the Oregon question, and in founding the Smithsonian Institution. Failing reflection in 1847, he took an active part in State politics, especially in furthering the legal rights of married women to property. From 1853 to 1858 he was chargé d'affaires and Minister at Naples. During the Civil War he served in the Ordnance Commission and the Freedmen's Bureau, and published an important open letter to Lincoln on emancipation. Owen was also a zealous advocate of Spiritualism. His chief publications, besides those mentioned above, are: *Outlines of the System of Education at New Lanark* (1824); *Moral Physiology* (1831); *Discussion with Origen Bachelor on the Personality of God and the Authority of the Bible* (1832); *Footfalls on the Boundary of Another World* (1859), perhaps his best-known work; *The Wrong of Slavery* (1864); *Beyond the Breakers* (1870); *Debatable Land Between This World and the Next*

(1872); and the autobiographical *Threading My Way* (1874), which deals with the first twenty-seven years of his life. He died at his summer residence on Lake George, June 17, 1877.

OWENS, ō'enz, JOHN EDWARD (1824-86). An American comedian; born in Liverpool, England, but taken to the United States when three years old. He began his stage career in Philadelphia in 1841, and within a few years his popularity won him a fortune. His *Solon Shingle* (1864) was famous both in the United States and in England; among his other favorite characters were Dr. Pangloss and the old man in *Esmeralda*, in which he last appeared in New York. Owens died at his home near Towson, Md., December 7, 1886.

OWENSBORO, ō'enz-būr-ō. A city and the county-seat of Daviess County, Ky., 112 miles southwest of Louisville; on the Ohio River, and on the Louisville and Nashville, the Louisville, Henderson and Saint Louis, and the Illinois Central railroads (Map: Kentucky, D 3). It is the seat of the Owensboro Female College (non-sectarian), opened in 1890, and of Saint Francis Academy. Prominent features of the city are a fine United States Government building, the high school, the county jail, and the county court-house. Owensboro is surrounded by a farming and stock-raising country, and in the vicinity are valuable forests and deposits of coal, clay, building stone, iron, zinc, and lead ores. Oil wells are in operation near the city. Owensboro has steamboat communication with important points on the river, and has developed extensive commercial interests, particularly in tobacco, being one of the largest leaf and strip tobacco markets in the United States. Its manufactures are extensive and varied. There are numerous tobacco factories, whisky and brandy distilleries, buggy, carriage, and wagon factories, a wheel factory, and a cellulose factory. The government, under a legislative charter, is vested in a mayor, who holds office for four years, and a council. Administrative officials are chosen by popular vote. The electric light plant is owned and operated by the city, and \$200,000 has been appropriated for a new municipal water-works system. Population, in 1890, 9837; in 1900, 13,189.

OWENS COLLEGE. A college at Manchester, England. It was founded in 1851 under the will of John Owens, a merchant of that city, who left £100,000 for the instruction of young men "in such branches of science and learning as were then and might be thereafter usually taught in English universities." Handsome new buildings have been erected, and the college has now a staff of about 50 professors and lecturers in the departments of art, science, law, and medicine. There are about 30 scholarships and prizes, and a valuable fellowship. Owens College has been constituted a college of Victoria University, chartered in 1880, a federation of colleges, having its seat in Manchester.

OWENS LAKE. A lake of California situated at the eastern base of Mount Whitney in the Sierra Nevada, 90 miles east of Tulare Lake (Map: California, E 3). It is 18 miles long and 8 miles wide, receives the Owens River (q.v.), but has no outlet. Its water is excessively saline.

OWEN SOUND. The capital of Grey County, Ontario, Canada; and a port of entry on Georgian

Bay, Lake Huron, at the mouth of the Sydenham River and on the Canadian Pacific and the Grand Trunk railroads, 99 miles northwest of Toronto (Map: Ontario, C 3). It has an excellent harbor with a dry dock 300 feet long, and is surrounded on three sides by wood-crowned heights. Its public buildings include a town hall, court-house, and high school. It has a trade in agricultural produce and lumber, and manufactures of mill machinery, turbine water wheels, agricultural implements, engines, sewing machines, bricks, and leather. The United States is represented by a consular agent. Population, in 1891, 7497; in 1901, 8777.

OWENS RIVER. A river of eastern California (Map: California, D 3). It rises in the Yosemite National Park, and flows southeast through an exceedingly rugged valley along the eastern base of the Sierra Nevada. It discharges into Owens Lake (q.v.) after a course of 175 miles.

OWL (AS. *ule*, OHG. *uwila*, *ula*, *huwela*, Ger. *Eule*, owl; probably onomatopoeic in origin). Any of a numerous and well-defined group of birds, the nocturnal birds of prey, constituting the Linnæan genus *Strix*, now the suborder Striges. Although they were formerly placed unhesitatingly in the order Raptores, of recent years there has been some tendency to separate them from the other birds of prey and place them near the nightjars, which they resemble to a remarkable degree. In appearance the owls are distinguished from all other birds by the large size of their heads and their great eyes, which are directed forward and surrounded by more or less perfect disks of feathers radiating outward and nearly hiding the small hooked bill. The claws are sharp and curved, but, like the bill, less powerful than in the Falconidae. The outer toe is generally reversible at pleasure, so that the toes can be opposed two and two, to give greater security of grasp. The wings, although generally long, are less adapted for rapid and sustained flight than those of the diurnal birds of prey, and the bony framework by which they are supported, and the muscles which move them, are less powerful. The owls in general take their prey, not by pursuit, but by surprise, to which there is a beautiful adaptation in the softness of their plumage and their consequently noiseless flight, the feathers even of the wings being downy, and not offering as firm a resisting surface to the

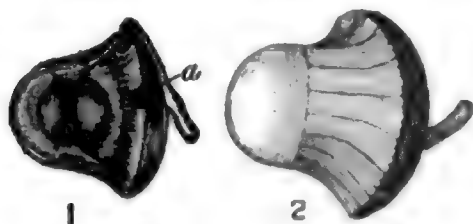


EAR OF AN OWL.

Showing the position and external appearance of the ear of a great horned owl; also the filamentous feathers about the beak.

air as in falcons. The soft and loose plumage adds much to the apparent size of the body, and also of the head; but the head owes its really large size to cavities in the skull between its outer and inner 'tables' or bony layers, which cavities communicate with the ear, and are supposed to increase the sense of hearing. This sense is certainly very acute, and the ear is, in

many of the species, very large, and has a concealed yet external conch, which is found in few other birds. The feathers immediately surrounding the ear are often arranged in a kind of cone, serving a purpose like that of an ear-trumpet. Owls can see well in twilight or moonlight, but poorly in the glare of the day. The eye itself is highly perfected, and the pupil remarkably



1. EYE OF AN OWL.

1. Section of the eye, showing the interior parts of the pecten at the insertion of the optic nerve (a) by which the vision is regulated under the great possible expansion and contraction of the eye. 2. Sclerotic coat, showing the stave-like pieces, connected by elastic tissue permitting great expansion and contraction.

contractile. The legs and feet of owls are usually feathered to the toes, and in many species even to the claws.

The digestive organs much resemble those of the Falconidae, but there is no crop and the stomach is more muscular. The gullet is very wide throughout, and owls swallow their prey either entire or in very large morsels, the indigestible parts gathering into little lumps or 'pellets,' which are ejected after a time. These pellets are to be found numerous where owls roost or nestle, and their examination reveals the bird's bill of fare. The largest species feed on hares, fawns, and gallinaceous birds; others on small mammals, reptiles, birds, and large insects. Although they capture many small birds, mice form the principal element in their diet, and the owls are thus highly beneficial to agriculture, and should everywhere be protected and encouraged by farmers. Some owls also feed largely on fish (see KETUPA), crabs, and the like, which they catch for themselves.

The owl family (Strigidae) falls into two divisions—the Striginae and the Buboninae, which are distinguished by differences in structure especially marked in the shoulder-girdle (consult Evans, *Birds*, New York, 1900). The former group is typified by the barn owl, the latter by our big barred or 'cat' owl. In size, owls vary greatly. The largest known species is the circumpolar gray owl (*Syrnium* or *Scotiaptes nebulosum*), from 27 to 28 inches long and more than 5 feet across the wings. The smallest known owl is the curious elf-owl (*Micrathene Whitneyi*) of Arizona, which is less than six inches long, and is further remarkable as having only 10 tail feathers; all other owls, so far as known, have 12. All owls have a general likeness in colors—a mixture of browns, whites, and yellows, as becomes nocturnal marauders who wish to remain unobserved, especially during the day when they are at rest. The Arctic owl becomes pure white in winter, but is brown in the summer plumage. There is little difference between the sexes, and the young, called 'owlets' or 'howlets,' resemble the adults. Owls are found in all parts of the world and in all climates, and rather more than 200 species are known. Of these 17 occur in North America, besides a dozen more or less rec-

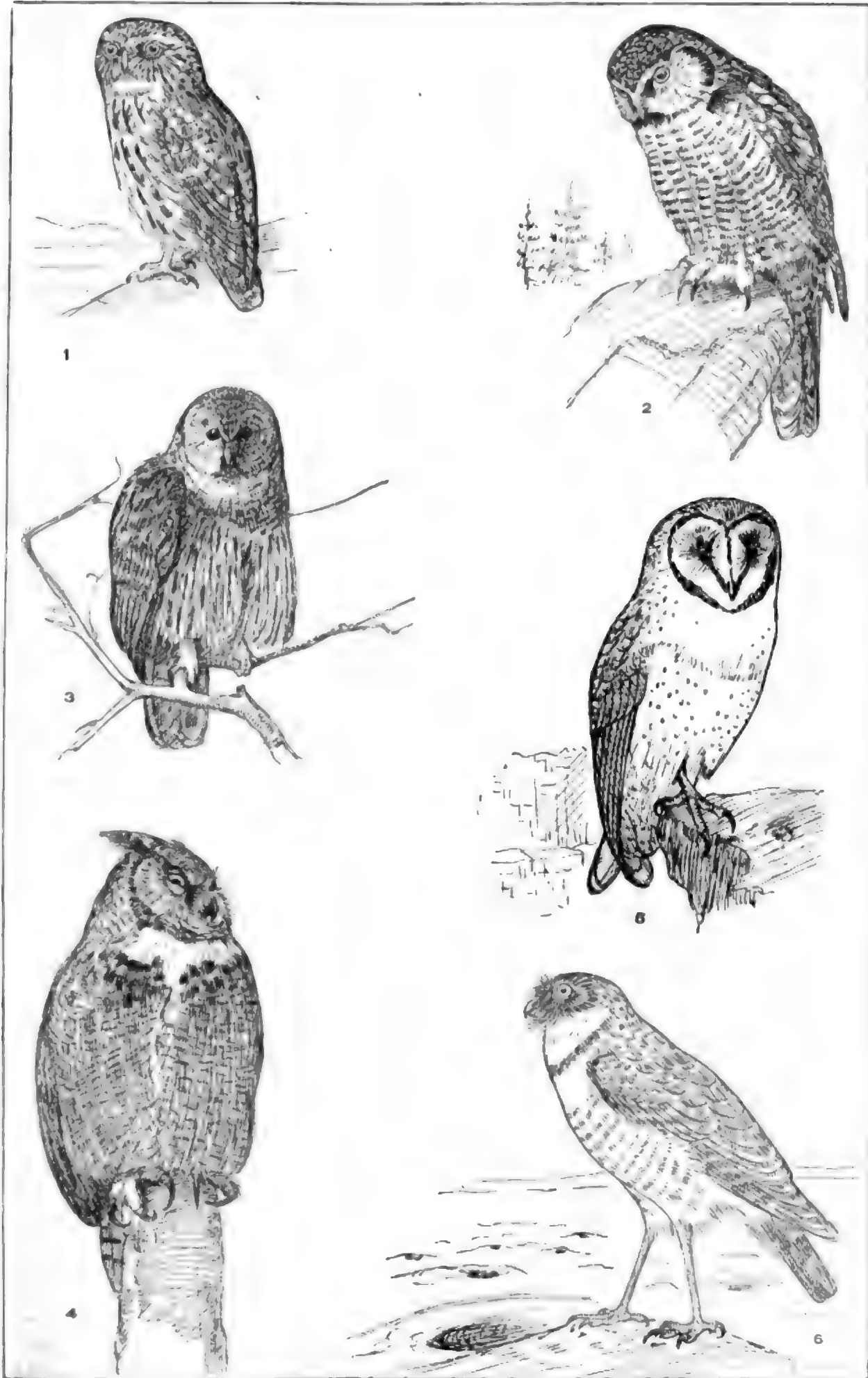
ognizable subspecies; and about 15 species are natives of Europe. Some have a very wide geographical range, especially those of northern regions, and it is doubtful whether several species separately named in Europe and North America are really distinct, e.g. the barn-owl (q.v.). Another very widely distributed bird is the short-eared owl (*Asio accipitrinus*), which occurs in nearly all parts of the world. It is fifteen inches long, variegated tawny and dark brown, with short ear-tufts of few feathers. It is common in the United States, is somewhat migratory, and is occasionally seen in small flocks. A closely related species, rather more common generally, with long ear-tufts, is the American long-eared owl (*Asio Wilsoniana*). The hawk-owl, snowy owl, and great horned or eagle owl (qq.v.) are other handsome circumpolar species.

Other well-known American owls are the screech-owls (*Megascops asio*, with half a dozen subspecies). They are little owls, only nine to ten inches long, with ear-tufts, and are found in all parts of the United States and Canada. They are of special interest because of their remarkable dichromatism (q.v.), some of the birds having the prevailing tint gray, while others are rusty red. The barred owl, without ear-tufts, is a large species, also common throughout the United States. In the South-western States are found several species of little owls, which feed largely on insects, and are known as 'gnome-owls' and 'elf-owls.' They are only six or seven inches long and are not specially nocturnal. They belong to the genera *Glaucidium* and *Micrathene*. Another peculiar and interesting species is the burrowing owl (q.v.) of the Plains. It is not the only owl which inhabits holes in the ground. The boobook of Australia (*Ninox boobook*) is a species of owl, which frequently repeats during the night the cry represented by its name, as if it were a nocturnal cuckoo, as the colonists generally believe.

Of British species, one of the most common and familiar, and the one most often referred to in literature, is the 'tawny,' 'brown,' or 'ivy' owl (*Syrnium aluco*), which is of medium size, and mottled ash-gray and brown, with the under parts lighter. It inhabits church belfries, ruins, ivied walls, and like places, often in a semi-domestic condition. One of the best accounts of it (and of the next named species) is to be found in Charles Waterton's *Essays*. Another generally interesting species is the 'little' owl of Southern Europe, called 'chevêche' by the French and 'civetta' by the Italians, which is the one regarded by the ancients as the familiar of Minerva, a symbol of wisdom, and hence became the emblem of Athens. It is the *Carine noctua* of modern ornithology. This small species is brown, mottled with white oval spots, has no 'horns,' and its great eyes are surrounded by horizontally oval disks, like big spectacles, giving it a very 'knowing' expression. It is numerous, comparatively tame, and lives well in aviaries.

The owl has from early times been deemed a bird of evil omen, and has been an object of dislike and dread to the superstitious. This is perhaps partly to be ascribed to the manner with which it is often seen, then as suddenly lost to view, when the twilight is deepening into night; partly to the fact that some of the best known ones frequent ruined buildings, while others haunt

REPRESENTATIVE OWLS



1. LITTLE OWL of Europe (*Carine noctua*); symbol of Pallas Athene
2. HAWK OWL (*Surnia ulula*).
3. BARRED OWL (*Syrnium*, or *Scotiaptex nebulosum*).

4. GREAT HORNED OWL (*Bubo Virginianus*); type of Eagle Owls.
5. BARN OWL (*Strix flammea*).
6. BURROWING OWL (*Speotyto cunicularia*).

the deepest solitudes of woods; but, no doubt, chiefly to the cry of some of the species, hollow and lugubrious, but loud and startling, heard during the hours of darkness, and often by the lonely wanderer. It is evidently from this cry that the word 'owl' is derived, as well as many of its synonyms in other languages, and of the names appropriated in different countries to particular species, in most of which the sound *oo* or *ow* is predominant. Nevertheless the notes of some of the smaller ones, as our common American 'mottled owl,' are low and melodious—a pleasant rippling ululation. Many of the owls have also another and very different cry, which has gained for more than one of them the appellation 'screech-owl,' and to which, probably, the Latin name *strix* and some other names are to be referred. The superstitions concerning owls persist and belong to savage as well as to civilized peoples. The folk-lore of the uncivilized world is full of such notions. European peasants connect the birds with death-signs; the Andalusians say they are the Devil's birds and drink the oil from the lamps in saints' shrines; and the Malagasy consider them embodiments of the spirits of the wicked. Even the birds and squirrels of the woods mob the owl unmercifully when one is discovered dozing in its retreat; but this is merely in recognition of a natural enemy taken at a disadvantage.

BIBLIOGRAPHY. See standard ornithologies and faunal works, especially Newton, *Dictionary of Birds* (New York, 1893), and Evans, *Birds* (New York, 1900). For North America, the writings of Wilson, Audubon, Nuttall, Coues, and recent ornithologists, especially Fisher, *Hawks and Owls of the United States* (Washington, 1893). For superstitions, etc., consult: Brehm, *Naturgeschichte der Vögel Deutschlands* (Ilmenau, 1831; trans. into English as *Bird Life*, London, 1874); De Gubernatis, *Zoological Mythology* (London, 1872); De Kay, *Bird Gods* (New York, 1898); and authorities cited under **FOLK-LORE**.

OWLET-MOTH. Any one of the night-flying moths of the family Noctuidæ. This is a large assemblage of moths of rather strikingly characteristic and rather uniform appearance, comprising in the United States more than 2100 species, which are almost without exception injurious to vegetation. The moths, as a rule, are of sombre colors, averaging perhaps 1.50 inch in wing expanse. The fore wings are comparatively narrow, rather short and stout, and crossed by a series of wavy lines, with two usually darker or paler spots near the centre of the wing. The hind wings are usually without markings, and when at rest are concealed by the fore wings, which overlap and cover them, either flat upon the back or roof-like. The body is large in proportion to the size of the wings. The thorax is heavy and quite stout, and in some species the scales on the upper surface are turned up, forming tufts. The abdomen is conical and extends beyond the inner angle of the hind wings when these are spread. The popular name, *owllet-moth*, is derived from the nocturnal habits of these insects, and from the fact that often when they are in obscurity their eyes shine brightly.

Some of the caterpillars are hairy, but the more typical ones are naked, and perhaps the most characteristic are the forms commonly known as cutworms (q.v.). They range from an inch to an inch and a half in length and have

dull colors, ranging from dirty gray to dirty brown with a few longitudinal stripes. They hide during the day a little below the surface of the ground and often at the base of the plants upon which they feed, and during the night come out to eat whatever vegetation they can find. The eggs are laid on trees, stones, or leaves, and the larvæ hatch, as a rule, late in the summer, and pass the winter in a half-grown condition hidden beneath stones or logs or under the surface of the ground. In the spring they come out after this long fast and devour the new vegetation with avidity. Some of them will climb trees and are known as 'climbing cutworms.'

The army-worm (q.v.) is a famous member of this family, as are also the wheat-head army-worm, the fall army-worm, the cotton caterpillar of the South, and the tomato-worm. The best remedy consists in ridding the land prepared for gardens before setting out the plants, by distributing here and there bunches of freshly cut grass or other vegetation which has previously been poisoned with Paris green.

Consult: Edwards, *Standard Natural History*, vol. ii. (Boston, 1884); Smith, *Manual of Economic Entomology* (Philadelphia, 1896); Comstock, *Manual for the Study of Insects* (Ithaca, 1895).

OWLGLASS. See **EULENSPIEGEL**.

OWL-PARROT. See **KAKAPO**.

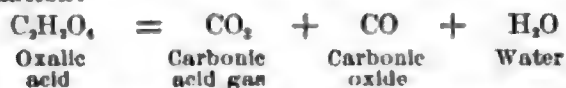
OWNERSHIP. Although not strictly a legal term, 'ownership' is used frequently by legal writers to denote the highest degree or kind of property one can have in anything. 'Owner' is often used to denote one who has such property, as contradistinguished from the various terms used to signify one who has only a partial or temporary interest in property as lessee, tenant, licensee, bailee, or one having custody or possession. Strictly speaking, complete ownership at English law consists of title and possession united in the same person, although in common practice one is said to be the owner who has title, although he may not have actual possession of the property. In general, one who is the owner of property has absolute control over it and the right to do with it as he will so long as he does not interfere with the legal rights of others. See **DOMINIUM**; **PROPERTY**; **REAL PROPERTY**; **POSSESSION**.

OWOSSO. A city in Shiawassee County, Mich., 79 miles northwest of Detroit; on the Shiawassee River, and on the Ann Arbor, the Chicago and Grand Trunk, and the Michigan Central railroads (Map: Michigan, J 5). It is situated on both sides of the river, and has a ladies' library and several fine churches and school buildings. The Federal Government has made an appropriation for a new post-office building here. There are manufactures of furniture, caskets, door and window screens, dining-room tables, spokes, carriages, cars, packed meats, butter, machine shop products, hickory handles, knit goods, rugs, breakfast food, snow shovels, etc. The city is also the centre of an extensive sugar-beet industry, and has a large beet-sugar factory. Settled about 1832, Owosso was chartered as a city in 1859. The government is administered under a charter of 1895, which provides for a mayor, annually elected, and a council. The city

owns and operates the water-works. Population, in 1890, 6564; in 1900, 8696.

OX (AS. *oxa*, Goth. *aúhsa*, *aúhsus*, OHG. *ohso*, Ger. *Ochse*, *Ochs*, Welsh *ych*, Skt. *ukṣan*, ox, from *ukṣ*, to sprinkle, or *ukṣ*, to be strong; in the latter case ultimately connected with Gk. *ἀΐζειν*, *aezein*, OHG. *wahsan*, Ger. *wachsen*, AS. *weaxan*, Eng. *wax*, to grow). The male of a bovine animal, especially one of the domestic races of cattle. The word in certain connections, as 'oxen' or 'ox tribe,' has come to stand for cattle in general. (See CATTLE.) An uncastrated male is a 'bull;' a young male a 'steer,' but the latter word, especially in the Western United States, is now used for beef-cattle in general, regardless of age or sex.

OXALIC ACID (from Lat. *oxalis*, from Gk. *ὄξαλις*, sorrel, from *ὄξυς*, *oxys*, sharp, acid), $C_2H_2O_4 \cdot 2H_2O$. A colorless crystalline substance with an intensely sour taste. It is soluble in nine parts of cold water, and much more freely in boiling water. When heated to $212^\circ F.$, the crystals lose their two equivalents of water, and the residue, consisting of the anhydrous acid, $C_2H_2O_4$, becomes opaque. The anhydrous acid may be sublimed partly undecomposed by heating gradually and carefully. When heated rapidly it decomposes into carbonic and formic acids, the latter acid further breaking up into carbon dioxide, carbon monoxide, and water. When warmed with strong sulphuric acid, oxalic acid is decomposed into equal volumes of carbonic acid and carbonic oxide gases and water, according to the equation:

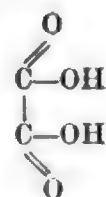


This reaction affords one of the best means of obtaining carbonic oxide for use in the laboratory. Oxidizing agents, such as manganese dioxide, peroxide of lead, nitric acid, etc., convert oxalic into carbonic acid, and on this property is based a good method of determining the commercial value of the black oxide of manganese.

Oxalic acid is one of the most powerful of the organic acids, and expels carbonic acid and many other acids from their salts. The acid itself and its soluble salts are poisonous. This acid is very widely diffused throughout the vegetable kingdom. Sometimes it occurs in a free state (as in *Boletus sulphureus*), but much more frequently as a salt, either of potash, as in the different species of *Oxalis* (from which genus the acid was originally obtained and derives its name) and of *Rumex*; or of soda, as in various species of *Salicornia* and *Salsola*; or of lime, as in rhubarb and many lichens. In the animal kingdom it never occurs except in minute quantity and in combination with lime. Oxalate of lime is found in a crystalline shape, both in healthy and morbid urine, and is the chief constituent of the urinary calculus known from its rough exterior as the mulberry calculus.

Oxalic acid is produced by the action either of hydrate of potash or of nitric acid upon most organic compounds of natural occurrence. Its most common mode of preparation is by the oxidation of starch or sugar by nitric acid. The organic compound and the nitric acid are heated in a flask till all effervescence has ceased, after which the solution is evaporated, and the oxalic acid separates in crystals on cooling.

The molecule of oxalic acid is composed of two carboxyl groups (COOH) and is represented graphically by the following formula:



Oxalic acid

Of the numerous *oxalates* the most important are the oxalate of lime (in consequence of its physiological and pathological relations); the neutral oxalate of ammonia, which is the best test for the detection of lime in solution (in consequence of the extreme insolubility of the resulting oxalate of lime); and the acid oxalate of potash, which is employed in various manufacturing processes, as well as for removing ink and rust stains. When the neutral oxalate of potash is mixed with sulphate of iron, a double oxalate of iron and potassium is produced. This compound is a strong reducing agent, and has the power of separating metals (for instance, silver) from their salts; this property is made use of in photography.

The best test for oxalic acid is the production of a white precipitate (of oxalate of lime), on the addition of any soluble salt of calcium. The precipitate is insoluble in water, in solution of potash, and in acetic acid, but dissolves in the mineral acids. A solution of nitrate of silver also gives a white precipitate of oxalate of silver, which explodes when heated.

In consequence of its employment in printing cotton, bleaching straw, etc., oxalic acid is more accessible to the general public than many other poisons, and on this account instances of suicide from the swallowing of this acid are by no means uncommon. Cases of accidental poisoning, moreover, sometimes occur by its being sold by mistake for Epsom salts. Large doses destroy life very rapidly. The symptoms of oxalic acid poisoning are a burning acid taste, with a sense of constriction or suffocation; vomiting, great pain in the region of the stomach, convulsions, cold perspirations, and general collapse speedily follow; and respiration shortly before death becomes slow and spasmodic. With the view of converting the free acid in the stomach into an insoluble and inert salt, chalk, whiting, or lime water, with full draughts of milk, should be administered with the least possible delay. Salt of sorrel is almost as poisonous as the pure acid. See ANTIDOTE.

OXALIS (Lat., from Gk. *ὄξαλις*, sorrel). A genus of the natural order Geraniaceæ, according to Bentham and Hooker, including herbs and shrubs with generally compound alternate digitate or ternate, rarely simple or pinnate leaves. There are upward of 200 known species, natives of warm and temperate climates, particularly abundant in North America and at the Cape of Good Hope. The genus *Oxalis* has a capsular fruit, and the seeds have an elastic integument, which, bursting open, projects the seed to a distance. The stems and leaves generally contain a notable quantity of binoxalate of potash, and have, therefore, a sour taste. The common wood sorrel (*Oxalis Acetosella*), very

abundant in shady woods and groves in most parts of Europe, a native also of North America, is a beautiful little plant, often covering the ground with its green leaves, amid which the white or slightly roseate flowers appear. Its leaves all grow from the rootstock, a long leaf-stalk bearing three obovate leaflets, the scape a



VIOLET WOOD BORREL (*Oxalis violacea*).

single flower. On account of their grateful acid taste, due to oxalic acid (q.v.), the leaves are used in salads and sauces. The plant is extremely abundant in Lapland, and is much used by the Laplanders. *Oxalis corniculata*, a plant of very extensive distribution, being found in Europe, North America, India, Japan, and some of the African islands, has a branched stem, with decumbent branches, leaves very similar to those of the common wood sorrel, and yellow flowers. Its properties agree with those of the common wood sorrel. Many other species resemble these in general appearance and properties. The leaves of some of the species exhibit an irritability like that of the sensitive plant, generally in a slight degree, and notably only in hot sunshine, but *Oxalis sensitiva* or *Biophytum sensitivum*, an East Indian species, with pinnate leaves, possesses this property in a high degree. Some species, as *Oxalis cernua*, a native of South Africa, are remarkable for producing large bulbels in the axils of the lower leaves. Several species have tuberous roots, and are cultivated on account of their tubers, as *Oxalis crenata* and *Oxalis tuberosa*, natives of Peru and Bolivia, where they are much esteemed, both receiving the name oca. The tubers when cooked become mealy like potatoes. They have a slightly acid taste. *Oxalis crenata* has been cultivated in gardens for many years, but continues to be almost exclusively an object of curiosity, being too tender for temperate climates and its product very inconsiderable in quantity. Its tubers are yellow, in size and shape like small potatoes. The succulent stalks of the leaves abound in a pleasant acid juice, and make excellent tarts and preserves. *Oxalis*

tuberosa produces numerous small tubers. The Bolivians often expose them for a long time to the sun, by which they lose acidity, become saccharine, and acquire a taste and consistence like dried figs. *Oxalis Deppei* is a Mexican species, with a root somewhat like a small parsnip, quite free of acidity. It is much cultivated in its native country, and succeeds well in the southern parts of England. *Oxalis tetraphylla* and *Oxalis crassicaulis*, natives of Mexico, and *Oxalis encephylla*, a native of the Falkland Islands, also have edible roots. Many species of *Oxalis* are much esteemed as ornaments of gardens and greenhouses.

OXALURIA (Neo-Lat., from Eng. *oxal-ic* + Gk. *ὄσων*, *ouron*, urine), or **OXALIC ACID DIATHESIS**. A morbid condition of the system, in which one of the most prominent symptoms is the persistent occurrence of an excess of crystals of oxalate of lime in the urine. Oxalate of lime is normally present in the urine, held in solution by the acid sodium phosphate. The amount excreted daily varies greatly within the limits of health, being largely increased by eating tomatoes, rhubarb, cranberries, and the like. The diet, therefore, must always be taken into account in estimating the pathological importance of an excess of the oxalates. When present in excess for a considerable period of time, the condition is known as oxaluria. The accompanying train of symptoms are depression, irritability, nervous indigestion, hypochondriasis, melancholia. There may be neuralgic pains, a sense of weight across the loins, and the characteristic symptoms of neurasthenia. The causes of oxaluria are not quite clear, but the trouble is believed to be due to faulty assimilation and imperfect oxidation of certain foods. It occurs in lithæmia, and is thought to be related to gout. The persistent occurrence of large amounts of calcium oxalate in the urine is also of special interest, because the crystals may be deposited before the urine is voided, and form the so-called mulberry calculi in the bladder or the pelvis of the kidney.

The treatment of this condition should look toward building up the general health, and improving the digestion by outdoor exercise and the administration of bitter tonics and the mineral acids. Articles of diet containing oxalic acid should be avoided, as should also the starches and sugars, which consume all the available oxygen and interfere with albuminous transformation.

OX-BIRD, or **OX-EYE**. The dunlin (q.v.).

OX'ENBRIDGE, JOHN (1608-74). An English nonconformist divine. He was born at Daventry, Northamptonshire. He was educated at Oxford and Cambridge, taking his degree at the latter university in 1631; was tutor of Magdalen Hall, Oxford, but was deprived of the position in 1634 for persuading the students to subscribe certain religious articles prepared by himself. He was ordained a minister of the Church of England, and spent the next few years as a missionary in the Bermuda Islands. In 1641 he returned to England and preached in various places; in 1652 he was chosen fellow of Eton College, ejected in 1660, and settled at Berwick-on-Tweed, where he preached till in 1662 he was silenced for non-conformity by the Act of Uniformity. He then went as a missionary to Guiana, and in 1669 came to Boston, where he

was installed in 1670 as colleague of the Rev. James Allen over the first church of that city. His publications are: *A Double Watchword* (1661); *A Seasonable Proposition for Propagating the Gospel by Christian Colonies in the Continent of Guiana* (1670); *Election Sermon* (1672); and *A Sermon on the Seasonable Seeking of God*.

OX'ENDEN, ASHTON (1808-92). Metropolitan of Canada. He was born at Broome Park, near Canterbury, and was educated at University College, London; he was rector of Pluckley with Pevington, in Kent (1849-69). In 1864 he became honorary canon of Canterbury Cathedral, and in 1869 was chosen Bishop of Montreal, and Primate and Metropolitan of Canada. He resigned his bishopric in 1878 because of age, and was vicar of Saint Stephen's, Canterbury, and also rural dean of Canterbury (1879-84). Among his publications may be mentioned: *The Cottage Library* (6 vols., 1846-51); *The Pathway of Safety* (1856); *Cottage Readings* (1859); *The Home Beyond* (1861); *The Parables of Our Lord Explained* (1864); *A Plain History of the Christian Church* (1864); *My First Year in Canada* (1871); *A Simple Exposition of the Psalms* (1872); *The Christian Life* (1877); *Counsel to the Confirmed* (1878); *Touchstones* (1884); *Short Comments on the Gospels* (1885). Consult his autobiography (London, 1891), and his posthumous *Plain Sermons* (ib., 1893), with memoir.

OX'ENFORD, JOHN (1812-77). An English translator and dramatic writer, born at Camberwell, London, August 12, 1812. He was apprenticed for the law, but he gave it up for literature. Unaided by the schools, he mastered German, Italian, French, and Spanish. From these languages he made many translations which have been highly commended. Among them are Calderon's *Vida es Sueño*; Molière's *Tartuffe*; Boiardo's *Orlando Innamorato* (incomplete); Goethe's *Dichtung und Wahrheit*; and Eckermann's *Gespräche mit Goethe*. In an essay entitled *Iconoclasm in Philosophy*, contributed to the *Westminster Review*, he first made Schopenhauer known to England. Oxenford's dramatic pieces probably number more than a hundred. Not only were they popular at home, but several of them were translated into French, German, and Dutch. Among them are *My Fellow Clerk*, *A Day Well Spent*, and *Twice Killed*. In 1850 or thereabouts, Oxenford joined the staff of the *London Times* as dramatic critic. In 1867 he visited the United States. He died at Southwark, February 21, 1877.

OXENHAM, òks'en-am, HENRY NUTCOMBE (1829-88). An English theologian, eldest son of William Oxenham, an English clergyman and second master of Harrow School, born at Harrow, November 15, 1829. From Harrow he passed to Balliol College, where he graduated B.A. in 1850 and M.A. in 1854. Ordained in the English Church, he became curate of Worminghall, Buckinghamshire (1854), and at Saint Bartholomew's, Cripplegate, London (1856). From the first a high churchman, he went over to the Roman Catholic Church in 1857. He was subsequently appointed professor in Saint Edmund's College, Ware, and master of the Oratory School at Birmingham. He died at Kensington, March 23, 1888. Besides contributing to periodicals, he

published extensively. Among his works are: *The Sentence of Kaires and Other Poems* (1854); *The Catholic Doctrine of Atonement* (1865); *Dr. Pusey's Eirenicon* (1866; 2d ed. 1871); *Catholic Eschatology and Universalism* (1876); *An Eirenicon of the Eighteenth Century* (1879); and *Short Studies in Ecclesiastical History and Biography* (1884-85). Oxenham studied for a time in Germany under Döllinger, several of whose works he translated into English.

OXENSTIERNA, or **OXENSTJERNA**, òk'sen-shâr'nâ (often called Oxenstiern by English writers), AXEL, Count (1583-1654). A Swedish statesman, born at Fånö, in Upland, June 16, 1583. He studied at Rostock, Jena, and Wittenberg, his original interest being in theology, to which he devoted his attention. After leaving the university, he visited most of the German courts, but returned to Sweden in 1603, and soon afterwards entered the service of Charles IX., who, in 1606, dispatched him as Ambassador to the Court of Mecklenburg. He became a Senator in 1609. He conducted with marked discretion the settlement of certain disputes between the Livonian nobles and the town of Reval, and was appointed guardian of the royal family and head of the regency when Charles became incapacitated. On the accession of Gustavus II. Adolphus (q.v.) in 1611 Oxenstierna was made Chancellor. In 1613 he acted as plenipotentiary in the negotiations for peace between Sweden and Denmark, and he arranged the Peace of Stolbova with Russia in 1617. In 1621 he conducted the administration at home during the absence of the King, who was carrying on the war with Poland. Subsequently he was appointed Governor-General of the conquered district, and in 1629 concluded peace with the Poles on highly favorable conditions. For a while Oxenstierna strongly opposed the desire of Gustavus Adolphus to take part in the Thirty Years' War, but when he found that the King had determined on his course he set about collecting money and troops with energy and persistency. After Gustavus Adolphus had fairly entered on the sanguinary struggle, Oxenstierna joined him, and conducted most of the extensive and complicated diplomacy which the course of events entailed on Sweden. After the death of the King, at Lützen, November 16, 1632, he resolved to continue the contest with the Imperialists, in spite of the visible disaffection of many of the German Protestant princes. At the Congress of Heilbronn the States of Swabia, Franconia, and the Rhenish territories placed Oxenstierna at the head of the Evangelical League (1633). The will of the dead monarch was sent to Stockholm; according to its conditions the government—during the minority of his daughter Christina (q.v.)—was intrusted to five nobles, who empowered the Chancellor to prosecute the war. His difficulties were enormous, yet he managed partly to allay the rivalries of the Protestant leaders. After the severe defeat of the Swedes at Nördlingen in 1634 Oxenstierna transferred the leadership of the Protestant forces to Duke Bernhard of Weimar, and proceeded, in 1635, to France and Holland, to obtain aid against the Imperialists. Returning to Germany, he assisted in quelling a mutiny among the Swedish troops at Magdeburg; put Pomerania in a state of defense to resist the expected attack of the Elector of Brandenburg; renewed the treaty with Poland; and,

leaving Banér in command of the Swedes, returned to Stockholm in 1636. In 1645 he represented Sweden at the Peace of Brömsebro with Denmark. He continued to direct ably the policy of the Protestants in Germany, till the Peace of Westphalia, in 1648, put an end to the war. Oxenstierna's son was one of the Swedish envoys who signed the treaty, and it is in a letter to him that the famous sentence of the statesman occurs: *Nescis, mi fili, quantilla prudentia homines regantur* ("You do not know, my son, with how little wisdom men are governed"). Queen Christina did not show a proper respect for the advice of Oxenstierna and persisted in her resolve to abdicate in spite of all his protestations. Oxenstierna died August 28, 1654. Some treatises and historical fragments are attributed to him. Consult: Geijer, *Geschichte Schwedens* (3 vols., Hamburg, 1823-36). See references under GUSTAVUS ADOLPHUS.

OXENSTIERNA, JOHAN GABRIEL, Count (1750-1818). A Swedish poet and statesman. He studied under the poet and critic Olof Bergklint, served a year in the Chancellor's office, and then entered the diplomatic corps as secretary of legation in Vienna (1770). Returning to Sweden in 1774, he became King's chamberlain, enjoyed high favor at Court and held various high offices there, being Marshal of the Realm from 1792 to 1801. Oxenstierna was one of the first members of the Swedish Academy on its formation in 1786. He edited the papers of King Gustavus III. (1803-12), and translated Milton's *Paradise Lost* and a part of Tasso's *Gerusalemme Liberata*; but he is better known for his own poetic works. *Skordarne* and *Dagens Stunder* are especially famed among his works for their beautiful descriptions of nature. In general his poetry is marked by a high order of imagination and a euphonious style, but it is not free from the pseudo-classicism of the period. His complete works were published at Stockholm (1805 to 1826). Selections from his diary were edited by Stiernström (Upsala, 1881). Consult Wirsén, *Minne af riksmarkalken greve J. G. Oxenstierna* (in the *Transactions of the Swedish Academy*, Stockholm, 1885).

OX-EYE. (1) The dunlin (q.v.). (2) The semipalmated sandpiper (*Ereunetes pusillus*). (3) In Great Britain, the common larger titmouse (*Parus major*).

OXEYE. An ornamental plant. See CHRYS-ANTHEMUM; DAISY.

OXFORD. The chief city and county-seat of Oxfordshire, England, and the cathedral town of the Diocese of Oxford. It is situated 52 miles (63 by rail) west-northwest of London, at the junction of the Isis (Thames) and Cherwell rivers. Its chief importance is due to its university. Oxford is a place of considerable antiquity, probably owing its origin to the shrine of Saint Frideswide, in whose honor a religious house was founded perhaps as early as the ninth century. The name is probably derived from Ousen-ford, or ford over the Ouse, a tributary of the Thames which comes in here, though the city arms, an ox crossing a ford, indicate a more popular etymology. Oxen-ford. Coins of King Alfred were struck here—a fact which testifies to the prominence of the place even in his day; but the first mention in written history is in the Chronicle under the year 912, when it was annexed or re-

annexed to the West Saxon Kingdom. It came to be a place of some importance as the key to the valley of the Upper Thames and in control of much of the trade of that region. It was a place of military significance and was possessed of fortifications, of which the great mound is still in existence. Its increasing prominence is shown in the more and more frequent mention in the Chronicles as a place of meetings and treaty-makings. At the Conquest it became part of the possessions of Robert D'Oyly, who built the castle, the keep of which still remains. It was fortified with a strong wall, and became a place of much importance, especially connected with royalty. Henry I. built a house or palace here. Queen Matilda was here besieged by Stephen; here both Richard I. and John were born, and here was held the Parliament of 1258, which enacted the Provisions of Oxford. The rise of the university attracted hither many religious Orders, and during the greater part of the period before the Reformation the chief interest of the place lies in the growth and struggles of the university (q.v.). In later times its chief historical significance lies in the part it played in the civil wars, when for a considerable time it was not merely the centre of Royalist operations, but the capital of Royalist England. It was besieged by the Parliamentarians, but fortunately not bombarded.

Despite its low-lying position amid the marshes of the many-branched Thames, surrounded by hills, Oxford is a very beautiful city, owing chiefly to the presence of the collegiate and university buildings. The centre of the city is Carfax (quatre voies), where the north and south ways (Cornmarket and Saint Aldate's) and the east and west ways (Queen Street and High Street) meet. High Street is the principal street of the place and is one of the most attractive thoroughfares in England. The chief architectural features of the place, in addition to the college and university buildings, are the very handsome new municipal buildings, begun in 1893, His Majesty's Prison, occupying the site of the old castle, and many interesting churches, including Saint Martin Carfax, the old city church, Saint Michael's, with an interesting Saxon tower, Saint Peter's in the East, with a Norman crypt, and many others. The city has much outgrown its former bounds, especially toward the north, in recent years, and is now surrounded by suburbs: North Oxford; Grandpont, on the south, reached by Folly Bridge over the Isis; Cowley, on the east, reached by Magdalen Bridge over the Cherwell; and Osney on the west. In 1901 Oxford had a population of 49,413. It is a Parliamentary and municipal borough, returning two members to the House of Commons besides the two from the university. It is governed by a mayor, ten aldermen, and thirty councilors, forming the corporation, a high steward, a sheriff, and a recorder. The jurisdiction of the civic government, however, does not extend over members of the university. It is a market town, has now some manufactures, and an increasing municipal importance. See OXFORD UNIVERSITY.

OXFORD. A city and the county-seat of Lafayette County, Miss., 73 miles southeast of Memphis, Tenn.; on the Illinois Central Railroad (Map: Mississippi, F 2). It is most important as an educational centre, having the State University (q.v.), and the Woman's College (Methodist Episcopal), opened in 1854. A Federal courts

building is located in Oxford. The leading industries are connected with cotton. Population, in 1890, 1546; in 1900, 1825.

OXFORD. A town and the county-seat of Granville County, N. C., 36 miles north of Raleigh; on the Seaboard Air Line and the Southern Railroad (Map: North Carolina, D 1). It has two private secondary schools, a Masonic orphan asylum, and an asylum for colored children. Oxford is in the fertile Piedmont section of North Carolina, the centre of extensive tobacco-growing interests. There are, besides several tobacco warehouses and stemmeries, cotton mills, a furniture factory, an iron foundry, a carriage factory, planing mill, etc. Population, in 1890, 2907; in 1900, 2059.

OXFORD. A village in Butler County, Ohio, 39 miles north by west of Cincinnati; on the Cincinnati, Hamilton and Dayton Railroad (Map: Ohio, A 7). It is a prominent educational centre, having Miami University (q.v.), and two colleges for women—Oxford College, opened in 1849, and Western College, opened in 1855. Population, in 1890, 1922; in 1900, 2009.

OXFORD, PROVISIONS OF. A set of regulations drawn up in 1258 for the government of England. In that year Henry III.'s difficulties with his barons had come to a head, and loud complaints were made when Parliament met at London on April 9th. Finally the King gave his consent to the formation of a committee of twenty-four, chosen half from the royal council and half by the barons, to propose reforms. On June 11, 1258, Parliament met at Oxford, and this Mad Parliament, as it was called, caused the adoption of a new scheme of government, now known as the Provisions of Oxford. A council of fifteen was selected in a complex manner, and this was to advise the King in all matters of government, and three times a year was to meet twelve representatives of the barons to discuss the whole state of affairs. This method of government lasted until 1263, with a short interruption in 1259. In 1263, however, war between Henry III. (q.v.) and his barons, led by Simon de Montfort (q.v.), began. Consult Stubbs, *Constitutional History of England*, vol. ii. (4th ed., Oxford, 1896).

OXFORD, ROBERT HARLEY, First Earl of. An English statesman. See HARLEY, ROBERT, Earl of Oxford.

OXFORD CLAY. An important formation of Middle Jurassic age found in England. It consists of dark-blue or blackish clay which sometimes reaches a thickness of 600 feet. The Oxford clay lies beneath the plain on which Oxford is built.

OXFORD MOVEMENT. The name commonly applied, from its place of origin, to the revival of the doctrines and practices of an earlier age which took place in the Church of England in the early years of the Victorian era. Though local in its inception, it achieved unexpected results and became world-wide in its influence. The movement proper, or the stage of it which is more strictly known as Tractarian, covered a period of twelve years. It began with Keble's famous sermon on national apostasy preached in Saint Mary's, Oxford, in July, 1833, and closed with Newman's defection in 1845. But under other leaders the work went on. Its field of

operations was widened. It moved along new lines and gathered fresh strength, until it vivified and transformed the English Church.

It was distinctly a revival, but of a different type from those which had preceded it in the seventeenth and eighteenth centuries. That of the seventeenth century was anti-Calvinistic and based on the moral responsibility of man. That of the eighteenth was anti-latitudinarian and based on devotion to a personal Redeemer. The Oxford Movement was anti-individualistic and based on the incarnate life of Jesus Christ. The revival of spiritual life under the Wesleys and Whitefield was intensely subjective and therefore one-sided and imperfect. Its complement was furnished by the Oxford Movement with its deep religious fervor, but distinctly objective teaching. To attempt to gauge the movement simply by its restoration of obsolete external observances is to miss its meaning. It had a double trend, historical and doctrinal.

Historically it was part of a larger movement. The beginning of the nineteenth century marked an epoch in religious thought. The Deism of the preceding century, with its mechanical universe and absentee God, had induced an all-pervading deadness in spiritual things. Religion was little better than a cold morality. A reaction was inevitable. The search was for authority; the transcendental school found it in an 'inner light,' in reason or conscience or 'an imaginative faith;' the ecclesiastical school appealed to the authority of the Church and localized the divine in persons and places and acts. Transcendentalism saw God in man and nature, ecclesiasticism saw Him in sacraments and ordinances. In England at the beginning of the nineteenth century the Church had become so thoroughly Erastian that few looked beyond the State with its civil courts for any centre of ecclesiastical authority. The most definite form of ecclesiasticism, though one little known to the great majority of Englishmen, was the Latin communion with its persistent assertion of Papal claims; and over against this stood the Transcendental school with its equally persistent demand for the recognition of the individual reason. But with the birth of the Oxford Movement in England came the appeal to the authority of the historic Catholic Church, of which, it was contended, the national Church of the country was an integral part. According to Dean Church, it was not until Newman determined to force upon the public mind, in a way that could not be evaded, the great article of the creed, "I believe in one Catholic and Apostolic Church," that the movement really began. Underneath the restoration of certain external requirements lay this appeal to the authority of the primitive and undivided Church. The effort was to make the national Church of England more truly Catholic, not by the introduction of new features in her economy, but by the restoration of those elements of Catholicism which were already inherent, though latent, in her constitution. The movement sprang from the Catholic teaching of the Caroline divines. Its fathers were Andrewes and Laud and Cosin. It made episcopacy essential not merely to the *hinc esse*, but to the *ecce* of the Church. The Apostolic Succession became a prominent plank in the platform of the Catholic school.

The doctrinal teaching may be summed up in one word—the Incarnation. This, as witnessed

by Church and Scripture, was the sum and substance of the apologetic work of both the early and the later leaders of the movement. Underneath the contention as to holy orders and valid sacraments lay this basic truth of Christianity. It gave the world a living Christ, whose quickening and energizing humanity permeated the whole body of the faithful. He, it was held, inspired sermons, gave vitality to worship and efficacy to sacraments, and imparted energy both to individual lives and to corporate agencies for good. The sacraments were openly proclaimed as 'the extension of the Incarnation.'

The immediate cause of the movement was the suppression by the reform Government in 1833 of ten Irish bishoprics, coupled with the significant hint to the English prelates to 'set their house in order.' John Keble, professor of poetry at Oxford, had long chafed under the manifest Erastianism of the times; and what the poet had already sung, in the *Christian Year*, the preacher now proclaimed from the pulpit. But if Keble's sermon was the first word, the first step was taken at a meeting of a few friends at Hadleigh vicarage, in Suffolk, the home of Hugh James Rose, in July of the same eventful year. It was there decided to begin the publication of the *Tracts for the Times*, and the decision opened a new era in Christian polemics. The first three tracts appeared under date of September 9, 1833, and during that and the following year forty-six were printed and circulated among the parochial clergy. They were short but incisive statements, bearing upon the polity, doctrine, and worship of the Church. In 1834 an address signed by seven thousand clergymen of the English Church, expressing a general adherence to her apostolic doctrine and polity, was presented to Archbishop Howley, and this was followed by another of the same purport from the laity bearing the signatures of two hundred and thirty thousand heads of families. An 'association' was formed by William Palmer, and a short supplement to the Catechism was prepared and published by William Perceval. But the 'Oxford Tracts' were the motive power of the new movement and its leaders were soon known as 'Tractarians.'

Concurrent with the issue of the Tracts were Newman's four o'clock sermons at Saint Mary's. They were plain, but pointed and pungent. Men read the Tracts and listened to the sermons. An atmosphere was created and in it the urgent issues of the hour were discussed and weighed. Toward the close of 1834 Pusey joined the movement. As a professor and a canon of Christ Church, Oxford, he brought with him a name and a position. The Tracts grew into heavier and more exhaustive treatises. A translation of the early Fathers was begun. The Anglo-Catholic library was started. The movement met with unexpected success, and, under the leadership of Newman, Keble, and Pusey, gathered great strength in the effort to return, in doctrine and worship, to the Anglicanism of the seventeenth century.

But in 1839 a new school was formed within the movement which from that year until 1845 had a large, if not the chief, share in its guidance. It originated with William George Ward and other younger men who came into it, as Newman afterwards said, "at an angle and were sweeping the original party aside." It is said to have represented the ethical and philosophical

side of the effort rather than the historical. The sympathies of its leading spirits were distinctly Roman. The vivid picture of Church authority and Catholic sanctity painted in Hurrell Froude's *Remains* fascinated many earnest and devout minds. The Protestant Reformation was represented as a deadly sin, and restoration to communion with Rome was the ideal. There was clearly a rift in the Tractarian forces. Ward's party were drifting toward the Roman Catholic Church. Pusey and Keble stood firm on the original foundation. Newman was unsettled. "The large and sweeping conception of a vast and ever-growing Imperial Church," we are told, "appealed strongly to his statesmanlike imagination." Flaws and imperfections were of no account in such greatness and could be overlooked. In 1839 his sympathies were strongly Roman Catholic. He had striven to present the Church of England as holding a central historic position between a bald Protestantism on the one hand and an infallible Roman Catholicism on the other. His appeal had been to the authority of the undivided Church. But his belief in the reality of the English Church was now being severely tested. While studying the Monophysite question in the summer of that year he says himself: "For the first time a doubt came across me of the tenableness of Anglicanism. I had seen the shadow of a hand on the wall. He who has seen a ghost cannot be as if he had never seen it. The heavens had opened and closed again. The thought for the moment had been, the Church of Rome will be found right after all. And then it had vanished. My old convictions remained as before."

Still the movement went on, with no outward signs of failure. But with the publication of Tract 90 there came a marked change. It was written by Newman, and interpreted the articles in what Ward called a 'non-natural' sense. It was an attempt to show, by an ingenious application of Article XXXV. on the Homilies, that the Articles were not necessarily anti-Roman. They were represented as condemning the popular exaggerations and misconceptions of Roman doctrine current at the time they were drawn up. This was enough in the temper of the times to let the storm loose. Dislike and suspicion had been seething, conspiracy and disloyalty had been darkly hinted; but with the appearance of the obnoxious Tract, the innate Protestantism of England flew to arms. The Tracts were stopped. Newman withdrew from Oxford to Littlemore. Saint Augustine's words about the Donatists, "Securus judicat orbis terrarum," kept ringing in his ears "like words out of the sky." The ghost came again, and this time it would not leave him. The attempt to establish a joint bishopric at Jerusalem, representing both the English Church and the Prussian Lutherans, pressed hard upon a sensitive and over-strained conscience. The Government and the Archbishop appeared guilty of the sacrifice of principle. Then came Pusey's suspension for his sermon on the Eucharist in 1843, followed by the condemnation of Ward's *Ideal of a Christian Church*, and the withdrawal of his degrees in the next year. By the summer of 1845 he and Faber and Oakeley had gone over to Rome, and in October the long-impending blow fell. Newman transferred his allegiance from the Anglican to the Latin Obedience.

The catastrophe shattered the Tractarian

Party; it checked but did not stop the Oxford Movement. The influence of the revival had already reached far beyond the Church in England. The events connected with the Carey case in America are sufficient to show this. Arthur Carey was a graduate of the General Theological Seminary in New York, and a young man of unusual promise; but he had become imbued with the teaching of the Tractarians, and a protest was entered against his ordination on the ground that he was unsound in the faith. He was, however, after the case had caused considerable excitement, ordained when he had passed a special examination by a committee of clergymen appointed for the purpose. The movement became the subject of an able and earnest debate in the American General Convention of 1844. Resolutions were adopted to the effect that the faith was already sufficiently proclaimed in the formularies of the Church, and that the canons were amply adequate to govern any cases of supposed heterodoxy. Victory seemingly rested with the advanced or Catholic school.

Another blow fell in England when the Judicial Committee of the Privy Council gave its decision in the famous Gorham case. (See GORHAM CONTROVERSY.) The court merely decided that the language used by Mr. Gorham was not so clearly contrary to the formularies of the Church as to justify the action of the Bishop in refusing to institute him; but it was understood by many people to declare that the Church of England did not teach the doctrine of Baptismal Regeneration. It was looked upon by the High Anglicans as a further proof of the inherent and ineradicable Erastianism of the National Church. A number of clergymen sought refuge in the Roman Catholic Communion, the foremost of whom was Manning. But the movement widened and went on, its work becoming more practical and less argumentative. Signs of the revival of church life were everywhere manifest. New parishes were formed, new churches built. Interest in foreign mission was aroused. Men like Dr. Hook of Leeds, Bishop Wilberforce of Oxford, Mr. Gladstone, Judge Coleridge, and Sir Roundell Palmer (afterwards Lord Selborne) were found coöperating with the old and tried leaders. Doctrinal interest centred in the Holy Communion. The Real Presence and its corollary, the Eucharistic Sacrifice, were openly and widely taught and found expression in a revived and elaborate ritual. (See RITUALISM.) In 1856 proceedings were taken against Archdeacon Denison of Taunton, and in 1871 against Mr. Bennett of Frome, for teaching the Real Presence. But the result in both cases strengthened rather than weakened the position of the Catholic school. In the American Church Dr. De Koven fearlessly took his stand upon the English decision in support of the doctrine of the Real Presence as coming "within the limits of the truth held in the Church of England." It has since held a recognized place in Anglican theology, and the doctrine of the Sacrifice of the Eucharist was clearly defined and ably championed by the English archbishops in their reply to the Papal declaration against the validity of Anglican orders in 1897.

It is held by some that the real tendency of the Catholic movement was to Latinize the Church. The very principle of historic continuity for which the leaders fought and struggled has been designated as 'absurd and contradictory.' Its

failure to 'trust the divine constitution of man' has been commented on, and we are told that it was too Augustinian in its theology. Froude maintained that the skepticism of England, in its leading principles, was introduced by Newman and that but for the Oxford Movement it would have remained 'a harmless speculation of a few philosophers.' It is also charged that the Mansell philosophy, with its unknown and unknowable God, was the culmination of its thought. It had its weak points, no doubt. But it had its strong features. It stood for great and forgotten truths. It rallied to it the learning and culture and intellect of England and other lands. It not impossibly anticipated, as some of its critics contend, the Higher Criticism and the agnosticism of the present day. It certainly begat the Neo-Oxford school whose views appeared in *Luz Mundi* in 1890, and who contend that the Church should assimilate the results of the ripest scholarship and the most searching scientific investigation.

Yet it is indisputable that the movement counts for much in the marvelous change which has taken place in religious life and work since the middle of the nineteenth century. Among its results may be placed the restoration of order and dignity to public worship; the more diligent ministrations to the poor and distressed; the raising of the standard of clerical work; the foundation of religious communities for both men and women; the multiplication and maintenance of educational facilities; and the taking by the Church of England of a securer hold upon the affections of the people.

The bibliography of the Movement is very extensive, and includes some of the best biographical work in the language. Consult, especially: Church, *The Oxford Movement* (London, 1891); Oakeley, *Historical Notes on the Tractarian Movement* (ib., 1891-92); Newman, *Apologia pro Vita Sua* (ib., 1864); his *Letters and Correspondence During His Life in the English Church*, ed. by Anne Mozley (ib., 1891); Abbott, *The Anglican Career of Cardinal Newman* (ib., 1892); Liddon, *Life of Pusey* (4 vols., ib., 1893-97); Williams, *Autobiography*, ed. Prevost (ib., 1892); Froude, R. H., *Remains* (ib., 1838-39); Lock, *John Keble* (ib., 1893); Church, *Life and Letters of Dean Church* (ib., 1894); Purcell, *Life of Cardinal Manning* (ib., 1895); Hutton, *Cardinal Manning* (ib., 1892); Mozley, T., *Reminiscences, Chiefly of Oriel College and the Oxford Movement* (ib., 1882); Mozley, J. B., *Letters*, ed. by his sister (ib., 1884); Wilfrid Ward, *William George Ward and the Oxford Movement* (ib., 1889); id., *William George Ward and the Catholic Revival* (ib., 1893); Donaldson, *Five Great Oxford Leaders* (ib., 1898); Pattison, *Memoirs* (ib., 1885); Bowden, *Life and Letters of F. W. Faber* (ib., 1869); Browne, *History of the Tractarian Movement* (Dublin, 1856); Perceval, *Collections of Papers Connected with the Theological Movement of 1833* (London, 1842); Allies, *A Life's Decision* (ib., 1880); Burgon, *Lives of Twelve Good Men* (ib., 1888); Bennett, "Some Results of the Tractarian Movement of 1833," in Shipley, ed., *The Church and the World* (ib., 1867); Ormsby, *Memoirs of James Robert Hope-Scott* (ib., 1884); R. H. Hutton, *Some Modern Guides of Thought in Matters of Faith* (ib., 1887); Tulloch, *Movements of Religious Thought in Britain* (ib., 1885); Abbott and

Campbell, *Life and Letters of Benjamin Jowett* (ib., 1897); Martin, *Life and Letters of Robert Lowe, Viscount Sherbrooke* (ib., 1893); Prothero, *Life and Correspondence of Dean Stanley* (ib., 1893).

OXFORDSHIRE. An inland county of England, bounded north by Warwick and Northampton, east by Buckingham, south by Berkshire, from which it is partly separated by the River Thames, and west by Gloucestershire (Map: England, E 5). Area, 750 square miles. The surface is varied, level toward the north and west; undulating and fertile along the Thames Valley and in the southeast, reaching an altitude of 820 feet in the Chiltern Hills. The principal rivers are the Thames, the Thame, the Cherwell, the Evenlode, and Windrush. The soil is fertile; agriculture is in an advanced state, a large proportion of the acreage being under crops or grass. Dairy farming is largely carried on. The manufactures are on a small scale, and include agricultural implements, Witney blankets, paper, and gloves. Capital, Oxford. Population of county, in 1891, 185,669; in 1901, 182,800.

OXFORD UNIVERSITY. One of the two principal universities of England. The legendary stories of its foundation by King Alfred may be neglected; but as early as 1117 there are notices of Continental scholars lecturing at Oxford, possibly attracted by the neighborhood of the palace of the scholar King, Henry I. The expulsion of foreigners from the University of Paris, as one of the results of the quarrel between Henry II. and Becket, seems to have caused a definite immigration to Oxford; and the account of a visit paid to it by Giraldus Cambrensis about 1185 shows that it was already a centre of learning, and possessed organized faculties with regular degrees. From this time on the university is a place of importance. In the reign of Richard I. scholars were maintained there by the royal bounty; and in 1209 the academic community suffered, as it had earlier grown, by migration. This grew out of one of the frequent conflicts between students and townspeople, and had as a result the transfer of a considerable number of students to Cambridge and the rise of the schools there to the dignity of a *Studium Generale*. In 1214 the liberties of the university were confirmed by decision of a Papal legate, which names for the first time a chancellor as a representative of the university, and requires the townsmen to surrender to him or to some other representative of the Bishop any 'clerks' whom they had seized. The distance from the see city of the diocese, Lincoln, which minimized direct episcopal control, and the prolonged struggles between town and gown, in which the university was generally successful, helped to differentiate it from the Continental universities. Yet in many ways the organization of Oxford was like that of Paris, a self-governing guild of masters, presided over by a chancellor of their election. As elsewhere, the earliest organization was for the purpose of limitation, not extension, of teaching; it was a trade guild, intended to supervise the qualifications of those who claimed admission to the teaching body. Like Paris and its imitators, Oxford had its 'nations,' though here there were but two—the North, including the Scotch, and the South, including the Welsh and Irish. From the beginning, the faculty of arts was of chief importance, those of law, medicine,

and theology never rising to the dignity of separate deans. In the management of university affairs, the congregation or assembly of 'regents,' masters actually engaged in instruction, passed upon measures before they were submitted to the greater congregation or whole body of masters. It was a democratic society, and was found on the side of independence against Henry III., who threatened such radical measures as the hanging of the whole body of students. The reform movement of Wiclif, himself a fellow and perhaps a master of a college, also found here a considerable body of sympathizers. The mention of colleges brings us to an important step in the development of the university. At first, as elsewhere, the students had lived independently at their own expense in the town. By degrees voluntary associations of students sprang up, which elected their head, rented a house, obtained a license from the university, and acquired something like a corporate existence. By the middle of the thirteenth century, too, the mendicant Orders had begun to plant themselves in Oxford, as they were doing in other universities. The Dominicans came in 1221, the Franciscans in 1224, the Carmelites in 1256, and the Augustinians in 1268. They acquired property, built houses, and gained an influence among the students which soon brought them into conflict with the university authorities.

But about the same time another movement was set on foot which was destined to have more lasting consequences. This was the establishment of colleges by private benefaction for the support of students, combining the freedom of the halls with the means of support offered by the religious houses. The movement seems to have begun in Oxford and Paris almost simultaneously. In 1249 William of Durham left three hundred and ten marks for the support of ten masters in lodgings, which were purchased by the university in 1253; this endowment grew in 1280 by the granting of definite statutes unto the oldest of the colleges, University College. Sir John de Balliol, between 1261 and 1266, laid the foundation of Balliol College by a similar gift; but the real type, which was afterwards to prevail, was struck out by Walter de Merton, who founded and gave his name to the first real college in the modern sense at Oxford. It was not, like the colleges at Paris, an association of masters of arts electing their own head, but without control of the funds by which they were supported; it was governed by a warden and a number of senior fellows, who perpetuated their own body by co-optation, administered their own property, and oversaw the younger members of the college. Thus a fourth class of students came into being, besides the 'chamberdekyns,' who lived in independent lodgings in the town, those who were inmates of religious houses, and those who lived in hostels or halls. With the foundation of colleges, often by the absorption of these older halls, came a corresponding diminution in the number of the latter, and they are now almost extinct. The tendency was toward the inclusion of all students in colleges, where discipline as well as instruction would be easier.

The fourteenth century saw the foundation of a number of these. Exeter College (1314), Oriel (1324), Queen's (1340), and New College (1379), show the importance of the movement in this century. The exhaustion of England and its demoralized condition, growing out of the Hundred

Years' War and the Wars of the Roses, is revealed in the fact that only three colleges were founded in the fifteenth century—Lincoln (1427), All Souls' (1437), and Magdalen (1458), in which last the system of teaching within college walls, begun by William of Wykeham at New College, was carried much further. The next century is much more prolific. Its foundations include Brasenose (1509), Corpus Christi (1516), Christ Church (planned by Wolsey as Cardinal College, but dating in its present form from Henry VIII.'s remodeling in 1546, and including the older Canterbury College), Trinity (1555), Saint John's (1555), and Jesus (1571). There are only two in the seventeenth century—Wadham (1612) and Pembroke (1624); then almost a century passes before the transformation of Gloucester Hall into Worcester College in 1714. Keble College (1870), and Hertford in its present condition (1874, though after a checkered career, lasting from 1282), date from the nineteenth. These, with the two remaining halls, Saint Mary and Saint Edmund, both doomed to extinction, like New Inn Hall, which has been absorbed into Balliol, a large body of non-collegiate students, and three small private halls, include all the resident members of the university. The foundation of the colleges had a profound influence on the history and polity of the university, and their existence here and at Cambridge marks the difference between these and other universities.

To return to the general history: The new learning of the Renaissance was at first warmly received at Oxford, and all the earliest Greek students in England were Oxford men. The more conservative members of the university, known as 'Trojans' from the opposition to the Grecians, resisted it for a time as likely to lead to heresy. The violent changes of the Reformation affected the prosperity of Oxford unfavorably. Elizabeth, however, did much to restore it, and Archbishop Laud, who was the ruling spirit there in the first half of the seventeenth century, still more. During the Civil War Oxford was more a court and a fortress than a home of study. The King resided at Christ Church, the Queen at Corpus Christi, and Parliament was held in the Divinity Schools. The university loyally contributed all its plate to the cause, and remained for long afterwards strongly reactionary in its politics. Yet the attempt of James II. to force a Roman Catholic head upon Magdalen was vigorously resisted, and was one of the causes which contributed to his overthrow. The eighteenth century was a period of stagnation; its only striking event was the rise of the Methodists from Oxford to influence the spiritual life of the nation, as the Tractarians (see OXFORD MOVEMENT) did half a century later. The history of the nineteenth century has been one of change. Two royal commissions have examined the whole subject of the university system; and legislation in 1850, 1876, and 1882 especially has resulted in freeing both university and colleges from the restrictions of the mediæval statutes, in restoring the university professoriate, in opening the fellowships to merit, and in relaxing the religious tests.

The constitution of the university may be most easily explained by drawing an analogy with that of the United States. It is strictly a federation, in which the colleges, with their own complete internal organization and laws, answer to the

several States, while the university, with its separate officials and legislative bodies, represents the national Government. Its nominal head is the chancellor, who, however, 'reigns but does not govern.' He is usually some great nobleman or officer of State; thus the Marquis of Salisbury has held the office for many years. The actual administrative functions are discharged by the vice-chancellor, who is always the head of a college, elected for a period of four years in rotation. He is a dignified official, preceded in his public appearances by mace-bearers or beadles, and still invested with many far-reaching powers; in his court all cases are tried which affect members of the university. The disciplinary functions of the university are in the hands of the proctors—two masters of arts elected annually by the colleges in turn. Their powers are also extensive, a survival of mediæval days, and extend in some particulars even over those who are not members of the university, but whom they may, for cause, forbid to reside in the town. Their surveillance, while of course it is always directed to the prevention or punishment of serious breaches of morality or order, is exercised in such minor details as the infraction of the rule which forbids an undergraduate to appear in the streets after dinner without cap and gown.

Legislative proposals are first brought up in the Hebdomadal Council, a body mainly of practical educators, composed of the vice-chancellor, the retiring vice-chancellor, the proctors, and eighteen members elected by Congregation, of whom six must be heads of colleges, six professors, and six members of Convocation of five years' standing. This body, which, as its name implies, meets weekly, initiates legislation by framing statutes and presenting them to Congregation. The latter consists, besides certain ex-officio members, of all masters and doctors who reside in Oxford one hundred and forty days in each year—some four or five hundred in all. Statutes approved by Congregation are presented to Convocation, which may adopt or reject but cannot amend them. This larger body is composed of all masters and doctors who have kept their names on the books of their colleges, no matter where residing. The number amounts to some six or seven thousand; but no large proportion of these attend except on the occasion of some burning question of theological or academic import, when stirring scenes sometimes take place. Convocation, most of whose routine business is intrusted to certain committees called delegacies, also elects the two members of Parliament whom the university has returned since the reign of James I.

The examinations are conducted and the degrees granted by the university, not by the colleges. The examinations for the degree of B. A. are three in number. The first, responsions, colloquially 'smalls,' is now in practice usually taken at or before matriculation. The second, moderations ('mods'), occurs after one or two years, according to whether the candidate seeks honors in it or not; and two years later comes the final examination, or 'greats.' The degree of M. A. requires no further examination, but may be taken by any B. A. of twenty-seven terms standing (about seven years) from matriculation. In law, theology, science, music, letters, and medicine, there are various complicated requirements, including an examination or its equivalent, for

the bachelor's and doctor's degrees, except in the rare cases where they are honorary. Until recent years Oxford maintained rather strictly the traditional ideal of a classical education, contrasted with Cambridge, which has always excelled more in mathematical and scientific lines; but a strong tendency has been shown of late, and deeply deplored by the more conservative, to reduce the quantity of Latin and Greek required to a minimum. In moderations and finals, each 'school' or department is divided into a pass and an honor school, differing in the amount and quality of the work and the difficulty of the examinations. The degree attained is the same in each case; but in the honor schools lists of the men, divided into four classes (three in moderations), have been published since the establishment of this system in 1801.

The internal organization of each college consists of a head (variously called warden, provost, principal, president, or master), and of a number of fellows and tutors—the tutorial office being sometimes combined with a fellowship and sometimes separate from it. The officer charged with the internal discipline is known as the dean, except at Christ Church, where the dean is head both of the college and of the cathedral of the diocese of Oxford, which is combined with it. All these are known collectively and colloquially as 'the Dons.' To each undergraduate on his matriculation is assigned a particular tutor, who is supposed to take a close personal interest in him, in fact to stand *in loco parentis* during his residence; a man's own tutor, however, need not have anything directly to do with his studies, unless he happens to take up the branch in which the tutor gives instruction. Formal teaching is chiefly by means of lectures, which are supplied usually by the college or by combinations of colleges. The exception is the lectures of the professors, who are university functionaries and whose lectures are public. At these lectures, of which two, three, or four may be attended in a morning, the undergraduate is supposed to take full notes to which he may refer afterwards. Except an occasional request to construe a passage of a Latin or Greek author in a man's first year, there is scarcely any approach to what are known in America as recitations. The instruction given in the lectures is supplemented by individual instruction given by the tutors of the college, especially by means of essays, which the student writes on his subject and the tutor corrects. Beyond this, a man is supposed to 'read' for some hours each day, at his own discretion. This freedom is a characteristic feature of the Oxford and Cambridge system. It is tempered by a college examination known as 'collections' at the end of each term; this has no effect on the obtaining of a degree, but is intended simply to give the college authorities an idea of how a man's work is progressing.

The afternoon is devoted by most undergraduates to athletic exercise of one sort or another, interest in which forms a normal part of the life. Distinctions won in this way—the right to wear the 'blue,' the university color which denotes that the wearer has represented the university in cricket, football, rowing, etc.—are as eagerly coveted as a 'double first' in the schools. In the evening the whole college assembles in the hall for dinner, the dons sitting at the 'high table' on a sort of dais. Breakfast and lunch are taken

in a man's own sitting-room. The evening is spent as he pleases, except that if he is residing in college he is absolutely required to be within the college gates before midnight. If he does not intend to 'read,' he will pass the evening in visiting or entertaining his friends, or in attending the meetings of the innumerable societies which exist, devoted to every conceivable interest, literary, scientific, musical, or purely social. Of these the most famous is the Union Society, which combines all the conveniences of a London club with the holding of regular debates in which many of the most famous public orators of England, from Mr. Gladstone and Lord Salisbury down, have received their first training. In fact, it may be considered one of the essential characteristics of English university life that there is no strict line of demarcation drawn between it and the after career of the student. The elasticity of the system adapts it to the requirements of very varied types of men; and the undergraduate who expects to enter political life or to become a mere country gentleman may profit by the discipline of life and the atmosphere of general culture, while a man who seeks for the attainment of advanced scholarship can easily get all the help he needs. The existence side by side of the pass and honor schools constitutes a distinct disavowal of the system of Procrustes.

The prevalent religious tone of the university is still one of attachment to the Church of England, in spite of the relaxation of the strict requirements of past days. The services in the college chapels are those of the Prayer-Book; attendance on them a certain number of times in each week is still usually compulsory, though in some colleges a roll-call at an early hour in the morning is allowed to take the place of the prayers. Since the throwing open of the university, Mansfield College for Congregationalists and Manchester College for Independents have been founded, as well as more recently a hall for Roman Catholic students. None of these, however, have any corporate connection with the university. Other institutions which have an influence upon the spiritual life of undergraduates are the Pusey House (see PUSEY) and Saint Stephen's House, the latter intended primarily as a training-school for Church of England missionaries. Outside of the colleges proper there is also a considerable body of unattached students, who are members of the university without belonging to any college or hall. They are under the general supervision of an official known as the censor of unattached students. This class was admitted first in 1858. The total number of undergraduates is generally over three thousand. Since 1884 women have been allowed to share the instruction, though not to matriculate or take degrees. Two houses, Somerville and Lady Margaret Halls, have been founded for them.

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while Hughes's *Tom Brown at Oxford* (Cambridge, 1861) gives a pretty accurate picture of those days, the best modern presentation of the life and spirit of the place has been given by an American, L. P. Smith, in *The Youth of Parnassus* (London, 1895). See also OXFORD, and the articles on the separate colleges.

OX-GALL. The bile of the ox, greenish-yellow in color. It has several uses in the arts and manufactures. It is an excellent cleansing agent on account of the abundance of soda in its composition, which gives it a soapy quality, and is used for scouring wool and other purposes. It is reduced to the form of an extract for preservation, and is dissolved in alkaline water for use. Its chief employment is in mixing colors, especially in water-color painting, the effect being to give them tenacity and fluidity. It is also an ingredient in varnish and is a substitute for India ink, and is used in painting on ivory.

OX'IA'NA, LAKE OF. The ancient name of a lake in Asia. See ARAL.

OXIDASE (from Gk. *ἄξω*, *oxys*, sharp, quick, acid). The name of a group of inadequately known enzymes (q.v.), producing direct oxidation of various substances, particularly coloring matters and sugars. Oxidases appear to be widely distributed among plants, having been found in many fungi, in the latex (milky or colored sap) of certain plants, and in many kinds of leaves and fruits. Probably they will be found to play an important rôle both as agents in normal functions and as the cause of disease. The destruction of chlorophyll in certain areas of leaves, as, for example, in tobacco ('mosaic' disease), has been ascribed to the action of oxidizing enzymes upon the green pigment.

OXIDES (from Gk. *ἄξω*, *oxys*, sharp, quick, acid). A term applied to a variety of compounds of oxygen, but more especially to those in which oxygen is combined only with a metal or a metalloid. The principal classes of oxides are the basic or metallic oxides, and the acid oxides or acid anhydrides. Lime, the oxide of calcium, is an example of oxides of the first class. Sulphur trioxide, or sulphuric anhydride (SO₃), is an example of oxides of the second class. An oxide of one class as a rule combines readily with an oxide of the second class to form a salt. Thus lime combines with sulphur trioxide to form calcium sulphate. Oxides are frequently prepared by the direct union of oxygen with other elements. Thus the oxides of all the elements, except bromine, chlorine, fluorine, iodine, gold, and platinum (not to mention the inert elements argon, helium, etc.), may be prepared. Many of the metallic oxides are formed by the action of heat on carbonates, nitrates, and other salts of volatilizable acids. Thus chalk (calcium carbonate) is transformed by heat into lime. The metallic oxides occurring in nature are among the most abundant and valuable ores. Thus hematite (sesquioxide of iron), pyrolusite (manganese dioxide), and cassiterite (tin dioxide) are important ores, respectively, of iron, manganese, and tin.

OX'LEY, JAMES MACDONALD (1855—). A Canadian author, born at Halifax, Nova Scotia, October 22, 1855. He graduated B.A. from Dal-

housie University in 1874, and subsequently studied at Harvard. Called to the bar in 1878, he practiced in his native city for five years and then became legal adviser to the Department of Marine and Fisheries at Ottawa. During this period he edited *Nova Scotia Decisions* (1880-83) and Young's *Admiralty Decisions* (1882). He resigned his position in 1891, and in 1892 he became manager of the Sun Life Assurance Company at Montreal. Before leaving Ottawa, Oxley had begun his long series of books for boys, among which are *Bert Lloyd's Boyhood* (1887); *Up Among the Ice Floes* (1890); *The Chore Boy of Camp Kippewa* (1891); *Donald Grant's Development* (1892); *Diamond Rock* (1893); *Archie McKenzie, the Young Nor'wester* (1894); *In the Wilds of the West Coast* (1894); *On the World's Roof* (1896); *In the Suing of the Sea* (1897); *Fife and Drum at Louisbourg* (1899); and *Lhasa at Last*, a journey to the Forbidden City of Tibet (1900).

OXLEYA (Neo-Lat., named in honor of John Oxley, an Australian explorer in the nineteenth century), or FLINDERSIA. A genus of trees of the natural order Cedrelaceæ, of which one species, *Flindersia Oxleyana*, the yellow wood of Eastern Australia, often attains a height of 100 feet. Its timber is valued for boat-building, for cabinet-work, and for other purposes where an ornamental wood is desired. It is quite resistant to attacks of ants, an important consideration in tropical countries. A yellow dye is obtained from the tree. See FLINDERSIA.

OXLIP. An ornamental plant. See PRIM-ROSE.

OXPECKER, or BUFFALO-BIRD. Any of several starlings, or starling-like birds, which gather about cattle and pick the parasites from their hides, or feed upon the insects which they disturb in the grass. The name more especially belongs to a South African species (*Buphaga Africana*), which seeks the company of the wild buffalo, and nowadays of tame cattle, and picks the ticks from their hides. Another species (*Buphaga erythrorhyncha*), distinguished by its red bill, performs the same service for the rhinoceros, and is commonly called 'rhinoceros-bird.' Similar birds with similar habits are known in the Orient as 'buffalo-birds,' and belong to the large genus *Sturnopastor*. Similar habits belong to the American cow-birds (q.v.). Compare BUFFALO-BIRD; and see Plate of LARKS AND STARLINGS.

OX'US. The ancient name of the Amu (q.v.).

OX-WARBLE. See BOT; WARBLE.

OXY-ACIDS. Those acids which contain oxygen, as distinguished from the acids which do not contain oxygen and were formerly designated as *hydracids*. The term oxy-acids is now seldom used in this sense. On the other hand, the term oxy-acids, or preferably *hydroxy-acids*, is applied by organic chemists to carbon compounds that are at once acids and alcohols, i.e. acids whose molecules contain one or more hydroxyl groups (OH) attached to a hydrocarbon radicle. (See ALCOHOLS.) Thus oxy-acetic acid, or hydroxy-acetic acid, known as 'glycollic acid,' has the constitutional formula CH₂(OH).COOH.

OXYÆNA (Neo-Lat., from Gk. *ἄξω*, *oxys*, sharp, quick, acid). A fossil creodont mammal

from the Wasatch Lower Eocene beds of the Western United States. See *PATRIOFELIS*.

OXYGEN (from Gk. *ὀξύς*, *oxys*, sharp, quick, acid + *-γενής*, *-genēs*, producing, from *γίγνομαι*, *gignesthai*, to become). A gaseous element isolated by Priestley in 1774. Priestley's classical researches in pneumatic chemistry led him to the discovery that when red mercuric oxide is heated by the sun's rays it decomposes into a colorless gas, which he called 'dephlogisticated air,' and metallic mercury. A year later Scheele, in Sweden, independently discovered oxygen, giving it the name of 'empyrean air.' Shortly afterwards Condorcet suggested the name of 'vital air.' Lavoisier, however, was the first definitely to establish the true character of oxygen, and it was he who first gave it its present name. See *CHEMISTRY*.

Oxygen exists uncombined in the atmosphere, to the extent of 21 per cent. by volume and more than 23 per cent. by weight. In combination, too, it is very abundant in nature, forming eight-ninths by weight of all water and a considerable percentage by weight of silica, alumina, and chalk, which are the three most abundant and widely distributed constituents of the earth's crust. It is further a normal component of nearly every rock and mineral, and of all animal and vegetable tissues and fluids. It is absorbed in large quantities from the atmosphere by animals and vegetables in the process of respiration, but plants also evolve it under the influence of sunlight. Oxygen may be readily prepared by heating red mercuric oxide, by heating manganese dioxide to a red heat, or by heating potassium chlorate to 370° C. Commercially it was long made by heating manganese dioxide, either alone or together with potassium chlorate. The alternate formation and decomposition of alkaline manganates was originally proposed in 1866 by Tessie du Motay, as a process of manufacturing oxygen for illuminating purposes. The process has been successfully employed in Europe and the United States. But more recently the alternate formation and decomposition of barium peroxide has been taken advantage of for the commercial production of oxygen. This method, which was chiefly developed by the brothers Brin, consists in heating barium oxide to a dull red heat in a current of air, whereby it is converted into barium peroxide, which at a still greater heat is decomposed again into barium oxide and free oxygen. This economic process is being worked on a large scale in various places. Pictet, in 1901, announced the invention of an economical method for obtaining oxygen from the air.

Oxygen (symbol, O; atomic weight, 16; see *ATOMIC WEIGHTS*) is a colorless, odorless, and tasteless gas which has been condensed to a pale steel-blue, transparent liquid, boiling at -181.4° C. and freezing to a white solid at -235° C. Compared with air as unity, oxygen has a specific gravity of 1.1504, and it is the least refractive of all gases. Oxygen is slightly magnetic, which property is diminished or temporarily suspended by elevation of temperature. When examined through thick layers, oxygen has a bluish tinge of color. It combines directly with most of the elements. (See *OXIDES*.) It is sparingly soluble in water, and nearly all natural waters contain oxygen in solution which can be completely removed by boiling in vacuo. This dissolved oxygen is the source from which fish obtain the oxy-

gen necessary to sustain life. In the pure state it may be inhaled, for a time, with impunity, and it even acts as a tonic or exhilarant. Its long-continued respiration, however, is harmful. In pure oxygen bodies burn with much greater brilliancy than in common air. See *COMBUSTION*.

Oxygen has been used successfully to maintain air in a respirable condition, as in diving bells, submarine vessels, etc., and its use has been suggested for the revivifying of the atmosphere in public halls. It finds extensive application, in connection with hydrogen or illuminating gas, to produce the oxyhydrogen flame. (See *OXYHYDROGEN BLOWPIPE* and *DRUMMOND LIGHT*.) It is also used in the bleaching of paper pulp, in the oxidation and thickening of oils which are used in the manufacture of varnish and oilcloths, for the purpose of hastening the maturing of spirits, or liquors, and in the manufacture of vinegar. See also *OZONE*.

OXYGEN, IN MEDICINE. Oxygen is widely used, both in medical and surgical practice, in three ways: By the inhalation of the gas itself, by drinking oxygenated water, and by means of peroxide of hydrogen.

When employed as a gas, oxygen is liberated slowly from a cylinder containing it under strong pressure, and inhaled. In this form it is given in all conditions where there is interference with respiration. In the later stages of pneumonia, when there is danger to life from deficient aeration of the blood; in the chronic bronchitis of old people; and for the resuscitation of victims of coal-gas asphyxiation, oxygen gas is of very great value. It will allay the oppression and dyspnea in phthisis and other wasting diseases. It acts as a direct stimulant to the respiratory mucous membrane, and has a beneficial effect on the heart and respiration. When prolonged anæsthesia is necessary, oxygen is often given in conjunction with the general anæsthetics, to relieve cyanosis, and as a safeguard against cardiac or respiratory failure. The use of oxygen in medicine is due to the valuable opinions and demonstrations of Dr. A. H. Smith, of New York.

OXYGENATED WATER is a solution of the gas in distilled water, made under pressure, and drawn off by means of a tap such as is used in siphons. It is taken internally, a glassful at a dose, and has a distinct value in chronic dyspepsia, persistent vomiting, constipation, and in headaches, whether neuralgic or digestive.

PEROXIDE OF HYDROGEN is a powerful local antiseptic, possessing the property of effervescing in the presence of pus, which it is useful in detecting in doubtful cases. It is widely used in diphtheria to loosen and destroy the false membrane. Application is made by means of a swab or spray. It is much used to cleanse ulcers and wash out abscess cavities. See *HYDROGEN DIOXIDE*.

OXYHYDROGEN BLOWPIPE, or **COMPOUND BLOWPIPE**. An apparatus by means of which hydrogen is burned in pure oxygen, the flame having an exceedingly high temperature. This apparatus, invented by Dr. Robert Hare, of Philadelphia, in 1801, and originally called a 'hydrostatic blowpipe,' may be used for fusing highly refractory substances. According to Bunsen, a temperature of 2844° C. (5151° F.) is obtained when a jet of oxygen gas is brought within the flame of hydrogen gas. A watch spring held

in such a flame, which is almost colorless, burns with bright scintillations, and platinum can be boiled by means of the flame. The principal use of the oxyhydrogen flame has been for fusing metals, although recently similar results have been obtained by the electric furnace. See COMBUSTION; DRUMMOND LIGHT.

OXYTICS (from Gk. *ὀξύτις*, *oxytikion*, medicine to facilitate quick delivery, from *ὀξύς*, *oxys*, sharp, quick, acid + *τόκος*, *tokos*, birth). Remedies which increase uterine contractions. The chief drugs of this class are ergot (q.v.) and quinine (q.v.). Ergot is the most widely known and used oxytocic, and was formerly employed to hasten labor, but it is now known that this practice is extremely dangerous, as it causes a tetanic instead of an intermittent contraction of the wall of the uterus and may lead to its rupture, an accident often fatal. It should never be given until the uterus has been emptied. In this way it is frequently given after labor, to cause contraction of the uterus and so prevent hemorrhage.

OXYURIS (Neo-Lat., from Gk. *ὀξύς*, *oxys*, sharp, quick, acid + *ὄυρα*, *oura*, tail). A nematode worm belonging to the *Ascaridæ*, characterized by a fusiform shape and a rounded oval aperture. The variety *vermicularis* is the thread-worm or maw-worm found in the sigmoid flexure and in the rectum of human beings. In horses this worm is called the bot. The male is $\frac{1}{8}$ inch, the female nearly $\frac{1}{2}$ inch in length. See ANTHELMINTICS.

OYER (AF., to hear). A term employed in common-law pleading to signify a demand by one party to an action, to hear read, or to have produced for inspection, a document to which the other party refers in his pleadings. Originally where a party based his claim or defense upon a deed, letters testamentary, or letters of administration, he was obliged to 'make profert' of the instrument, that is, allege that he produced it in court, whereupon the other party might 'crave oyer,' that is, demand to hear it read, in order that he might avail himself of its contents in his pleadings if he deemed it advisable. At a later date, instead of having it actually read in open court and spreading it upon the records, the party making profert was required to give the opposite party a true copy of the instrument.

In England and most of the United States the practice of requiring a pleader to make profert has been abolished, and with it the practice of demanding oyer, and instead a party referring to an instrument in a pleading is required to annex a true copy thereto. If it becomes necessary for a party to inspect a document in the hands of the other, he obtains an order to that effect from the court. See EVIDENCE.

OYER AND TERMINER (AF., to hear and to determine). In English law, a commission under the King's great seal appointing certain judges to hear and determine criminal causes in and for designated circuits. This commission was very ancient in its origin, it having first been employed some time after the reign of Edward III., the exact date not being certain. Before the Judicature Act (q.v.), the commissioners, as the judges so appointed were called, constituted the Court of Oyer and Terminer. The above act vested in the High Court of Justice all the powers formerly exercised by the Court of Oyer and

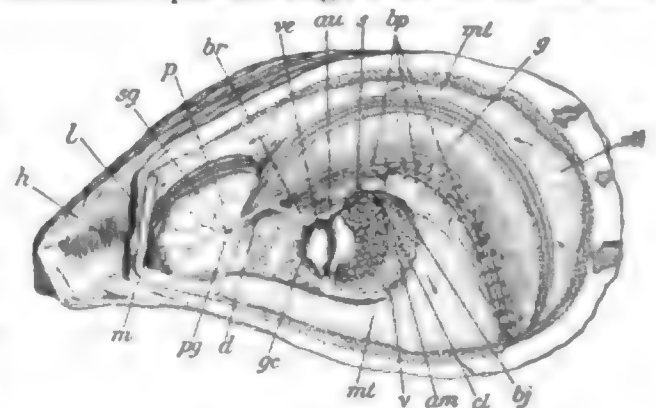
Terminer, but its jurisdiction of criminal offenses is still dependent upon such a commission. A special commission is sometimes issued, authorizing the judges to try certain designated criminal cases out of the regular term.

The highest court of criminal jurisdiction in New York was formerly known as the Court of Oyer and Terminer, but it derived its jurisdiction from the statutes creating it and not from a commission as in England. It has been merged in the Supreme Court by the Constitution. See ASSIZE.

OYEZ (AF., OF., hear ye). An introductory word sometimes employed by court officers or criers in announcing the opening of court. It was introduced into England by the Normans, together with their other legal expressions and forms. The English translation 'hear ye' is still employed by most court criers in the United States.

OYO, *ò'yò*. The capital of the African State of Yoruba, now included in British Nigeria, situated about 90 miles northeast of Abeokuta (Map: Africa, E 4). It has an estimated population of 60,000, and its inhabitants are said to be intelligent and skillful in the crafts.

OYSTER (OF. *oistre*, *ouistre*, *huistre*, Fr. *huitre*, from Lat. *ostrea*, *ostreum*, from Gk. *ὀστρεον*, *ostreon*, oyster; connected with *ὀστέον*, *osteon*, Lat. *os*, bone). A sessile bivalve mollusk of the family *Ostreidae*, especially any of the numerous species, extinct and extant, of the genus *Ostrea*. The shells are irregular and unequal; the fixed left valve generally spacious, strongly convex without and excavated within; right valve generally plane or concave externally, always less convex than its fellow; both shells beaked; ligamentary area elongate or triangular; hinge toothless; adductor impression single and shell subnacreous.



ANATOMY OF OSTREA VIRGINICA.

h, Hinge; *l*, ligament; *d*, *pg*, and *sq*, connective, and two ganglia of the nervous system; *p*, palps; *br*, blood-vessel from gills to auricle of heart; *au*, auricle; *ve*, ventricle; *s*, external opening of sexual and renal organs of right side; *bp*, pores from which the water issues into the branchial canals after passing through the gills; *mt*, mantle (the arrows showing the direction of currents produced by cilia); *g*, gills; *gc*, cavity between the two mantle folds; *cl*, clonca; *am*, adductor muscle (cut across); *bj*, outline of organ of Bojanus, the so-called 'kidney.'

The oyster of the eastern coast of the United States is *Ostrea virginica*, a valuable species of protean characters, formerly much subdivided by systematists and almost impossible to diagnose. The shells are lateral and hinged anteriorly, an elastic pad (ligament) causing them normally to gap. Closely applied to their inner faces and extensible beyond their margins are two thin folds (mantle) of the body-wall, which secrete the

shell in successive layers within and on the margins. The mantle encloses a chamber (mantle cavity) open ventrally and posteriorly, into which project on each side a pair of gills, commonly called the 'beard,' and in front of these a pair of smaller fleshy lobes (palps). Above the gills and palps lies the body, containing the digestive, reproductive, circulatory, excretory, and nervous systems, and the adductor muscle which closes the shells. The adductor (popularly, the 'eye' or 'heart') lies somewhat behind the middle of the body, the dark scars on the inside of empty shells marking its attachments. The funnel-shaped mouth lies between the two pairs of palps. A short gullet leads into a spacious stomach, and this into the tubular intestine which opens by an anus above the adductor. Surrounding the stomach is the liver, a large dark green digestive gland opening into the stomach by numerous ducts. In front of the adductor lies the pericardium, containing the two-chambered heart and in relation to the excretory organ. The simple degenerate nervous system consists of two pairs of ganglia, one above the gullet and the other beneath the adductor, connected by a pair of nerve cords.

The sexes are separate, but without external distinction. The sexual glands when ripe are creamy white organs surrounding the digestive system and opening on each side beneath the adductor. In Long Island Sound spawning occurs from May to August, in Chesapeake Bay from April to October, in South Carolina as early as March, and in Florida as early as February. In oysters transplanted during the spawning season reproduction is often interfered with or arrested. An average oyster will produce 16,000,000 eggs and a very large one 60,000,000. When ripe the sexual products ooze from the genital openings and fertilization results from their accidental meeting in the water. Segmentation results in five or six hours in the production of a ciliated gastrula, a cup-shaped, free-swimming organism, often carried by the currents to found new and remote beds. An embryonic shell soon appears, and the little oyster sinks to the bottom, where, if favorably situated, it becomes attached by its left valve and gradually assumes the adult form. The recently attached spat is 1-80 to 1-90 of an inch in diameter, and its subsequent growth varies with its environment. Single oysters on firm bottom become round and deep, but those in clusters or on soft bottom grow irregular and elongate. On undisturbed natural beds they grow in clusters, and the beds repose, as a rule, on a muddy substratum upon which they have been built up from a comparatively small nucleus by the fixation, year after year, of the young upon the shells of their predecessors.

Oysters live from above low-water mark to a depth of 15 fathoms, where the density is between 1.002 and 1.025, the optimum being from 1.011 to 1.022, and in a range of temperature which in Chesapeake Bay extends from 32° F. to 90° F. The embryos and fry require more equable and stable conditions, the temperature required being between 68° F. and 80° F. The best and most productive beds are commonly in strong tidal currents, which disseminate the fry and food and keep the old shells clean enough to catch the spat. Diatoms constitute about 90 per cent. of the oyster's food, the rest consisting of other small plants and animals, and in the breeding season of

its own eggs and fry. The latter are eaten by other mollusca also, and from its attachment until it reaches a large size the oyster is preyed upon by starfish, drills (*Urosalpinx*), drumfish, rays, and other aggressive enemies, while it wages a passive fight against starvation and suffocation with mussels, barnacles, sponges, worms, aquatic vegetation, and other prolific or luxuriant organisms growing on the beds.

Ostrea Virginica occurs from the Gulf of Saint Lawrence to the tropics, but between Cape Breton and Cape Cod the Sheepscot River, Maine, is its only locality. It has also been introduced in San Francisco Bay, where it breeds to a limited extent. The yield of Eastern oysters at the beginning of the present century was as follows:

	Bushels	Value *
Gulf States.....	1,987,216	\$687,539
South Atlantic States.....	1,612,181	384,934
Middle Atlantic States.....	19,749,677	10,286,556
New England States.....	2,642,072	1,910,684
Pacific States.....	360,000	792,000
Canada (estimated).....	95,000	150,000
Totals.....	20,453,146	\$14,231,713

* Value to oystermen and growers.

The greatest production is in Chesapeake Bay, where the principal yield is from the natural beds. Most of the oysters from New England and from New York and the outer coast of New Jersey are produced by planted beds; the entire yield of the Pacific Coast is similarly derived, and there has been recently a considerable increase in oyster culture in New Jersey, Virginia, and other States. The number of persons engaged in the industry is estimated at upward of 60,000, but as many of them are employed part of the year in other fisheries, farming, etc., definite statistics are not available. Baltimore is the most extensive market and New York has a considerable export trade with Europe.

The native oyster of the Pacific Coast is *Ostrea lurida*, a small thin-shelled species. It is hermaphroditic, and, like the European oyster, retains its young for a time in the mantle cavity. In 1901 159,340 bushels, valued at \$251,192, were marketed, principally on the Pacific Coast.



PACIFIC COAST OYSTER.

The European oyster (*Ostrea edulis*) is found from Italy to Norway. It is a round thin-shelled species, more shapely than the American species, and hermaphroditic, first female and afterwards male. It is less prolific than its American relative and the young undergo considerable development in the mantle chamber of the mother. It thrives in water of full, or almost full, organic density. The Portuguese oyster (*Ostrea angulata*) sexually and in its habits more closely resembles *Ostrea Virginica*.

The oysters of Japan are *Ostrea cucullata*, which occurs in shallow and moderately brackish or moderately salt water throughout the whole archipelago; and *Ostrea gigas*, a very large salt water species found in deep water. Many other species of *Ostrea* are found in temperate and tropical seas throughout the world.

FOSSIL OYSTERS. The oyster family appears to have had its origin in some imperfectly known forms, such as *Ostrea nobilissima* of the Carboniferous. The family is found also in the Permian. In the Triassic it is represented by a strongly plicated form, *Alectryonia*, which form becomes more prominent in the Jurassic and Cretaceous. There are also the common arcuate shells of *Gryphæa* and *Exogyra* in the Jurassic and Cretaceous. *Ostrea* itself is known in the Mesozoic, but it attained its maximum of size and abundance in the Tertiary. The sandy marls of this period in the Southeastern United States often contain great numbers of very large specimens of oysters, especially of two species, *Ostrea Georgiana* and *Ostrea sellæformis*. Consult White, C. A., "A Review of the Fossil Ostreidae of North America and a Comparison of the Fossil with the Living Forms," *Annual Report of the United States Geological Survey*, vol. iv. (Washington, 1883).

OYSTER CULTURE. Owing to the exhaustion of the natural beds and their inability to supply the demand for oysters, it has been found necessary to resort to artificial methods of production, effecting (1) an increase in the number of eggs fertilized; (2) an increase in the surfaces available for fixation, and also of the number of spat attaching; (3) the saving of spat and young oysters which would naturally fall victims to enemies and adverse physical conditions; and (4) the utilization of barren bottoms and naturally unavailable food supplies. But a small part of the area under water suitable for oysters has been utilized by nature, mainly for lack of suitable bodies for the attachment of the young. In the United States such barren bottom is utilized by clearing it of all rubbish and either planting 'cultch' to collect the spat, or else young oysters (seed), that they may improve in size, shape, and quality under conditions safer and more favorable than in their original environment. In certain places either method may succeed, but commonly a locality is better adapted to one than the other.

The most suitable bottom for oyster culture consists of firm mud or of a firm substratum with a thin surface of soft mud, but stable sandy bottom is often used with success. Rocky bottom is usually deficient in food, loose sand drifts and covers the oysters, and very soft mud ingulfs and stifles them or produces inferior elongate stock. Mud naturally too soft may be utilized by distributing over it shells, sand, or other material, which, resting on or near the surface, furnishes a firm foundation upon which the growing oyster may repose in security. For spat-collecting it is frequently advantageous to use hard mud, gravel, or rocky bottom in shoal water, ill adapted to adult oysters from deficiency of food. The bottom being properly prepared and its boundaries marked with stakes or buoys, either system may be adopted to accord with circumstances. Generally seed-planting is more certain in its results and yields quicker returns to the grower. Seed-oysters vary from 'blisters'

$\frac{1}{2}$ inch in diameter to individuals almost ready for market, but ordinarily they are between 1 and 3 inches long. They are obtained from planters making a specialty of seed production or from natural beds, their cost varying from 10 cents to \$1 per bushel, the larger culled stock, separate, well shaped, and free from rubbish, bringing higher prices and giving the best results. From 300 to 600 bushels of culled seed per acre are used, a larger quantity of 'rough' material being required, as much of it consists of old shells and debris. It is usually sowed broadcast with shovels from boats. Further attention, other than that required to keep the beds clean and free from enemies, is generally unnecessary, especially if culled seed has been used.

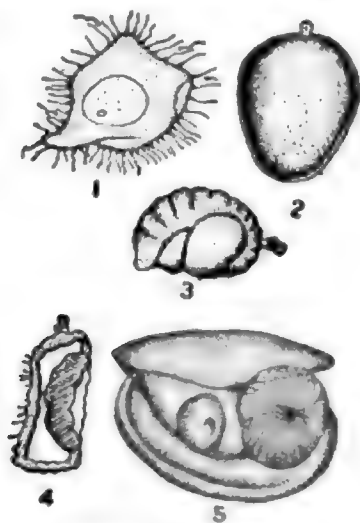
The system of spat-collecting is often extremely productive, though sometimes, for reasons not well understood, it results in complete failure. Spat will attach to almost any clean solid body, but certain materials, from their shape, structure, or cheapness, possess advantages which commend them. The most widely used and one of the best forms of cultch consists of the clean shells of the oyster itself. They are cheap, readily obtainable in all oyster regions, and, owing to their size and shape, can be used with success on bottom too soft for most other materials. The principal objection to them is that so many spat sometimes attach to a shell that they have no room for growth, and scallop (*Pecten*), jingle (*Anomia*), and other small fragile shells are sometimes preferable, as they catch the spat in smaller clusters and tend to break up as the oysters grow, but, owing to their lightness, they cannot be used in strong currents. The cost of oyster shells is from 2 to 5 cents per bushel, and sometimes they may be had for the hauling. Coarse gravel, pebbles, and crushed stone are used to a considerable extent in Long Island Sound and vicinity, but require a harder bottom than shells. The particles average about the size of a walnut or smaller, and as but few spat attach to each, the oysters are well shaped, less laborious to cull, and a larger proportion survive. This material costs from 5 to 8 cents per bushel and the cost of planting is about the same as of shells, $\frac{1}{2}$ to 5 cents per bushel, according to local conditions.

Shells, stones, and gravel are distributed, like seed, from boats or scows. From 250 to 600 bushels per acre are used, soft bottom requiring more than hard. If there are extensive beds of adult oysters in the vicinity, and especially if the currents set from them to the spat-beds, they can be depended upon to supply the fry, but if not, adult oysters should be used in the proportion of 30 to 60 bushels per acre. The brood oysters should be planted several months before the spawning season, but the cultch should not be put down until spawning is about to begin, that it may be free from slime and sediment when the fry is ready to fix, even a thin coating of sediment being sufficient to suffocate the young oyster at that period.

Some planters allow the beds to remain unworked until the crop is ready to market, but to produce oysters of superior shape and quality, the clusters should be taken up and separated as soon as they can be culled without injury. It frequently happens that good localities for obtaining a set are not favorable to the production of marketable oysters, and in this case the culled young

may be transplanted with advantage and profit to beds possessed of an environment more favorable for the adults. Whether cultch or seed be planted, the beds should be closely watched to protect them from enemies which sometimes work havoc unsuspected until the time comes to market the crop.

The United States Fish Commission is experimenting with a system of fattening oysters artificially, by using fertilizers to stimulate the production of oyster food in ponds. Good results have been attained, but the commercial feasibility of the method has not yet been demonstrated. The alleged method of fattening oysters by feeding with corn meal is worthless. 'Plumping' them by placing in fresh or nearly fresh water is a bloating and not a fattening treatment, and is less resorted to than formerly. Oysters should not be planted or bedded in the vicinity of sewage contamination, as they may thereby become sources of disease infection, but there is no danger to be anticipated from the consumption of oysters from beds remote from sources of contamination. Green oysters are sometimes placed on the market. There are three types of greenness, two of which are perfectly harmless. The third type is evidently a pathogenic condition, correlated with the presence of copper; but while the affected oysters are poor in quality, it is not demonstrated that they are dangerous.



OYSTER DEVELOPMENT.

1, Unfertilized egg shortly after mixture of spawn and milt; spermatozoa are adhering to the surface. 2, Same egg a few minutes after fertilization; polar body at broad end. 3, Optical section of egg 27 hours after impregnation, showing two large cells, covered by a layer of small ectodermal cells. 4, Optical section of an older egg, now become flattened from above downward. 5, An embryo with well-developed larval shells.

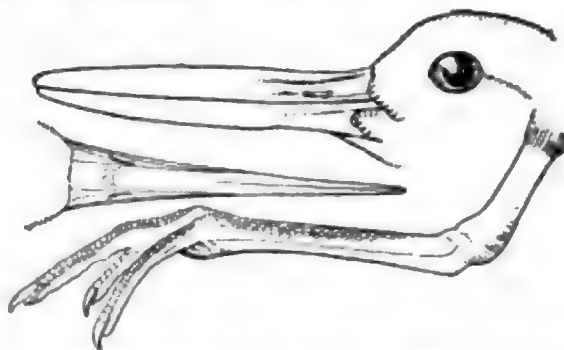
In England oyster culture is practically along the same lines as in the United States. Shells are used to collect the spat, and seed-oysters are planted in favorable places, notably on the bottoms controlled by the Whittable Company, a coöperative corporation. On the Continent the methods are more elaborate, the low price of labor and the high price of oysters, as well as the restriction of the area upon which they can be grown, tending to encourage an intensive system of culture. Tiles and fascines are generally used as spat-collectors, and especially in Holland and France a system of ponds or 'claires' is used for growing and fattening. Japanese methods somewhat resemble those of France and Holland in the recognition of a distinction be-

tween the bottoms used for spat-collection and for growing, although ponds are not used. Bamboo branches in regular arrangement are used for spat-collectors and the oysters are usually twice transplanted, first to a place favorable for rapid growth, and finally to beds especially rich in food, where they fatten.

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OYSTER BAY. A town, popular both as a residence place and as a summer resort, in Nassau County, N. Y., 30 miles northeast of New York City, situated on the northern coast of Long Island, on a deep sheltered bay, opening into Long Island Sound (Map: New York, G 5). A line of steamboats and a branch of the Long Island Railroad connect Oyster Bay with New York. The town offers attractions of fine scenery, and facilities for boating, bathing, and fishing. It has many handsome residences and a public library. The principal industry is oyster cultivation. The government is administered by town meetings, held every two years. Population, in 1890, 13,870; in 1900, 16,334. Within the limits of Oyster Bay is the village of Sea Cliff. Population, in 1900, 1558. Oyster Bay is the home of President Roosevelt.

OYSTER-CATCHER, or MUSSEL-PICKER. A long-legged shore-bird of the stilt family, having a long, hard, wedge-pointed bill. One species inhabits the northern part of the Old World, and another North America, but the term is occasionally extended to other related forms. The common one in the United States (*Hæmatopus palliatus*) is from 18 to 20 inches long, smoky brown above, with head and neck black, and white beneath. It is found on both coasts of both American continents, but rarely occurs



BEAK AND FOOT OF THE AMERICAN OYSTER-CATCHER.

north of New Jersey. It feeds on oysters, clams, and other mollusks, and breeds freely on the coast of Virginia. On the Pacific coast occurs an oyster-catcher (*Hæmatopus Bachmani*) which has no white in its plumage. Both of these feed largely on worms, crustaceans, and the like, as well as on mollusks. The European species (*Hæmatopus ostralegus*) is similar in all respects, and is known in Great Britain (where

it breeds numerous on all sandy coasts) as 'sea-pie,' on account of its handsomely variegated black and white plumage, resembling that of the magpie. Consult Newton, *Dictionary of Birds* (London and New York, 1893-96).

OYSTER-CRAB. A small brachyuran crab of the genus *Pinnotheres*, the females of various species of which are about the size and shape of a pea, and hence are called 'pea crabs' in Great Britain. These females live as commensals (see COMMENSALISM), within the shells and mantle-lobes of various bivalved mollusks. A familiar American species is *Pinnotheres ostreum*, found in oysters, and bright reddish-yellow when cooked. It is esteemed a great dainty, and large numbers are used for food in the Eastern United States. Another species is very common in the wing-shells (*Pinna*) of the Mediterranean, and was imagined by the ancients to render important services to its host in return for its lodging, keeping a lookout for approaching dangers, against which the 'blind pinna' itself could not guard.

OYSTER-FISH. See TAUTOG.

OYSTER PLANT. See SALSIFY.

OYSTERS, LAW AS TO. Oysters are classed with animals *feræ naturæ* (of a wild nature), and, therefore, in their wild state may be gathered by any one when they are located on land under navigable waters. In England the cultivation of oysters has been protected and encouraged by statutes since the reign of Richard II. Most of the oyster beds in the waters about the British Isles are now enjoyed by virtue of special grants from the Crown or by lease from royal commissioners, or by prescription, that is, long continued possession and user under the laws of England. No one can appropriate to his exclusive use land under public waters for the purpose of establishing an oyster bed, but after gaining the right by grant or lease, a person has an absolute ownership in the oysters he plants or deposits in the space allotted to him, and appropriation of them by another in such a case is punishable as a misdemeanor.

In the United States generally, after wild oysters are gathered and 'planted,' that is, placed in another location for the purpose of propagation, they remain the property of the person who has thus reclaimed them, even though he plants them on ground under public waters. This rule prevails in most States, even in the absence of statutes, but there are generally statutory provisions regulating the industry, especially in regard to giving notice to the public where a person appropriates land under public waters for an oyster bed, and also establishing 'close' seasons. Therefore, in most States any one has a right to preëempt an unoccupied area under public waters and establish thereon an oyster bed. When a bed is once established, as long as it is maintained, the law protects the owner, as the person planting the bed is called, in his property right in the oysters, and in his possession of the area which his bed covers. The owner of an oyster bed is not only entitled to the oysters which he plants, in order to allow them to mature, but also to all offspring from those oysters, within the limits of his bed. The statutes usually require one who claims an oyster bed to stake it off by means of long poles embedded in the mud at the bottom and extending above the surface of

the water. This is for the purpose of giving notice to the general public and avoiding an innocent invasion of the owner's rights. A person cannot acquire property right to a bed of oysters by planting young oysters in a natural bed already containing oysters in sufficient quantities to make it profitable for the public to gather them. If a person thus mingles his oysters with others which the public may gather he loses all separate property right in them, and can only gather them as a citizen of the State. Natural oyster beds are defined to be those that are not planted by man, but where oysters are to be found growing in sufficient quantities to be valuable to the public.

Where no definite period for the enjoyment of the privileges of oyster beds is fixed by statute, the right to use the public land under water for such purpose is construed to be a conditional or qualified license, which is personal in its nature and not inheritable or transferable, and the State in which the beds are situated may at any time revoke the license and demand back the possession of the submerged land, giving the owner of the oysters a reasonable time in which to remove them. This right of the State will not ordinarily be exercised, and as the owner of the oysters may dispose of them in any way he sees fit, and as they will go to his representatives at his death, it is often popularly supposed that the possession of the submerged land itself is a property right in the person who is said to 'own' the bed. The occupation of an oyster bed by an individual does not interfere with the rights of the public to fish in the waters above the bed. Statutes of a State prohibiting citizens of other States from taking oysters or locating beds on lands under its navigable waters have been held to be constitutional. A person taking oysters from a private oyster bed, without permission, is guilty of larceny. See FISHING LAWS; FERÆ NATURE; RIVER. Consult the local laws and decisions for specific information of local rights.

OYSTER-SHELL BARK-LOUSE. A popular name for the most abundant and widespread of scale-insects (*Mytilaspis pomorum*), which occurs most abundantly upon the apple, but is found also in various parts of the world upon pear, quince, hawthorn, willow, maple, elm, and many other trees. It was introduced into the United States from Europe at the close of the eighteenth century, and spread gradually throughout the country until it is now present practically wherever the apple is cultivated. The insect hibernates in the egg state under the old female scales. The young hatch in spring, wander out upon the twigs, and settle at once both upon the young twigs and the fruit. It occurs very rarely upon the leaves and is not common upon fruit, but frequently clusters upon twigs and limbs so as completely to cover the bark. In the Southern United States there are two generations each year, but in the North only one. After settling, the female molts twice and begins the formation of the scale. The male is much smaller than the female, and is distinguished by the fact that it has but one cast skin at its anterior end, whereas the female has two. The scale of the adult is of almost the same shape as an oyster shell, whence the popular name. The insect is readily destroyed in the

spring, after the young have hatched, by the application of a dilute kerosene emulsion in the form of a spray. Consult Howard, *Year Book of the United States Department of Agriculture* (Washington, 1894). See SCALE INSECT.

OZANAM, ô'zâ'nân', ANTOINE FRÉDÉRIC (1813-53). A French Roman Catholic writer. He was born at Milan, and began to study law at sixteen, besides picking up several languages and contributing to the periodical press. In 1832 he went to Paris to pursue his studies, and took his doctor's degree in law after four years; in literature, six years later. He soon came into close relations with Chateaubriand, Lacordaire, and Montalembert, and threw himself ardently into the cause of the Church. With seven other students he founded the Saint Vincent de Paul Society. (See SAINT VINCENT DE PAUL, SOCIETY OF.) In 1839-40 he was professor of commercial law at Lyons, and in 1844 became professor of foreign literature at the Sorbonne. His special study was the history of mediæval civilization, particularly with the view of showing the beneficent influence of the Church and her doctrines. His health proved unequal to his diligence as a teacher, and after a year's sojourn in the Pyrenees he died at Marseilles, September 8, 1853. His collected works appeared in eleven volumes (Paris, 1862-65). Important among them are: *Dante et la philosophie catholique au treizième siècle* (1836); *Etudes germaniques pour servir à l'histoire des Francs* (1847-49); *Documents inédits pour servir à l'histoire littéraire de l'Italie* (1850). In English translations have appeared: *History of Civilization in the Fifth Century* (London, 1868); *Protestantism and Liberty* (ib., 1874); and his letters, with sketch of his life (ib., 1886). There are biographies by O'Meara (Edinburgh, 1876); Legeay (Paris, 1854); and de Montrond (Lille, 1869).

OZANAM, JACQUES (1640-1717). A French mathematician, born at Bouligneux, of Jewish descent. He was trained for the Catholic priesthood, but after his father's death devoted himself to mathematics, and taught at Lyons and then in Paris, where, in 1701, he was admitted to the French Academy of Sciences. His works include: *Tables des sinus, tangentes et sécantes* (1670; 3d ed. 1710); *Dictionnaire mathématique* (1690); *Recreations mathématiques et physiques* (1694), which was frequently republished (in English by Hutton, 1803); and *La perspective théorique et pratique* (1711; 2d ed. 1720).

OZARK' MOUNTAINS. A low, dome-like plateau or uplift in the Mississippi Valley between the Missouri and the Arkansas rivers (Map: Missouri, C 5). It covers the greater parts of southern Missouri and northern Arkansas, and extends some distance into Kansas and Indian Territory. It consists of Paleozoic rocks, and in many respects resembles the Allegheny plateau, but is much less dissected. It rises gradually from the north, but is somewhat escarped and rugged in its southern portion in Arkansas, where it is also heavily timbered, this part of the country being in marked contrast with the surrounding plains. The plateau nowhere rises much above 2000 feet. The Ouachita Mountains, south of the Arkansas River, are an outlying portion of the main plateau.

OZE'NA (Lat. *ozæna*, from Gk. *ὀζæνα*, *ozæna*, fœtid polypus in the nose, from *ὀζειν*,

ozein, to smell; connected with Lat. *odor*, *olor*, odor). A term applied generally to diseased conditions of the nose characterized by great fetor of the breath. It may be due to syphilitic necrosis of the intra-nasal structures, or to tubercular or malignant ulceration. When due to these causes there is an accompanying purulent discharge from the nostrils. The morbid secretions accumulate in the nasal passages and form dry crusts over the mucous membrane. These decompose and give rise to the peculiarly offensive odor from which the disease derives its name.

The disease is chronic and difficult of management. Much benefit, however, is secured from the removal of the fœtid crusts and secretions by the frequent use of alkaline and antiseptic douches, followed by the application of stimulating substances to the affected mucous membrane. The general treatment in the specific form of the disease consists in toning up the general health. A change of climate is often beneficial. When the factor is due to syphilitic or other trouble, the treatment must be directed to the disease which causes it.

OZEROFF, ô'zye-rôf, VLADISLAV ALEXANDROVITCH (1770-1816). A Russian 'pseudoclassical' dramatic writer. He graduated from the Cadet Corps, was adjutant to its director, served in the army and the Department of Forestry, and in 1808 retired, with the rank of major-general, to devote himself to literature. An admirer of the French 'Classicists,' he closely imitated Ducis's *Edipe à Colonne* in his first success, *Œdipus at Athens* (1804). His fame grew with *Finzal* (1805), which was based on Ossian, and reached its zenith in *Dmitriy Donskoy* (1807). *Polytena* (1809), though unsuccessful with the public, was his favorite tragedy. The fifth edition of his works appeared at Saint Petersburg in 1856.

OZOCERITE, OZOKERITE (from Gk. *ὀζæιν*, *ozein*, to smell + *κηρός*, *kêros*, wax), or NATIVE PARAFFIN. A yellow, brown, and sometimes green, wax-like substance, originally found in Moldavia and Austrian Galicia, and more recently in Emery and Uinta counties, Utah, where it occurs in the form of small veins in Tertiary rocks. It consists chiefly of a mixture of hydrocarbons, is greasy to the touch, and melts between 56° and 63° C. (133° and 114° F.). It finds some use in the manufacture of candles, as an adulterant or substitute for beeswax, and in the manufacture of ointments and pomades. A residual product obtained in purifying ozocerite, having a hard waxy nature, is combined with india-rubber and used as an insulating material ('okonite') for electric cables.

OZONE (from Gk. *ὀζæιν*, *ozein*, to smell), or ACTIVE OXYGEN, O₃. A colorless gaseous allotropic modification of oxygen. (See ALLOTROPY.) In 1785 Van Marum observed that oxygen gas through which an electric current had been passed, as well as the air or oxygen in the vicinity of an electric machine, possessed a peculiar odor somewhat resembling chlorine. He referred to it as the 'smell of electricity.' In 1801 Cruikshank observed a similar odor when water was decomposed by electrolysis. Schönbein, in 1840, investigated the matter and established the fact that the odor was due to the formation of new gas, which he named ozone. He showed that ozone was generated by the action of phospho-

rus on moist air, and that it was capable of liberating iodine from potassium iodide. Its constitution was a matter of doubt until Soret determined the fact that it was an allotropic form of oxygen produced by the condensation of three volumes of oxygen into two of ozone. It is found in minute quantities in the atmosphere, of which it is regarded as a normal constituent, and its presence is believed to be due to the electric discharges during thunder storms, silent discharges from thunder clouds, vibrations of water, especially of saline waters, as in sea foam, and the action of some vegetable products on the air. Ozone is also said to be formed by the action of sunlight on clouds and the blueness of the sky has been attributed to its presence. Ozone is formed when a series of electric sparks is passed through oxygen or air, and it is evolved at the positive pole in the electrolysis of acidulated water. The slow oxidation of phosphorus in air yields ozone, and it may also be obtained by the action of strong sulphuric acid on barium peroxide. Certain organic substances, such as turpentine, various essential oils, etc., generate ozone when exposed to the air.

Ozone is a gas with a strong penetrating odor resembling that of diluted chlorine. When con-

densed under a pressure of 125 atmospheres at -103° C., it forms a deep blue liquid. It is more strongly magnetic than common oxygen. It decomposes slowly even at ordinary temperatures. It is a very strong oxidizing agent, converting copper, mercury, silver, and iron into their oxides. It oxidizes most organic compounds, destroying rubber and vulcanite with great rapidity; also it bleaches many colored vegetable and animal products, such as indigo, litmus, blood, etc. Its powerful oxidizing properties are taken advantage of for commercial purposes and its artificial production for the purpose of purifying the air of sick-rooms has been recommended. It finds some application for bleaching, as in the case of discolored engravings, where the printed portion is rolled up and inserted in a glass vessel, on the bottom of which some water and pieces of phosphorus have been placed. It has also been used to oxidize alcohol to aldehyde and to vinegar, and for the rapid aging of liquors. Slightly ozonized air and oxygen are used medicinally, especially in pulmonary complaints, although if too strong it is said to produce harmful effects, causing headache and irritating the mucous membranes of the respiratory organs.

P

P The sixteenth letter in the English alphabet. It can be traced through the Latin and Greek alphabet to the Semitic *pē*, 'mouth,' probably so called from the original elliptical shape of the letter. The form of the letter is now essentially Roman, which differed from the Greek in that the second stroke was bent round to meet the first.

ⲡ	Ϟ	Π	Ϙ	Ɑ
Phœnician	Early Greek	Later Greek	Early Latin	Later Latin

PHONETIC CHARACTER. As a phonetic character, *p* is the breathed or surd labial stop consonant corresponding to the voiced *b*. In forming the sound the lips are closed for an instant, and the breath then escapes explosively. From the manner of its sound-formation it is termed an occlusive explosive. The sound *p* is often voiced to *b*, which may then become the closely related *f* or *v*, as Latin *episcopus*, 'bishop,' Spanish *obispo*, French *évêque*, English *bishop*; Avesta *xšapan*, 'night,' Persian *šab*, North Baluchi *šaf*, Kurdish *šav*. *P* in Sanskrit, Greek, and Latin becomes Germanic *f* by Grimm's law (q.v.), as Sanskrit *pād*, 'foot,' Greek *πῶς-αῖ*, Latin *ped-em*, English *foot*; Sanskrit *napāt*, 'grandson,' Latin *nepos*, Anglo-Saxon *nefa*, English *nephew*. In English, *p* represents an original Indo-Germanic *b*, which was, however, of rare occurrence. No example of initial *p* from this original *b* exists in English. As examples of medial *p* from Indo-Germanic *b* may be cited Sanskrit *sab-ar*, 'nectar,' English *sap*; Latin *lubricus*, slippery, English *slippery*. The digraph *ph* is pronounced *f*, as in *pharmacy*, *phonetic*, and is written *f* in Spanish and Italian, as *farmacia*, *fonetico*. In English words beginning with *pn*, *ps*, and *pt*, as *pneumatic*, *pseudonym*, *pteropod*, *p* is silent. Such words are of Greek origin, as in pure Latin *p* combines initially only with the consonants *l* and *r*. A *p* in Latin is often euphonicallly inserted between *m* and *s*, and *m* and *t*. This *p* is retained in English derivatives of such words, as for example, *redemption*, *sumptuous*.

As a SYMBOL. In Hebrew and Greek Π and Π stood for 80; in mediæval numbers, *P* for 400, and \bar{P} for 400,000. In chemistry, *P* is the symbol for phosphorus. In music *p* is the abbreviation of piano (softly), and *pp* of pianissimo (very softly).

P is the abbreviation of Latin *post* in P.M. (*post meridiem*) and in P.S., postscript.

PAARL. The capital of a district of Cape Colony, South Africa, on the southern slope of the Drakenstein range, 36 miles by rail northeast of Cape Town (Map: Cape Colony, E 9). It is the centre of a fruit-growing region, which is the wine-producing district of the colony. It dates from an ancient Dutch settlement, and derives its name, signifying 'pearl,' from a neighboring granite rock of pearl-like appearance. Population of the town, in 1891, 7668; of the district, 21,363, of whom 13,137 were native blacks.

PAASCHE, pā'she, HERMANN (1851—). A German economist and authority on the sugar industry. He was born at Burg, near Magdeburg; studied at Halle; became professor at Rostock (1879), at Marburg (1884), and in the Berlin Polytechnic Institute (1897), and was elected to the Reichstag as a member of the National Liberal Party in 1881. Since 1893 he has also been a member of the Prussian Lower House. Paasche wrote: *Studien über die Natur der Geldentwertung und ihre praktische Bedeutung in den letzten Jahrzehnten* (1878); *Wandlungen in der modernen Volkswirtschaft* (1890); *Zuckerindustrie und Zuckerhandel der Welt* (1891), his most important work; and *Kultur- und Reiseskizzen aus Nord- und Mittelamerika* (1894).

PABIANICE, pā'byā-nyé'tse. A manufacturing town in the Government of Piotrkow, Russian Poland, situated about 10 miles southwest of Lodz (Map: Russia, A 4). It has textile mills, and manufactures paper and agricultural machines. Population, in 1897, 26,892.

PA'CA (Neo-Lat., from *pak*, *paq*, the native name in Brazil), or SPOTTED CAVY. One of the largest of the agoutis (*Cælogenys paca*), found from Paraguay to Venezuela east of the Andes. It is about two feet long and dark brown in color, with four rows of white spots along the sides, and the throat and belly black. The form and gait are clumsy, yet the paca is quick and agile. It lives in moist ground, makes burrows, and feeds on plants, often damaging sugar plantations. The skull of this animal is remarkable for the great development in the breadth of the jugal arch, inclosing a large cheek cavity, which gives an extraordinary breadth and swollen appearance to the face. One or more other species (or varieties) inhabit the high Andes of Ecuador, and are much sought after as food by the aid of trained dogs. Consult Beddard, *Mammalia* (London, 1902).

PACA, WILLIAM (1740-99). An American political leader and jurist, one of the signers of the Declaration of Independence, born at Wye Hall, his father's estate on the eastern shore of Maryland. He studied at Philadelphia College, then went to England, where he was entered at the Middle Temple, London, and in 1764 was admitted to the bar. He began the practice of law at Annapolis, and in 1761 was elected to the Legislature. He served again from 1771 until 1774, when he was chosen a delegate to the Continental Congress, of which body he continued to be a member until 1779. Personally a strong advocate of the independence of the colonies, his hands were tied by the instructions of the State convention, which as late as the middle of May, 1776, declared against a policy of separation. Paca and his supporters labored to secure a reversal of these instructions, and on June 28th the convention gave its delegates power to vote on the question according to their own judgment. Paca was a member of the State Senate in 1777-79, and from 1778 to 1780 was Chief Justice of Maryland. He was then Chief Justice of the Court of Appeals in 1780-82, and was Governor of Maryland from 1782 to 1785. He was a delegate to the State convention which ratified the Federal Constitution in 1788, and in 1789 was appointed United States judge for the District of Maryland, an office which he held until his death.

PACAY, pà-kā' (Quichua name), *Prosopis dulcis*, or *juliflora* according to some authorities. A tree of the natural order Leguminosæ, suborder Mimoseæ; a native of Peru, of rather large size, with a broad head; producing pods from 20 inches to 2 feet long, which contain black seeds imbedded in a white sweet starchy substance, used as an article of food. The ground pods are fed to stock. See MESQUITE TREE.

PACCA, pāk'kā, BARTOLOMEO (1756-1844). An Italian diplomat and cardinal. He was born at Benevento, studied at Naples and Rome, and in 1785 became Chamberlain to Pius VI., who advanced him rapidly, made him Nuncio to Cologne in 1786, and sent him as special envoy to Louis XVI. in 1791. From 1795 to 1800 Pacca was Nuncio to Lisbon. One of the most prominent of the anti-French party, he was captured with the Pope in 1809 and imprisoned for two years. He urged Pius to break the agreement of Fontainebleau, and in consequence was banished by Napoleon (1814), but was rewarded after the fall of the Empire and received in 1830 the See of Ostia and Velletri. He remained a strong opponent of reform. Pacca wrote *Memorie istoriche* (1830), *Notizie sul Portogallo* (1835), and *Relazione del viaggio di papa Pio VII.* (1833).

PACCHIONIAN (pāk'kī-ō'nī-an) **BODY**, or **GLANDULA PACCHIONI**. One of numerous small, whitish granular-looking bodies, collected together in clusters of varying size, found upon the human meninges, or cerebral membranes, principally in the following localities: Upon the outer surface of the dura mater, in the superior longitudinal sinus, being received into little depressions, called Pacchionian depressions, on the inner surface of the skull; upon the inner surface of the dura mater; in the superior longitudinal sinus (a large venous canal, or vein, attached to the inner surface of the skull, running from before backward; upon the pia

mater, near the margin of the hemispheres. They are named after Antonio Pacchioni, an Italian anatomist (1665-1726). The Pacchionian bodies are not glandular in structure. They are produced by an increased growth of the villi of the arachnoid. They not infrequently contain small, hard, calcareous concretions called 'brain sand.' Their growth and consequent pressure produces absorption of the dura mater, through which they pass to the inner surface of the skull as well as into the superior longitudinal sinus. These bodies do not occur in infancy, and very seldom before the third year; usually after the seventh, increasing after this as age advances. Sometimes they are wanting. Their function is supposed to be that of lymph channels, for the outflow of lymph from the subdural and subarachnoid spaces into the sinuses of the dura mater. See NERVOUS SYSTEM AND BRAIN. Consult Landois and Stirling, *Physiology* (Philadelphia, 1903).

PACCIOLI, pà-chō'lē, **PACIOLI**, or **PACIUOLO**, pā'chē-ōō'lō, LUCA, or LUCAS, DE BORGO (c.1440-c.1515). An Italian mathematician, born at Borgo San Sepolero, in Tuscany. He was a Franciscan monk, and in his younger days, had traveled extensively in the East. He taught mathematics at Florence, Rome, and Venice, and then took orders under the name Fra Luca Sancti Sepulchri. He afterwards taught in various Italian universities. His chief work was the *Summa de Arithmetica, Geometria, Proportioni et Proportionalita* (1494; 2d ed. 1523), a work which contained all that was then known of mathematics. This was the first important printed treatise on mathematics. Paccioli was a judicious compiler, and he exerted a powerful influence on the teaching of the sixteenth century.

PACE. See WEIGHTS AND MEASURES.

PACER (from *pace*, from OF., Fr. *pas*, step, from Lat. *passus*, step, pace, from *pandere*, to stretch; connected with *patere*, to lie open, Gk. *πεταρύναι*, *petannynai*, to spread out). The ambling gait of the pacer, smooth, frictionless, and lateral, as distinguished from the diagonal gait of the trotter, has been appreciated from the earliest antiquity. In America the pacer long received slight encouragement in competition: yet against all odds, and mechanical contrivances to force the pacer to trot, his progeny continue to inherit his characteristics; and as it transpired that eventually pacers had greater speed than the trotter, he was first tolerated and then sought after. The time for a paced mile was gradually reduced from 2:28, until in 1897 "Star Pointer" made it in 1:59¼. The gaits of trotting and pacing are practically interchangeable, though it is still true that a fast trotter becomes a faster pacer. The *Narragansett pacer* is supposed to have been a descendant of the Spanish horse. Governor Robinson is said to have brought some Spanish horses from Andalusia to New England, and the breed was kept up to supply the demand for them in the Cuban trade, but with the falling off of the trade the industry was allowed to lapse, and the breed became extinct.

PACHACAMAC, pā'chá-kā'māk, **RUINS OF**. The remains of a vast city of the Yuncas, the ancient coast Indians of Peru, situated about 20 miles southeast of Lima. It was their sacred city before the conquest of the Incas, and held the shrine of Pachacamac, the Creator or Maker of all things. The Incas, after they had subjugated

the Yuncas, erected here a great temple of the sun and a house of the Virgins of the Sun. The ruins cover four large hills which furnished abundant building material used in combination with bricks or adobes of sun-dried earth. The site is at present a waste of drifting sand, sometimes obscuring the buildings which in the rainless and frostless region are in a fair state of preservation. The city was well laid out, having broad streets and a surrounding wall with large gates for entering. The houses were great communal structures built in terraces like the New Mexican pueblos. There were capacious reservoirs and irrigation works; the hills were terraced and upon the level areas thus secured were located the temple and other buildings. The principal Yunca structure, the temple of Pachacamac, is located on a headland about 500 feet above the sea, which breaks at its feet.

The hill has been surrounded by four terraces, forming a semi-lunar pyramid, the summit several acres in area. The entrance is from the east and the ascent is by a series of ramps. The walls were at one time painted red and adorned with frescoes. The temple covers an area of 600 × 450 feet, and is an aggregation of rectangular buildings and sunken courts on the various terraces. The shrine is on the summit at the southern corner behind two projecting rocks. The Inca convent stands on low ground near a small lake. It is also built of adobe bricks and covers an area 350 × 200 feet. It consists of a square, terraced area covered with buildings, and from this extends a long wall having 18 cells on the inner face. At a right angle another wall extends to a square terrace backed also with a niched wall, in which a fine example of the round arch has been found.

Around the temple of Pachacamac is a vast cemetery in which the flexed bodies of the dead, wrapped in cloth and secured with a network of cord, were placed in vaults lined with adobe bricks and roofed with canes and rushes. Some of the tombs have three or more chambers. The objects buried with the dead consist of pottery, bronze, gold, or copper objects, textiles, weaving apparatus, pigments, food, and the like.

Pachacamac being a central shrine, first of the Yuncas and later of the Incas, was exceedingly rich; it is said that Pizarro secured here 1700 pounds of gold and 1600 pounds of silver at the sack of the temples. Consult: Squier, *Peru* (New York, 1853); Wiener, *Pérou et Bolivie* (Paris, 1880).

PACHECO, pá-chû'kô, DONNA MARIA. The wife of the Spanish patriot Juan de Padilla (q.v.).

PACHECO, FRANCISCO (c.1571-1654). A Spanish painter and writer on art. He was born at Seville, and was a pupil of Luis Fernandez, an imitator of Raphael. Of small importance as a painter, he is remembered chiefly as the master and father-in-law of Velazquez, and deserves most lasting credit for his *Arte de la pintura* (Seville, 1639). The precepts of this work were for a long period considered of standard authority by Spanish artists, and it also contains many valuable historical notices.

PACHELBEL, JOHANN (1653-1706). An eminent German organist and composer, born at Nuremberg. First instructed there by Heinrich Schwemmer (1621-96), he next studied at

Altdorf and Regensburg, and in 1674 went to Vienna, where he became assistant organist at Saint Stephen's. Called to Eisenach in 1675, he was successively organist there, at Erfurt (1678-90), Stuttgart, Gotha, and finally (from 1695) at Saint Sebaldus in Nuremberg. With Butehude, one of the immediate forerunners of Bach, he contributed much to the improvement of Church music, and was the first to introduce in Germany the overture form on the piano-forte. The few of his compositions that appeared in print include: *Musikalische Sterbens-Gedanken* (1683); *Musikalische Ergetzung* (1691); *Acht Choräle zum Präambuliren* (1693); *Hexachordum Apollinis* (1699). The manuscript of his important *Tabulaturbuch geistlicher Gesänge Martini Lutheri*, etc. (1704), is in the grand-ducal library at Weimar.

PACHMANN, päk'män, VLADIMIR DE (1848—). A Russian pianist, born in Odessa. He first studied music under his father, a professor in the University of Odessa, an amateur violinist, and the friend of Beethoven, Weber, and other musicians. Subsequently he was sent to the Conservatory of Vienna, and, returning to Russia in 1869, made his first appearance as a pianist, and played also in Germany and France. In 1882 he went to London, and in 1890 traveled in the United States, making subsequent extended tours in 1892, 1899, and 1900. He became very popular in America and enjoyed a high reputation both there and in Europe, especially as a sympathetic exponent of the music of Chopin.

PACHOMIUS, SAINT. An Egyptian monk who is held to have been the first to substitute for the free asceticism of the solitary recluse a regular cenobitic system. He was born about the year 292, of heathen parents, served as a soldier, and was converted to Christianity by the kindness of certain Christians whom he encountered at Thebes. About 325 at Tabennæ, an island in the Nile, he founded the first monastic institution. The members agreed to follow certain rules of life and conduct drawn up by Pachomius, and to subject themselves to his control and visitation. His sister is said also to have embraced the cenobitic life, and to have established the first convent for nuns. The pair labored with so much diligence and zeal that at their death, according to Palladius, not fewer than 7000 monks and nuns were under their inspection. Consult: Grützmacher, *Pachomius und das älteste Klosterleben* (Freiburg, 1896); Amélineau, *Etude historique sur Saint Pakhôme et le cénobitisme primitif dans la Haute Egypte* (Paris, 1887). See MONASTICISM.

PACHUCA, pä-chû'ká, or HIDALGO. The capital of the State of Hidalgo, Mexico, situated 55 miles northeast of Mexico City (Map: Mexico, K 7). It is built in a mountain pass more than 8000 feet above sea-level, and its principal industries are derived from the rich silver mines of the district. These are among the most important in the country; they are said to have been worked before the Conquest, but still yield an annual output of 90,000 tons of rich argentiferous ore. It was here that in 1557 Bartolomé de Medina discovered the *patio* process of amalgamation, which is still considered the most economical process for reducing the peculiar ores of Mexico. Population, in 1895, 40,487.

PACHYDERMATA, pāk't-dēr'mā-tā (Neo-Lat. nom. pl., from Gk. *παχύς*, *pachys*, thick + *δέρμα*, *derma*, skin). The 'pachyderms,' an order of mammals in the system of Cuvier, including the rhinoceros, elephant, hippopotamus, tapir, hog, and other ungulate mammals regarded as 'thick-skinned.' The group was a thoroughly unnatural one and the name is no longer in scientific use, although it has been adopted into literary service as a synonym for insensitiveness. Several of these animals are illustrated on the Colored Plate of PACHYDERMS.

PACHYMERES, pāk't-mē'rēz, GEORGIUS (1242-c.1310). A Byzantine historian. He was born in Nicæa, was educated there, and in 1261 went to Constantinople, his father's native city, where he entered the priesthood and held high office in both Church and State. He wrote a *Historia Byzantina*, covering the period 1255-1308, a valuable source for the reigns of Michael Paleologus and Andronicus II., which was edited by Bekker (Bonn., 1835).

PACIFIC OCEAN (from Lat. *pacificus*, peace-making, peaceful, from *pax*, peace + *facere*, to make). The portion of the water envelope of the earth which lies between America and Asia-Australia. The name Pacific was given to it by Magellan. On the north it connects with the Arctic by the Bering Strait, and southward it merges into the Southern Ocean, the parallel of latitude 40° S. being usually taken as the limit in this direction. Its waters communicate with the Indian Ocean on the west by numerous passages in the island chain extending from South-eastern Asia to Australia. The Pacific is the largest and deepest of the oceans. With the bordering seas—the Bering, Okhotsk, Japan, Yellow, Eastern, China, Celebes, Java, Molucca, Banda, and Arafura seas—which are regarded as its dependencies, it has an area of about 55,000,000 square miles, equal to the entire land surface of the globe. Its greatest length from north to south is about 7350 miles and the greatest breadth along the parallel of latitude 5° N., 10,300 miles.

THE PACIFIC BASIN. The configuration of the Pacific basin is quite irregular, although there are large areas where the bottom exhibits little relief. In general, the depth increases from southeast to northwest. A vast depression known as the Tuscaraora deep extends from the Japan and Kurile islands eastward along the Aleutian chain toward the coast of North America. Within this area the depth exceeds 3000 fathoms and in places soundings of 4000 fathoms or more have been made. Another extensive deep lies south of the Tonga Islands, between the Chatham Islands and New Zealand on the west and the Maria Theresa Reef on the east. In the central part of the ocean are the Belknap, Miller, and Hilgard deeps. The deepest sounding—5269 fathoms—was made in 1900 off the island of Guam by the United States ship *Nero*. A sounding of 5155 fathoms and another of 5147 fathoms have been made north of New Zealand. These depths are much greater than have been found in any other ocean. The most extensive plateau in the Pacific lies southeast of New Guinea and includes the Solomon, Ellice, Fiji, and Tonga islands, while a southern arm extends from the last-named group to New Zealand. The bottom within this area rarely exceeds 2000 fathoms

in depth and much of it is less than 1000 fathoms. Other plateaus are occupied by the Marshall and Gilbert groups, by the Caroline Islands, the Low Archipelago, and Hawaii. A broad continental shelf extends along the eastern coast of Asia, but the western shores of America slope abruptly to the ocean floor. The mean depth of the Pacific is estimated at 2300 fathoms.

The proportion of land drained into the Pacific is insignificant when compared with the drainage received by the Atlantic. Its basin includes the generally narrow strip of the American continent to the west of the Rocky Mountains and the Andes, Melanesia, the Indo-Chinese States, China, a small part of Siberia, and eastern Australia.

WINDS. In the trade wind belts of the Pacific the winds are generally quite uniform except when such belts approach the western coasts, where they are more or less modified by monsoon influences. In Polynesia hurricanes called typhoons are of frequent occurrence. North and south of the tropical zone the winds exhibit little regularity, being found to blow from all points of the compass during any given season of the year, though a westerly direction is most frequent. On the southern part of the coast of South America and the northern part of the coast of North America west winds prevail during the greater part of the year. In the Chinese seas the typhoon may occur at all seasons of the year.

CURRENTS. The currents of the Pacific Ocean are less marked in character than those of the Atlantic. In a general way the movement and direction of these currents follow the prevailing winds. In the northern trade wind belt a great equatorial current sweeps westward until at the western side it is largely deflected northward to the belt of westerly winds, where it flows north-eastward as the Kuro Shiwo, or Japan Current, toward North America. A part of it subsequently turns southward along the American coast until it joins the equatorial current again; thus the surface drift of the northern Pacific Ocean constitutes a great eddy revolving slowly in the N.E.S.W. direction. In the southern Pacific a similar surface drift in the opposite direction, namely, north, west, south, east, is maintained, though not as well defined, because of the absence of the circumscribing continents. In the more quiet waters at the centres of these great eddies are the Sargasso or masses of floating seaweed, but these regions are very small compared with the large Sargasso Sea of the North Atlantic Ocean.

ISLANDS. The larger islands, with the exception of New Zealand, lie upon the continental shelf. The numerous small islands which rise out of great depths are one of the distinctive features of the Pacific. Most of these are of volcanic character, and in the equatorial region they are frequently surmounted by coral reefs. Consult Thomson and Murray, *Report of the Challenger Expedition* (London, 1880-95). See OCEAN.

PACIFICUS. The signature used in 1793 by Alexander Hamilton in a series of letters on neutrality. Madison replied to the letters in a number of essays signed *Helvidius*.

PACINI, pā-chē'né, FILIPPO (1812-83). A prominent Italian anatomist. He was born in



1 INDIAN ELEPHANT - *Elephas indicus*
2 INDIAN RHINOCEROS - *Rhinoceros unicornis*
3 HIPPOPOTAMUS - *Hippopotamus amphibius*

Pistoia, studied medicine in Florence and Pisa, and became professor of anatomy at Florence. At twenty-three he made himself famous by discovering the peripheral nerve terminations which are called the 'corpuseles of Pacini' (or 'of Vater,' if the claim of the latter be considered). Pacini wrote much on anatomy, especially microscopic, and on pathology and therapeutics. His more important monographs include those on artificial respiration (1867, 1876, 1877, sqq.), which describe 'Pacini's method,' one of especial value in resuscitating asphyxiated new-born children.

PACINI, GIOVANNI (1796-1867). An Italian composer and teacher, born at Catania, and pupil of Marchesi and Furlanetto. His first opera, *Annetta e Lucinda*, was produced in 1813, and this was followed by forty-two operas during the subsequent twenty years. He was invariably successful, and was able to command the best theatres and artists in Italy. When one of his operas failed, he retired from the field of composition and devoted himself entirely to teaching, his school of music at Viareggio winning world-wide repute. His best work was done after 1840, the list of his compositions including about ninety operas, cantatas, masses, etc., besides numerous musical monographs and articles for musical periodicals. *Medea* (1843), *Saffo* (1840), and *Le regina di Cipro* (1846) are regarded as his best works. He died at Pescia.

PACINOTTI, pā'chè-nōt'tè, ANTONIO (1841—). An Italian physicist and electrician. He was born and educated at Pisa, taught there for two years, and at Bologna (1864-73), and, after nine years in the University of Cagliari, in 1882 became professor at Pisa. He is best known for his invention in 1860 of a dynamo in which the coils of the armature were wound on a ring. Subsequently the same device was independently discovered by Gramme, and was brought into extensive use in his machines.

PACK'ARD, ALPHEUS SPRING (1798-1884). An American educator. He was a graduate of Bowdoin College, where he was tutor from 1819 to 1824, and professor of the Greek and Latin languages and literatures from 1824 to 1865. He became Collins professor of natural and revealed religion, and librarian in 1869, holding both offices until his death. During the last two years of his life he was acting president of the college. He edited and was joint author (with Nehemiah Cleaveland) of *The History of Bowdoin College, with Biographical Sketches of Its Graduates* (1882). He also edited: *Works of the Rev. Jesse Appleton, with a Memoir* (1836-37); *Xenophon's Memorabilia of Socrates, with English Notes* (1839; 3d ed. 1843); and contributed many articles to various periodicals.

PACKARD, ALPHEUS SPRING (1839—). An American naturalist, born at Brunswick, Maine. He graduated at Bowdoin College in 1861 and at the Maine Medical School in 1864, and studied under Agassiz in the Lawrence Scientific School, Harvard University. In 1865-66 he was librarian and custodian of the Boston Society of Natural History; in 1867-78 curator and afterwards director of the Peabody Academy of Science, Salem; and in 1871-73 State entomologist of Massachusetts. From 1877 to 1882 he was a member of the United States Entomological Commission. In 1878 he was appointed professor of

zoölogy and geology in Brown University. His chief work has been the classification and anatomy of arthropod animals, and contributions to economic entomology, zoögeography, and the phylogeny and metamorphoses of insects. In systematic zoölogy he proposed a new classification of the insects; a new grouping of the chief branches (phyla) of arthropods; a new order and several families of fossil merostomes, and the crustacean orders Phyllocarida and Syncarida. In comparative anatomy he discovered the brick-red renal glands of *Limulus*, the origin of the ovipositor, and that of the spiral thread of the tracheæ. His publications include: *Guide to the Study of Insects* (1869); *The Mammoth Cave and Its Inhabitants* (with F. W. Putnam, 1872); *Life-History of Animals* (1876); *Insects Injurious to Forest and Shade Trees* (1890); *A Naturalist on the Labrador Coast* (1891); *A Text-book of Entomology* (1898); *Lamarck, the Founder of Evolution: His Life and Work* (1901).

PACKARD, JOHN HOOKER (1832—). An American surgeon, born in Philadelphia. He graduated at the University of Pennsylvania in 1850, and at the Medical School there in 1853. During the Civil War he was attached to the Christian Street and Satterlee army hospitals, with the rank of assistant surgeon, U.S.A. From 1863 until 1884 he was surgeon to the Episcopal Hospital, and from the latter date until 1896 he filled a similar position at the Pennsylvania Hospital. His publications include the translation of *Malgaigne on Fractures* (1859); *Manual of Minor Surgery* (1863); *Handbook of Operative Surgery* (1870); and *Sea Air and Sea-bathing* (1880).

PACKARD, JOSEPH (1812-1902). An American clergyman, of the Protestant Episcopal Church, born at Wiscasset, Me. He graduated at Bowdoin College in 1831, was a professor in Bristol College (Pa.) in 1834-36, and was ordained priest in 1837. From 1836 until his retirement as professor emeritus in 1890 he was professor of sacred literature in the Protestant Episcopal Theological Seminary of Virginia, near Alexandria. He was a member of the American committee for the revision of the Bible in 1872-85, contributed largely to Church periodicals, edited *Malachi* in the translation of J. P. Lange's Commentary (1874), and published *Questions on the Gospels* (1855).

PACKARD, LEWIS RICHARDS (1836-84). An American classical scholar, born in Philadelphia, Pa. He graduated at Yale in 1856, studied further at Berlin University, in 1863 was appointed assistant professor of the Greek language and literature at Yale, and in 1866 full professor. In 1883 he was the second director of the American School of Classical Archaeology at Athens. With J. W. White and T. D. Seymour he was editor of the *College Series of Greek Authors*, of which one volume, the *Clouds of Aristophanes*, appeared in 1885. A collection of his lectures and essays was published in 1896 as *Studies in Greek Thought*.

PACKARD, WILLIAM ALFRED (1830—). An American classical scholar, born at Brunswick, Me. He graduated at Bowdoin in 1851, studied at Göttingen in 1857-58, and was appointed professor of the Latin language and literature in Princeton University. In addition to contribu-

ting to the *Presbyterian Review* and the *Princeton Review*, he revised the translation of Curtius's *Griechische Geschichte*, with translations from a later German edition.

PACKER, ASA (1806-79). An American capitalist, born at Groton, Conn. In 1822 he went to Pennsylvania, and eleven years later undertook the charge of one of the first boats on the Lehigh Canal. He became contractor for the building of locks and of boats for the transportation of coal from Pottsville to New York. He projected and completed (1855) the Lehigh Valley Railroad from Mauch Chunk to Easton. In 1844 he served in the Pennsylvania Legislature, and from 1853 to 1857 was a Democratic member of Congress. Having amassed great wealth, he gave liberally to charities, and founded and endowed Lehigh University (q.v.), Bethlehem, Pa., in 1866.

PACKER COLLEGIATE INSTITUTE. A school for girls in Brooklyn, N. Y., chartered in 1853, replacing the Brooklyn Female Academy, destroyed by fire in 1852. The new school was founded on a gift of \$65,000 by Mrs. Harriet L. Packer. It has primary, preparatory, academic, and collegiate departments. The attendance in 1902 was 587, including 110 collegiate, 261 academic, 180 preparatory, and 36 primary students, and the faculty numbered 49. The institute has thoroughly equipped buildings, valued in 1902 at \$222,047, the total valuation of its property being \$277,860. The library contained 8479 volumes.

PACKING INDUSTRY. The slaughtering of cattle, sheep, and hogs, and the utilization of their carcasses is an important industry in many American cities, especially in the middle West. The choicer parts of the animals are shipped in refrigerator cars and vessels to the markets of this country and Europe for consumption as fresh meat, while other parts, especially in the case of the hog, are *cured*, by smoking or salting. The fatty portions are converted into lard and commercial grease by rendering processes. (See **DIGESTER**.) The bones are converted into glue or fertilizers, and the hoofs and horns (see **HORN**) are used or sold for other purposes. The term *packing industry*, which was originally applied to the curing and packing of the flesh of the hog, has been extended, with the development of the industry, to include all the multitudinous operations connected with the utilization and transformation into merchantable form of the different parts of animals slaughtered for food, in so far as these operations are conducted in a single plant.

The history of the packing industry begins in New England, in the seventeenth century, where large quantities of pork were packed in barrels for foreign trade. The first packing house in the West was established in Cincinnati in 1818. Cincinnati continued to lead in the industry for many years, but is now surpassed by Chicago, while in many other Western cities, including Milwaukee, Kansas City, Saint Louis, and Omaha, the industry has risen to great importance. Prior to 1872 most of the slaughtering was done during the winter months. About this time chilling processes began to be developed, which have since been brought to such a state of perfection that animals are killed and their products prepared for the market with equal

success and in equal amounts in mid-winter and in 'dog-days.' Indeed, the development of the packing industry is largely due to the application of artificial means of refrigeration (q.v.), for at the foundation of all successful meat-curing is the thorough chilling of the carcass.

Before cold storage of meat was introduced, it was customary to ship the living animals to Eastern markets, and the long and tiresome journey was both cruel to the animals and harmful to the meat. Now the meat, after thorough chilling, is shipped in refrigerator cars to Eastern cities and placed in cold-storage warehouses owned by the packing company, from which it is delivered to local dealers, or if it is to be delivered in Europe, it is transferred directly from the refrigerator cars to specially constructed chill-rooms in the ocean steamers, to be delivered in London, Liverpool, or Glasgow.

Labor-saving devices have been adopted at every step in the packing industry. The animals are killed, "hooked by the nose to an endless chain, passed through scalding vats, and then through an automatically adjusted scraper which deprives them of hair and bristles in a few seconds. The animals are then hoisted, head down, upon an inclined rail and disemboweled, beheaded, washed, trimmed, and whirled to the chill-rooms at the rate of twenty a minute." In dressing hogs, about 20 per cent. is offal and the rest is used as meat, of which only about 10 per cent. is sold as fresh meat. The other parts are cured, usually by pickling in brine for seven or eight weeks, and then smoking for twenty-four hours. The most profitable part of the industry is the manufacture of sausage. The meat used is chiefly trimmings, which are obtained from all parts of the establishment, a large part of them being head and hoof trimmings. The meat is chopped, mixed with potato flour and water, in the proportion of 40 per cent. meat, 40 per cent. potato flour, and 20 per cent. water. Certain spices are also added, including sage, pepper, salt, ginger, and mustard. The intestines, which are used for sausage casings, are cleaned by machinery. They are filled with the sausage by means of a stuffing machine, which consists of two cylinders, the steam cylinder and the stuffing cylinder, and a piston rod directly connected with the piston rod of the steam cylinder. The sausage casings are slipped over a tube attached to the open bottom of the stuffing cylinder, and through this orifice the casings are filled at a rapid rate.

Another important part of the pork-packing industry is the manufacture of lard (q.v.). Two grades of lard are made—leaf lard and steam lard. In the leaf lard of commerce, not only the pure leaf, but all sorts of trimmings from the belly of the animal are used. Steam lard is made from scraps taken from all parts of the animal, particularly from the feet, or even the feet themselves and the head bones.

In dressing cattle, the parts intended to be sold as fresh beef are allowed to cool for forty-eight hours and then shipped. In the canning of fresh beef, inferior meat is used, either poorer grades of cattle or poorer cuts. Since 1891 the whole packing industry has been under vigilant Government inspection.

STATISTICS. According to the twelfth census of the United States, \$189,194,264 were invested in the packing industry in 1900. The annual

value of the product was \$785,562,433. Since 1850 the number of establishments had increased from 185 to 921; the number of laborers employed from 3276 to 68,534; and the average yearly wages per laborer from \$376 to \$488. The detailed figures published show that in Eastern cities, as Boston, New York, Newark, there has been a decided falling off in the business, while in certain cities of the Middle West, as Saint Joseph, Mo., there has been a more than correspondingly marked increase. This is due to the tendency to conduct the business nearer the centre of cattle-raising, which is, of course, the great corn belt of the Middle West and the pasture lands still nearer the Rockies. The accompanying table shows the exports of this industry in 1900.

MEAT PRODUCTS EXPORTED FROM THE UNITED STATES IN THE YEAR 1900

(Taken from the Statistical Abstract for 1900)

	Pounds	Dollars
Beef products—		
Canned beef.....	65,553,745	5,233,982
Fresh beef.....	329,078,699	20,643,830
Salted or pickled beef.....	47,306,513	2,697,340
Other cured beef.....	2,319,165	197,051
Tallow.....	89,030,943	4,398,204
Hog products—		
Bacon.....	512,153,729	38,975,915
Hams.....	196,414,412	20,416,367
Pork, canned.....	8,496,074	658,402
Fresh pork.....	25,946,905	1,925,772
Salted or pickled pork.....	133,199,683	8,243,797
Lard.....	661,813,663	41,939,164
Lard mixtures and substitutes (cottolene, lardine, etc.).....	25,862,685	1,475,064
Casings for sausages.....		2,307,571
Mutton.....	773,760	64,313

NUMBER OF HOGS, CATTLE, AND SHEEP KILLED IN VARIOUS YEARS IN THE LOCALITIES NAMED

(From *One Hundred Years of American Commerce*)

HOGS PACKED IN THE WEST

YEAR	Summer	Winter	Total
1844-45.....			790,000
1849-50.....			1,652,000
1854-55.....			2,124,000
1859-60.....			2,351,000
1864-65.....			2,423,000
1869-70.....			2,635,000
1874-75.....	1,200,000	5,566,000	6,766,000
1879-80.....	4,061,000	6,950,000	11,001,000
1884-85.....	4,059,000	6,460,000	10,519,000
1889-90.....	6,881,000	6,664,000	13,545,000
1894-95.....	8,812,000	7,191,000	16,003,000

CATTLE KILLED IN FOUR WESTERN CITIES

YEAR	Chicago	St. Louis	Kansas City	Omaha
1871-75.....	190,000	104,000	37,000	
1876-80.....	411,000	165,000	60,000	
1881-85.....	864,000	182,000	82,000	10,000
1886-90.....	1,696,000	210,000	341,000	170,000
1890-94.....	2,228,000	303,000	756,000	460,000

SHEEP KILLED IN FOUR WESTERN CITIES

1871.....	261,000
1880.....	405,000
1890.....	1,621,000
1894.....	3,564,000

BIBLIOGRAPHY. The twelfth census contains many statistics, and also a good account of slaughtering and meat-packing methods in the United States. Consult, also, Philip Armour's description of the industry in Depew, *One Hun-*

dred Years of Commerce in the United States (New York, 1895).

PACK-SADDLE. Contrivances for the transportation of materials, whether of merchandise or military stores, by means of pack-animals. The pack-saddle in most general use consists of crossed sticks, fastened to saddle-bars of long bearing. In the United States Army pack-animals are usually supplied with the aparejo (q.v.). Ammunition mules are equipped with pack-saddles, specially adapted for the carrying of ammunition boxes, which are placed in such a way as to admit of easy access when the animal is employed in supplying troops in action. See illustration accompanying MOUNTAIN ARTILLERY.

PACTOLUS (Lat., from Gk. Πακτώλος, *Paktōlos*). The ancient name of a small brook of Lydia, in Asia Minor (now called Sarabat), which rises on the northern slope of Mount Tmolus. It flows northwest past Sardis (Sart) and empties into the Gulf of Smyrna. It is nowhere more than ten feet broad and one foot deep. The sands or mud of Pactolus once contained a good deal of gold, and were regarded as the source of Cræsus's vast wealth; but as early even as the time of Strabo, Pactolus had ceased to yield any of the precious dust.

PACU'VIUS, MARCUS (c.220-c.132 B.C.). A Roman writer of tragedies. He was born at Brundisium, Italy. Returning to Rome, he soon acquired fame by his skill in poetry and painting. One of his pictures was hung in the Temple of Hercules in the Forum Boarium at Rome. His finest works were his tragedies, which showed eloquence and refinement. Fragments of thirteen of these, as well as of a *proetexta*, or tragedy, with a typically Roman plot, have been preserved. These have been collected by Ribbeck, *Scenice Romanorum Poesis Fragmenta* (Leipzig, 1897).

PADANG, pa-däng'. The capital of the Dutch possessions on the west coast of Sumatra. It is situated amid picturesque mountain scenery near the centre of the west coast (Map: East Indies, B 5). Its Malay inhabitants live mostly in bamboo huts, but the Europeans and Chinese have well-built houses of stone and wood, and there are several churches, schools, a hospital, large warehouses, and Government workshops. The town is the terminus of a railroad line into the interior, and has a lively trade with Java and the other East Indian islands as well as with Europe, exporting coffee, nutmegs, copra, tobacco, gum, cane, and hides. It is the station of a United States consular agent. Population, in 1895, 32,038.

PADDLE. A wooden implement with a wide flat blade at one end or both, used by canoeists in place of oars. It is held in the hands, not rested in a rowlock, and is dipped into the water with a nearly vertical motion. The double-bladed paddle is frequently used in canoes, though many sportsmen prefer the single blade, which is worked over one side of the canoe, the steering being accomplished by giving a particular twist to the paddle at the end of each stroke. The fact that the paddler faces the bow of his boat is frequently an appreciable gain, especially in threading narrow streams. See CANOE.

PADDLE-FISH (so called from the form of the snout). A fish (*Polyodon spathula*) of the

Mississippi River and its tributaries, which has the general appearance of a rather slender cat-fish, but is a ganoid with a skeleton chiefly cartilaginous. It is about five feet long, has a smooth dark-green skin without scales, and a long bony snout containing fine teeth, with which it digs up the mud at the bottom of sluggish streams in search of the minute animals upon which it feeds. It has much the habits of a cat-fish, but inferior flesh, and is known as the 'duck-billed' or 'spoon-billed' cat, or 'spade-fish,' both names referring to the spatulate form of its snout. It represents the order Selachostomi of the subclass Teleostomi and the family Polyodontidæ, and is closely allied to the sturgeons. A similar species inhabits China. See Plate of STURGEONS, ETC.

PADDLE-WHEEL. An appliance in steam-vessels by which the power of the engine is made to act upon the water and produce locomotion. It consists of a skeleton wheel of iron, on the outer portion of whose spokes flat boards, called floats or paddles, are fixed, which beat upon the water, and produce, continuously, the same effect as is given, in an intermittent manner, by the blades of oars. The use of paddle-wheels in conjunction with steam as a motive power dates from about the commencement of the nineteenth century, but the employment of the paddle-wheel itself is as ancient as the time of the Egyptians. A specimen is also known to have been tried in Spain in the sixteenth century.

In the usual form of paddle-wheel, called the radial, the floats are fixed, and it will be seen that a certain loss of power is involved, as the full force of the engine on the water is only experienced when the float is vertical, and as on entering and leaving the water the power is mainly employed in depressing or lifting the particles of water. This resistance has great force at the moment of starting, or when progress is very slow, as is illustrated by the small power a paddle-steamer evinces when trying to tug a stranded vessel off a sandbank; but when in full progress, the action is less impeded by this circumstance, the water in front of the wheel being depressed, and that abaft being thrown into the form of a wave. The extent of the immersion much influences the economy of power, as will be readily understood if the consequences of immersion up to the centre of the wheel be imagined. An immersion somewhat over the top of the lowest float is about the most advantageous, and, in order that the floats may be as nearly as possible vertical when they strike the water, it is advisable to give the wheel as large a diameter as possible, and to place the axis at the highest available point in the vessel.

To overcome the drawbacks to the radial wheel, there was devised early in the nineteenth century the *feathering paddle-wheel*, in which the floats are mounted on axes, and are connected by rods with a common centre, which revolves upon a pin placed eccentrically to the axis of the paddle-wheel. By this method the floats are kept, while immersed, at right angles to the surface of the water. So long as the water is smooth the gain is great, consequently feathered floats are much used in river-steamers. Paddle-wheels have been almost entirely superseded by screw propellers (see SCREW PROPELLER) on all vessels except river and lake boats. See STEAM NAVIGATION.

PAD'EMEL'ON (Australian name). A small wallaby or kangaroo (*Halmaturus thetidis*) of New South Wales. It inhabits scrubby districts, and is hunted both for its flesh and its hide. Several other species in Australia, New Guinea, and Tasmania belong to this genus, which is characterized by the absence of hair on the muffle.

PADERBORN, pã'dër-börn. A town in the Province of Westphalia, Prussia, situated at the source of the Pader (hence the name of the town), about 15 miles southwest of Detmold (Map: Prussia, C 3). It has a modern aspect, a considerable part having been rebuilt since the conflagration of 1875. The cathedral, built above the source of the Pader mainly in the thirteenth century, and which contains parts of the original twelfth-century structure, underwent complete restoration in 1891-93. It is Gothic in style and contains among other treasures the silver coffin of Saint Liborius, which was substituted for the original one coined into dollars by Duke Christian of Brunswick in 1622. The Busdorkirche, of the fourteenth century, and the Rathaus, dating from the fifteenth century, and recently restored, are noteworthy buildings. The chief educational institutions are a gymnasium, an institute of theology and philosophy (taking the place of the university, which was closed in 1819), seminaries for priests and teachers, and a *Realschule*. The town has railway shops, manufactures of glass, soap, and tobacco, distilleries, flour mills, etc., and carries on some trade in fruit, cattle, and wool. In the vicinity are mineral springs of considerable reputation. Population, in 1890, 17,986; in 1900, 23,502, chiefly Roman Catholics. Paderborn first came into notice when Charlemagne held a diet there in 777, and eighteen years later nominated the first bishop. It was surrounded with walls in the eleventh century, and in the Middle Ages enjoyed considerable political independence as a member of the Hansa. For its early adoption of Reformation principles it was forcibly deprived of its privileges in 1604 by the Prince-Bishop Theodore of Fürstenburg. The bishopric, founded in 795 by Charlemagne, was secularized in 1802. Consult Richter, *Geschichte der Stadt Paderborn*, vols. i., ii. (Paderborn, 1899-1903).

PADEREWSKI, pã'de-rëf'skë, IGNACE (1859—). A famous Polish pianist and composer. He was born in Podolia, Russia. When only three years of age he showed great fondness for music, and at seven was placed under a teacher, making such rapid progress as a pianist that in five years he gave public recitals. He studied under Raguski at the Warsaw Conservatory, in which he became himself a professor at the age of eighteen. In 1884 he accepted a similar position at Strassburg, and in 1887 made his formal début in Vienna, and was at once placed in the foremost rank of pianists. In 1890 he created a furor in London by his marvelous playing, and in 1892, 1893, 1895-96, and 1899 appeared in the United States. As a virtuoso pianist Paderewski must be placed among the very greatest performers that the world has yet seen. His pronounced individuality, his freedom from affectation, together with a vivid appreciation of tone gradations and values, a wonderful technique and mastery of the pedal, and a singularly intel-

tual conception and interpretation of the great masterpieces of his repertoire, easily determine him as the greatest pianist of his day and generation. For his three months' season in the United States in 1895-96 he received the net sum of \$200,000, and he gave to specially appointed trustees, for a fund to encourage American composers, \$10,000. In 1902 he again visited the United States and personally conducted his opera, *Manru*, which met with an enthusiastic reception. His works, consisting largely of compositions for the piano, have become widely known; they include: *Prélude and Minuet*; *Elegie op. 4*; *Danses polonaises*; chamber music; songs; and the grand opera *Manru* (1900).

PADIHAM, pād'ī-ham. A town in Lancashire, England, on the Calder, 4 miles northeast of Accrington. Its industries comprise cotton mills, collieries, and stone quarries. Its parish church dates from the fourteenth century; it has an anciently endowed national school. Population, in 1891, 11,300; in 1901, 12,200.

PADILLA, pā-nē'lyā. The capital town of the Department of Chuquisaca, Bolivia, 90 miles northeast of Potosí (Map: Bolivia, E 7). It received its name in memory of the patriot guerrilla Manuel Ascencio Padilla, who met his death in the battle of Villar, September 14, 1816. Its population is about 4000.

PADILLA, JUAN DE (1484-1521). A popular hero of Spanish history. He came of a noble family of Toledo, was commandant of Saragossa in 1518, and administrator of his native city in 1520. While he was so employed, a formidable rebellion, caused by the excessive taxes which the Emperor imposed on the Spaniards to defray the cost of his various wars in Italy, Germany, and the Low Countries, broke out among the towns (*comunidades*) of Castile, and the rebels, who were known as *comuneros*, called upon Padilla to put himself at their head. Padilla for a short time was all-powerful, and formed a new junta to carry on the government. He was successful in a number of enterprises undertaken against the Royalist party, but on April 23, 1521, was completely beaten by the Royalists at Villalar. This conflict decided the fate of the rebellion, and of Padilla himself, who was taken prisoner, and on the following day beheaded.

His wife, MARIA PACHECO, rallied the wrecks of the rebel army, and for a long time held the castle of Toledo against the Royalist army, and after its fall in February, 1522, retired to Portugal, where she died in 1531. The deeds of Padilla and his wife have often been celebrated in Spanish song.

PADISHAH, pā'dē-shā' (Pers. *pādishāh*, king, from *pād*, Skt. *pāti*, master, protector, from *pā*, to protect + *shāh*, OPers. *xšāyathiya*, king, connected with Av. *xšā*, Skt. *kṣi*, to rule). One of the titles of the Sultan of the Ottoman Empire and of the Shah of Persia. Formerly this title was accorded only to the kings of France among European monarchs. It was subsequently allowed to the head of the House of Austria, and still later, by a special article in the treaty of Kutchuk-Kainar (1774), to the Autocrat of All the Russias. Of late it has been accorded to the monarchs of all the great European nations, and even to those of secondary States.

PADOVANINO, pā'dō-vā-nē'nō, IL. The name commonly applied to the Venetian painter Alessandro Varotari (q.v.).

PADUA. The capital of the Province of Padua, Italy, situated 22 miles by rail west-southwest of Venice (Map: Italy, F 2). Several arms of the Bacchiglione, here canalized, flow through the city and are crossed by a number of old Roman bridges. The city lies in a compact shape in one of the richest gardened plains of Italy. The ancient, narrow, crooked streets are generally arcaded. The arcades, however, are being removed gradually to accommodate the increasing traffic. There are seven city gates.

The cathedral is of no particular interest, but its baptistery is a handsome brick conception of the twelfth century. The fine and immense San Antonio Church is identified with Saint Anthony, the patron saint of the city. It dates from the middle of the thirteenth century, and was restored about 500 years later. The saint is entombed here. The edifice has six domes, and is fashioned after the Byzantine Saint Mark's of Venice, with Gothic features added. The most valuable of its numerous contents are a monument by Al. Vittoria; a collection of goldsmith's work of the Renaissance period; a bronze candelabrum by A. Riccio, by whom are also valuable biblical reliefs in bronze; the high altar by Donatello; the exquisite white and gold decorations on the ceiling; the ambitious Renaissance Cappella del Santo; and a Madonna by A. Bosselli. Before San Antonio stands Donatello's splendid equestrian bronze statue of the Venetian General Gattamelata.

Another fine church is the spacious Santa Giustina, begun by Riccio. Its façade is brick, with one of the many noble flights of stairs for which Padua is famous. Domes and cupolas add to the impressiveness of the edifice. In the interior are the fine "Martyrdom of Saint Justina" by Veronese, and handsome choir stalls. The adjoining cloister is used as barracks. In the northeastern part of the city are the Madonna dell' Arena and the Eremitani. The former is a fine chapel dating from the beginning of the fourteenth century. It is situated in an attractive garden, and is remarkable for its frescoes by Giotto, most of them in a good condition. The Augustinian Eremitani, dating from the thirteenth century and restored in 1880, contains scarcely less valuable and important mural paintings by Mantegna and other members of the school of Squarcione. The Mantegna pictures were painted between 1450 and 1460, the life of Saint James furnishing a part of the subjects. There are also found here, in the sacristy, a "Pieta" by Canova, and a "John the Baptist" by Guido Reni.

Among the notable palaces of Padua is the Palazzo della Ragione, belonging to the twelfth century, with a vast mediæval hall (Salone) 273 feet long, 90 feet wide, and 78 feet high. Donatello's celebrated wooden horse is here. The Loggia del Consiglio is a charming example of the early Renaissance—an arcade reached by majestic stairs. In the vicinity are found a statue of Victor Emmanuel II. and a column bearing a Lion of Saint Mark. Padua possesses also a monument to Petrarch, modern statues of Dante and Giotto, both by Vela, a bronze monument to Cavour, and a statue of Garibaldi. The Scuola del Santo, occupied by the Brotherhood

of Saint Anthony, has three fine mural paintings by Titian. The chapel San Giorgio near by has numerous excellent frescoes by Altichieri and J. Avanzi. Among the objects of interest in the city is Dante's house, in front of which is an ancient tomb, containing, according to tradition, the ashes of Antenor, the legendary founder of Padua.

On the Via dei Servi, the main business street, stands the university (q.v.), far famed as a seat of learning in mediæval times. It occupies an edifice known as Il Bò, distinguished by a court with attractive colonnades. Padua has a celebrated café, the Pedrocchi, almost entirely of marble, with noble halls and columns, the scene of student uprisings against the Austrians. The municipal museum, in a building reconstructed in the latter part of the nineteenth century by Boito, has an attractive façade, and contains the city library (110,000 volumes), the picture gallery, archives, and an interesting monument of the Volumni. The picture gallery is not important. Its best work is Romanino's Madonna—an altar piece. In the southern part of the city lies the spacious Piazza Vittorio Emanuele, beautified with trees and embellished with the statues of eighty-two celebrated persons who have been associated with the city. Some of the marbles are by Canova. The piazza is the lively scene of the annual fair which commences on Saint Anthony's festival, June 13th.

The Botanic Garden of Padua, which is connected with the university, is well known as the oldest in Europe, having been established by the Venetian Republic in the middle of the sixteenth century. It has some exotic trees which have long been celebrated, and are associated with certain of Goethe's scientific investigations here. Also connected with the university are an observatory and a large and valuable library. There are in the city an archiepiscopal seminary, a lyceum and other high schools, a technical industrial school, an agricultural school, an industrial art school, and a silk-worm breeding institution. The industries of Padua include foundries, farm machinery works, an automobile factory, chemical factories, distilleries, etc. The city is the centre for the trade of Venetia, cattle, wine, oil, and grain being chiefly dealt in. It is particularly famous for its fruit. Canals connect Padua with the Adige, the Brenta, and the Adriatic. The population in 1901 was 82,281.

Padua claims its origin from the time of Troy. In the height of Rome's glory it was the most important town in North Italy. It was sacked by the Goths and the Huns. Charlemagne wrested it from the Longobards. In the middle of the thirteenth century it was the capital of the cruel tyrant Ezzelino (IV.) da Romano. Later it was for a time a republic, then passed under the rule of the Carrara family, and became the object of conquest on the part of Venice, to which it fell in 1405, and whose fortunes it afterwards shared. Livy and Mantegna were born here. In art history Padua is prominent. Mantegna shed his glory upon the city, and the influence of the Squarcione school, with which he was associated, is traced all over Northern Italy. Giotto, Donatello, and Fra Filippo Lippi also did much work in Padua. Consult Cappelletti, *Storia di Padova* (Padua, 1875).

PADUA, UNIVERSITY OF. One of the oldest and most famous of European universities. It had its inception in the emigration from the University of Bologna in 1222 of a large number of students owing to difficulties with the town authorities. The School of Martinus for the study of jurisprudence at Padua, however, is mentioned as early as 1190. The restless students found Padua as unaccommodating as Bologna, and in 1228 entered into a contract to emigrate to Vercelli, that commune promising 500 houses for the accommodation of students and other privileges. This contract was only carried out in part, and the university at Padua was not wiped out entirely. At first jurisprudence constituted the principal study, but soon the liberal arts came into vogue. During the tyrannical reign of Ezzelino (IV.) da Romano (1237-59) the university lost its prestige and was almost ruined, but with his death the town endeavored to improve its condition. In 1260 a code of statutes, modelled after those of Bologna, was drawn up, two universities, the Ultramontani and the Citramontani, were established, and the grammatical, rhetorical, and medical studies instituted. In 1263 Pope Urban IV. speaks of the 'Universitas Magistrorum et Sclolarium Padue' as a recognized institution, and in 1264 confirmed the power of the Bishop to confer the licentiate degree. The fame of the university soon rivaled that of Bologna. In 1282 the Paduans attempted to force new statutes, prepared by them, on the university. This was vigorously resisted by the university and Pope Nicolas IV. An attempt was even made to transfer the university to some other place, but the difficulty was settled in 1290. In 1363 Pope Urban V. instituted theology as a *studium generale*. In the same year the first college was founded, the number increasing gradually henceforth. After 1390 the university received many foundations for poor scholars, and in 1390 Francesco Carrara presented it with its first building. In the fifteenth century it far outranked Bologna in renown. Humanism obtained a strong foothold here, and besides the professional studies, mathematics, modern languages, fine arts, and knightly exercises were eagerly pursued. At Padua were established the first botanical garden and anatomical theatre. The university became a favorite place with the Germans, there being, in 1564, 200 of them under the faculty of law. During the seventeenth century the fame of the institution gradually declined. In 1613 the complaint was made that there were only 1400 students. Still there were about 100 annual promotions in jurisprudence. At that period the university was famous for the licentiousness of the students, which hastened the decay of the once flourishing institution. In the beginning of the eighteenth century Augustin Leyser laments its total ruin. Under the Austrian régime, and later under the Italian government, strenuous efforts were made to re-establish the former fame of the university, and its regeneration has proceeded gradually. During the troublous period of 1848-50 the university was closed. In 1902 the University of Padua consisted of the following schools and faculties: (1) law, (2) medical-surgical, (3) mathematical-natural science, (4) philosophy, (5) engineering, (6) pharmacy. The attendance was over 1400. The library contained 136,000 volumes, 64,900



PAESTUM
RUINS OF THE TEMPLE OF NEPTUNE (RIGHT), AND THE SO-CALLED BASILICA

pamphlets, and 2326 manuscripts. The university also includes a number of clinics, an observatory, a botanical garden, and a number of museums. For bibliography, see UNIVERSITY.

PADUCAH, pá-dŭ'ká. A city and the county-seat of McCracken County, Ky., 48 miles east by north of Cairo, Ill., and 165 miles southeast of Saint Louis, Mo.; at the confluence of the Ohio and Tennessee rivers, and on the Illinois Central and the Nashville, Chattanooga and Saint Louis railroads (Map: Kentucky, C 3). It has a United States Government building, hospitals, and public parks. The city is in an agricultural, mineral, and timber region; is the terminus of several river packet lines; controls large lumber and tobacco interests, besides an important wholesale trade; and has extensive manufactures of lumber products, furniture, brick, potter's ware, tobacco, cotton rope, wagon material, flour, and foundry and machine shop products. The building of steamboats is carried on. The government, under a charter of 1893, is vested in a mayor, who holds office for four years, and a council. The school board is independently chosen by popular vote. The electric light plant is owned and operated by the municipality. Paducah was laid out in 1827, incorporated as a village in the following year, and received a city charter in 1856. In September, 1861, it was occupied and fortified by General Grant, and on March 25, 1864, then having a garrison of about 800 men under Hicks, it was unsuccessfully attacked by General Forrest with a force of 5000. Population, in 1890, 12,797; in 1900, 19,446.

PÆ'AN (Lat., from Gk. Πᾶν, *paian*, hymn in honor of Apollo, from Παιάν, *Paian*, Παιών, *Paíōn*, epithet of Apollo). An ancient Greek god of healing. Pæan appears in Homer and later poets down to Æschylus as a personal god, a divine physician, invoked to cure disease and also to avert threatened destruction from other causes. From the middle of the fifth century B.C. we hear little of this god, and Pæan becomes a surname of Apollo, as the averter of disease and destruction. The hymn for deliverance, addressed probably originally to the god Pæan, with its refrain ἦ Παιάν, was also transferred to the worship of other gods, and became the name for a recognized division of the Greek choral lyric poetry. It was sung either in solemn procession or in a stately dance around the altar, especially of Apollo, though sometimes in connection with the worship of Dionysus, Asclepius, and others. We also find the word used to denote a prayer or hymn accompanying the libation at a sacrifice, or sung to the gods with the libation at the symposium or at the marriage feast. As a prayer for safety it was naturally chanted before the battle, and, indeed, before any undertaking where danger was anticipated. The refrain seems also to have become a shout of victory, as expressing thanksgiving for deliverance, and thus the Pæan is also the name for the hymn sung at the processions and the sacrifices in celebration of victory. Consult: Fairbanks, *A Study of the Greek Pæan* (New York, 1900); Usener, *Götternamen* (Bonn, 1896).

PÆ'DOGEN'ESIS. See PARTHENOGENESIS.

PÆONIUS (Lat., from Gk. Παῖνιος, *Paíōnios*). A Greek sculptor of the latter part of the fifth century B.C. He was a native of Mende,

probably the Thracian town, which was settled by Ionians, and is known by his statue of Nike (Victory), executed for the Messenians of Naupactus and erected as a trophy at Olympia, probably about B.C. 420. The statue stood on a triangular pedestal some thirty feet in height, and represented the goddess as in full flight toward the earth. The feet barely touch the pedestal, the support being afforded by the flowing drapery, which in its light folds suggests admirably the rush of the goddess through the air. Pausanias says that Pæonius also made the sculptures in the east pediment of the Temple of Zeus at Olympia, but this seems to be due to a misunderstanding of the inscription on the base of the Nike, in which the artist claims to have been the victor in making the figures on the extremities of the gables.

PAËR, pá-ar', FERDINANDO (1771-1839). An Italian composer, born in Parma. He was appointed chapel-master at Dresden in 1801; Imperial composer to Napoleon in 1807, and was director of the Italian opera at Paris in 1812-27. Besides a number of overtures and cantatas, he was composer of forty-three operas (the best is *Camilla*, 1799), which have long been forgotten. He is of interest more for the part he played in the musical life of his day, as shown by his appointments, and his rivalry with Rossini, his successful competitor for public favor, and for a time a joint conductor with him at the Théâtre Italien. He was granted the cross of the Legion of Honor in 1828; elected to the Academy in 1831; and the year following became conductor of the Royal Chamber music. He died in Paris.

PÆSTUM (Lat., from Gk. Παῖστον, *Paiston*, earlier Ποσειδωνία, *Poseidōnia*). An ancient Greek city of northwestern Lucania in Southern Italy, in the present Province of Salerno. It seems to have been founded under the name Posidonia, by Træzenians expelled from Sybaris, probably not earlier than the latter part of the seventh century B.C. It does not appear prominently in the history of Magna Græcia, but its temples show it must have enjoyed considerable prosperity. About B.C. 400 it was captured by the advancing Lucanians, who, however, allowed the ancient inhabitants to remain, and even to mourn their lost glories at an annual festival. With the rest of the region it submitted to Rome, and in B.C. 273 was made the seat of a colony, but in the time of Strabo was reputed unhealthy, and gradually fell into neglect. In the ninth century the town was sacked by the Saracens, and after that the site seems to have been abandoned, and now is occupied only by a few houses and the fine ruins of three temples, commonly called the Temple of Poseidon, the Basilica, and the Temple of Ceres. They are all important monuments for the history of the Doric style, and are among the best preserved and most impressive examples of Greek temple architecture outside of Athens.

PAEZ, pŭ'As. A mountain tribe of Colombia, occupying about twenty villages in the high Central Cordilleras, westward from Bogota. They are believed to be the principal modern representatives of an ancient group of allied tribes, hostile to the more civilized Chibcha (q.v.), and constituting a distinct linguistic stock. They are hunters and go nearly naked in spite of the cold, but wear hats woven from reeds or bark. They also weave mats and cloth from maguay

fibre, and have some skill in hammering gold into ornaments. They burn the houses in which either a death or a birth occurs. They number about 2000.

PAEZ, JOSÉ ANTONIO (1790-1873). A Venezuelan soldier and political leader, born at Araure in the old Province of Barinas. He was of aboriginal descent, and passed his early life as a herdsman on the llanos of the Apure. On the outbreak of the War for Independence he led a body of his half savage comrades to join the patriot ranks, and soon made his name a terror to the Spaniards. His most important victory was that of Carabobo in 1821, when he defeated the Spanish General Latorre and so assured the independence of Colombia. The next year he was given the chief military command in the Department of Venezuela, and in 1823 drove the Spaniards from Puerto Cabello, their last foothold in the Republic. In 1829 Venezuela, under his influence, seceded from Colombia, and in the following year he was elected its first President. At the end of his term in 1834 he was succeeded by Dr. José Vargas, during whose administration there were two attempts at revolution. Both were quickly suppressed by Paez, who in 1839 again became President and served until 1843. During the war between the Creoles and the colored people in 1846 he was made dictator, but at the conclusion of hostilities declined to become President, and resigned his powers to General Monagas. Scarcely a year later, however, he rebelled against the despotism of his successor, was defeated and captured, and was kept in prison until 1850, when he was allowed to leave the country. After the fall of Monagas, in 1858, he returned to Venezuela, and in 1860 was appointed Minister to the United States. The next year he was made commander of the army, and a few months later was proclaimed dictator. On account of age, he confided his duties to one of his ministers, who grossly usurped his power. The result was an insurrection which spread rapidly until, on June 15, 1863, Paez was forced to resign his office and again go into exile. In 1871 he went to New York, where he passed the last years of his life. In 1888 his remains were placed in the Pantheon at Caracas. Consult: *Autobiografía de General José Antonio Paez* (New York, 1867); Paez, *Public Life of J. A. Paez* (1864); Jones's translation of *The History of South America* (London, 1879), and Guzman Blanco's *Apoteosis de General Paez* (Paris, 1889).

PAGAN, pá-gān'. A town of the Myingyan District, Upper Burma, India, on the left bank of the Irrawaddy River, 92 miles southwest of Mandalay (Map: Burma, B 2). Population, estimated, 7500, chiefly Buddhists. Pagan was the capital of Burma from its foundation in A.D. 847 until 1284, when, to resist the advance of an avenging Chinese army, the Burmese ruler demolished a great part of the city to build fortifications, but finally abandoned the project and fled. The ruins of Buddhist temples and pagodas in every stage of dilapidation occupy an area along the river about 8 miles long by 2 miles broad. The best preserved and most important archaeologically of the temples are the eleventh-century cruciform Ananda, occupying a square of 280 feet and rising to a height of 183 feet; the

Thapinyu, 201 feet high, built in 1100; the Gaudapalin, 180 feet high, built in 1160; and the low quadrangular Bodhi, dating from 1200.

PAGANI, pá-gā'né. A town in the Province of Salerno, Italy, on the Naples-Taranto Railroad, 21 miles southeast of Naples (Map: Italy, J 7). In the Church of San Michele is the tomb of Alfonso de Liguori, founder of the Order of the Redemptorists. There are manufactures of silk and cotton goods and matches. Population (commune), in 1881, 12,780; in 1901, 14,607.

PAGANINI, pá-gā-né'né, Niccolò (1782-1840). A famous violinist, born in Genoa, the son of a poor shopkeeper. Under his father's encouragement the child was early imbued with the ambition to become a great violinist, and formed the habit, which he maintained throughout his career, of incessant practice. He studied at first under Servetto, the leader of the Genoa Theatre, and two years later under Costa, the principal violinist and conductor in the Cathedral at Genoa, with whom he made his greatest progress. Other teachers were Gnecco, Alessandro Rolla, and Ghiretti. He produced his first sonata before he was nine years of age, and was also desired by his teacher to perform every Sunday in church a violin concerto, a practice to which Paganini attached great importance, in that it forced him to the constant study of new music. His first appearance in public was in 1793 at Genoa. In 1795 he went to Parma to become a pupil of Rolla, but there is some doubt whether the arrangement was carried out. About this time he evolved a style of fingering and a method of bowing peculiar to himself. Upon his return to Genoa he composed his first studies, which were of such unheard-of difficulty that he frequently was known to have spent ten or twelve hours practicing a single passage. So far, he had been wholly under the control of his father, whose only thought apparently was as to how far he could turn his son's talent to his own financial advantage; but in 1798, after a very successful concert at Lucca, he threw off parental control and made a tour of Pisa and other places. He was everywhere received with the utmost enthusiasm, and although but a youth, he unfortunately became intoxicated with the license of his life and plunged into all kinds of dissipation, especially that of gambling. Alternate periods of gambling and study, both pursued with equal zeal, reacted dangerously on his naturally weak constitution, with the result that illness frequently prevented his fulfilling engagements. On one occasion he was announced for a concert at Leghorn, but having gambled away his money and pawned his violin, he was compelled to appeal for the loan of an instrument to keep his engagement. In this emergency M. Livorn, a French merchant of Leghorn, lent him his Guarnerius, said to be one of the finest violins in the world. After the concert, when Paganini desired to return the instrument, its owner exclaimed, "Never will I profane the strings which your fingers have touched. That instrument is yours." Paganini used this instrument at all his concerts, and at his death bequeathed it to his native town of Genoa, where it is still preserved in the museum. From 1801 to 1803 he lived in comparative retirement at his home, dividing his attention between composition and the guitar, on which instrument he was very proficient. He took up

his concert tours in 1805, meeting, if possible, with greater enthusiasm than before. He was appointed Court solo violinist at Lucca, at which place he remained until 1808, and then for twenty years made concert tours in Italy. In 1828 he began his tours of other countries, commencing with Austria. His opening concert in Vienna was a complete triumph. The gold medal of Saint Salvator was conferred upon him by the city authorities; from the Emperor he received the title of Court virtuoso, and on all sides he was hailed as the popular hero. A similar success greeted him in Germany (1829) and in France (1831). His first appearance in London was on June 3, 1831, and in the year which followed he appeared in the principal cities of England, accumulating a considerable fortune. He then returned to Paris, but revisited England the following season. The winter of 1833-34 was spent in Paris, during which period he maintained a close intimacy with Berlioz, whom he invited to write a concerto for his Stradivarius viola, a request which resulted in the composition of "Harold en Italie." Four years later Berlioz received from Paganini a present of 20,000 francs as a mark of his admiration. In 1834 he returned to Parma and purchased several properties, in one of which, the Villa Bagona, he made his residence for two years. About this time his health gave signs of a complete breakdown. In 1836 he was persuaded to join some Parisian speculators in the establishment of a casino for music and gambling in the fashionable quarter of Paris. It was opened under the name of the Casino Paganini, but the Government refused to sanction gambling, and the venture proved a failure, with great financial loss to Paganini. The end of his career was rapidly approaching. He journeyed to Marseilles, and from there to Genoa, and shortly afterwards to Nice, in which city he died. His technic in double-stops, left-hand pizzicato, harmonics, and staccato approached the miraculous, while his power and control of tone and the intense passion of his style brought his audiences into instant subjection, so that he swayed them at will. He had many personal eccentricities and numberless tricks of virtuosity. His compositions were comparatively few, and included the following: twenty-four Capricci per violino solo; six Sonate per violino e chitarra; three gran quartetti a violino, viola, chitarra e violoncello (opus 4, 5); Concerto in E \flat (solo part written in D, for a violin tuned a semitone higher; opus 6). Consult: L'Héritier, *Notice sur le célèbre violiniste Niccolò Paganini* (Paris, 1830, Eng. trans., London, 1830); Schottky, *Paganini's Leben und Charakter* (Hamburg, 1830); Fétis, *Biographical Notice of Niccolò Paganini* (trans. from the French, London, 1871).

PAGE, Mr. In Shakspeare's *Merry Wives of Windsor*, a gentleman to whom, under the name of Brook, Falstaff boasts of his conquest of Mrs. Page and in consequence becomes a laughing-stock. Page's daughter, Anne, is in love with Fenton.

PAGE, DAVID (1814-79). An English geologist, born at Lochgelly, Fifeshire, and educated at Saint Andrews. His parents had devoted him to the ministry, but he preferred natural science, and worked on a Fifeshire newspaper, besides doing other journalistic work, until 1843, when

the Chambers Publishing Company of Edinburgh first employed him as scientific editor. He was appointed professor of geology in Durham University in 1871. Page's especial claim to fame was his ability as a popular writer on geology; he wrote many excellent text-books, such as: *Rudiments of Geology* (1844); *The Earth's Crust* (1864 and after); *Physical Geography* (1864); and elementary and advanced text-books of geology. It is probable that he contributed to *Vestiges of the Natural History of Creation*.

PAGE, DAVID PERKINS (1810-48). An American educator, born at Epping, N. H. He was educated at the Hampton Academy, and was afterwards principal of a department in Newburyport High School. In 1845 he was appointed first principal of the Albany State Normal School, a post he held until his death. His work, *Theory and Practice of Teaching, or the Motives of Good School Keeping* (1847), remains a valuable work on the subject. The edition of 1886 contains a biography by W. H. Payne.

PAGE, JOHN (1744-1808). An American patriot, born in Rosewell, Va. He graduated at William and Mary College in 1763, sat in the Virginia House of Burgesses, and became a member of the Colonial Council. He was a member of the convention which, in 1776, framed the Constitution of Virginia; at one time was colonel of a militia regiment; was appointed one of the first councilors; was a member of the Committee of Public Safety; and was Lieutenant-Governor of the State. In the course of the war he contributed a large part of his very considerable private fortune to aid the Patriot Party. He was a member of Congress from 1789 to 1797, and in 1802-05 he was Governor of Virginia. Subsequently, until his death, he was commissioner of loans for this State.

PAGE, THOMAS JEFFERSON (1808-99). An American naval officer, born in Gloucester County, Va. He was appointed a midshipman in 1827, and became lieutenant in 1839, and commanded the *Dolphin* against the Chinese pirates. From 1853 to 1860 he was engaged in making surveys of South American rivers. In 1855 he had reached the rank of commodore, but upon the secession of Virginia, resigned from the United States service. He declined the rank of admiral in the Italian Navy, and commanded the Confederate batteries at Gloucester Point, York River, Virginia. He was made commodore in 1862, and was sent to England to superintend the building of two powerful rams on the Mersey, but these were seized by the British Government on the protest of Charles Francis Adams, the United States Minister. In January, 1865, a small iron-clad, built for the Confederacy, was commissioned at Copenhagen and called the *Stonewall*. In this he cruised for some time after the collapse of the Confederacy, but turned her over to the Governor-General of Cuba in return for \$16,000 to pay the crew. Afterwards he engaged in cattle and sheep raising in the Argentine Republic and superintended the building of four gun-boats for the navy of that country. The last twenty years of his life were spent in Florence, Italy. He published *La Plata, the Argentine Confederation, and Paraguay* (1859).

PAGE, THOMAS NELSON (1853—). An American novelist. He was born of old Virginian stock in Oakland, Hanover County, Va. He graduated

from Washington and Lee University and studied law at the University of Virginia. He practiced for some years in Richmond, Va., then after a second marriage moved to Washington, D. C., where he continued to live. Aside from some dialect poetry, his first noteworthy literary venture was the tale *Marse Chan*, published in the *Century Magazine* in 1884, and incorporated, with *Meh Lady* and other stories, in the volume entitled *In Ole Virginia* (1887). This was followed by *Two Little Confederates* (1888); *Befo' de War*, a collection of his early poems together with poems by A. C. Gordon (1888); *On New-found River* (1891); *Elsket* (1891); *The Old South*, a volume of essays (1892); *Pastime Stories* (1894); *Red Rock* (1898), a novel of the Reconstruction period; and *Gordon Keith* (1903). These stories, with very few exceptions, deal with Virginia, present negro character, and are noted for the faithfulness and sympathy with which they depict the courtesy, courtliness, and high spirit of the aristocracy of that State just before, during, and after the Civil War.

PAGE, WILLIAM (1811-85). An American portrait and historical painter. He was born at Albany, N. Y., and in 1819 moved with his parents to New York City. He first studied with F. B. Morse, through whom he entered the Academy of Design. From 1828 to 1830 he studied theology at Andover and Amherst, but returning to art, he took up portrait painting at Albany, and later at New York, where, in 1836, he was made National Academician. His works of this period include portraits of Governor Marey for the New York City Hall, and John Quincy Adams for Faneuil Hall, Boston; "The Holy Family," Boston Athenæum; "The Infancy of Henry IV.," and others. In 1849 he went abroad, residing at Rome and Florence, where he made many fine copies of Titian and painted his celebrated "Venus," the "Flight Into Egypt," the "Infant Bacchus," besides portraits of Robert and Elizabeth Browning and others. In 1860 he returned to New York, and in 1871-73 was president of the Academy of Design. He afterwards painted portraits of Henry Ward Beecher, Wendell Phillips, Charles P. Daly, James Russell Lowell, and General Grant. He published a *New Geometrical Method of Measuring the Human Figure* (New York, 1860).

PAGÈS, pà'zhès'. See GARNIER-PAGÈS.

PAGET, pāj'it, Sir GEORGE EDWARD (1809-92). An English physician and reformer of medical education, born at Great Yarmouth, Norfolk. He studied at Charterhouse School and at Gonville and Caius College, Cambridge, and got his medical education at Saint Bartholomew's Hospital and in Paris. He practiced in Cambridge, and in 1842 his suggestion of bedside examinations for medical students was adopted by the university. Paget represented Cambridge in the General Council of Medical Education (1863 sqq.) and served as its president (1869 and 1874). For the last score of years of his life he was regius professor of physic in Cambridge. Paget wrote little besides papers for the *Lancet*, the *British Medical Journal*, and the *Edinburgh Medical Journal*.

PAGET, HENRY WILLIAM. See ANGLESEY, FIRST MARQUIS OF.

PAGET, Sir JAMES (1814-99). An English surgeon and pathologist, born at Yarmouth. He

became apprenticed there to Charles Costerton, a practitioner, from whom he gained the rudiments of medical knowledge. Having finished his apprenticeship, Paget, in 1834, entered Saint Bartholomew's Hospital, London, where he distinguished himself in his first year by discovering the *trichina spiralis* (q.v.). At the end of his second year he carried off all the honors. He was soon made curator of Saint Bartholomew's Hospital Museum, and in 1839 demonstrator in the hospital. In 1842 he undertook an immense task which resulted in the publication of the *Descriptive Catalogue of the Pathological Specimens Contained in the Museum of the Royal College of Surgeons* (London, 1846-49). He prepared a similar catalogue for Saint Bartholomew's Hospital Museum. From 1847 to 1852 he was professor of anatomy at the College of Surgeons, and during this period delivered the famous lectures on surgical pathology which gave him a wide reputation. He became surgeon to Saint Bartholomew's Hospital in 1861; he was also made sergeant-surgeon to the Queen, surgeon to the Prince of Wales, and in 1871 was made a baronet. His chief works, besides the *Descriptive Catalogue*, were his *Lectures on Surgical Pathology* (London, 1863), which were for many years the standard text-book in England and the United States.

PAGET, VIOLET (pen-name VERNON LEE) (1856—). An English author, who in 1871 settled in Italy. From her we have several novels and many brilliant essays on art and literature. Among her publications are: *Studies of the Eighteenth Century in Italy* (1880); *Belcaro*, a volume of essays (1881); *The Prince of the Hundred Soups*, a fairy tale (1883); *Ottile, an Eighteenth Century Idyll* (1883); *Euphorion*, a collection of essays (1884); *Miss Brown*, a novel (1884); *Baldwin*, philosophical dialogues (1886); *A Puppet Show* (1889); *Hauntings* (1890); *Vanitas* (1892); *Althea* (1893); *Renaissance Fancies* (1895); *Limbo*, a volume of essays (1897); *Genius Loci* (1899).

PAGGI, pà'jè, GIOVANNI BATTISTA (1554-1627). An Italian painter, born in Genoa. He was a pupil of Luca Cambiaso, and lived in Florence twenty years, painting for the Medici. His best works in Florence are "Saint Catharine of Siena," in Santa Maria Novella, and the "Transfiguration," in San Marco. In 1600 he returned to Genoa and there became one of the most noted of the Genoese school. His two pictures in San Bartolommeo, and his "Massacre of the Innocents" in the Palazzo Doria, are good examples of his graceful treatment of sacred subjects. He is less successful as a colorist.

PAGO'DA (Sp. *pagoda*, from Pers. *butkadah*, idol temple, *pagoda*, from *but*, idol + *kadah*, temple; Chinese, *peh-kuh-t'a*, *poh-kuh-t'a*, white bone tower, *pao-t'a*, precious tower, *t'a*, tower, pile). A temple of Eastern Asia, or part of a temple, and generally a tower-like mass of many stories. As the term is European and applied to a non-European building, and as it is in careless popular use without exact significance, it can be said only that the idea generally conveyed by it is that of an Eastern religious tower. Thus an accurate writer describing Buddhist temples in Japan will speak of the hondo or temple proper, the gateway building, and the pagoda; but the

word 'pagoda' is not Japanese. These buildings in Japan are always of wood.

In the magnificent stone-built Buddhist temples of India the pagoda is generally a pyramidal structure raised above a gateway, or above the inner sanctuary; just as in a Christian church there may be a tower at the west end, or one over the crossing, or both. These Indian pagodas are among the most splendid buildings of pure monumental design in the world. The term is also applied to the tope or stupa; but this is clearly unnecessary and should be avoided. See STUPA.

In China a pagoda is often a memorial building and not connected with a temple or a monastery. The most common form is an octagonal tower of many stories, with curved roof, and a piece of roof like that of a veranda surrounding each story. Most Chinese pagodas are built of brick, with no very great architectural pretension, but they are effective in outlines, and their great number in certain parts of the Empire adds a peculiar charm to the landscape. But little archaeological and critical study has been given to them (see CHINESE ART), and the books of recent travelers illustrated with specially taken photographs have added very greatly to our understanding of the great number and variety of them which exist in many of the provinces. Consult the authorities mentioned under CHINESE ART.

PAGO-PAGO, päng'ô-päng'ô, or **PANGO-PANGO**. A splendid natural harbor on the south coast of Tutuila (q.v.), the chief of the Samoan Islands (Map: Australasia, L 4). It was ceded to the United States in 1872 for a naval and coaling station, and during the imbroglio over the local kingship in 1898 was occupied by a United States naval contingent. By the Anglo-German agreement of 1899, it came under the protection of the United States with part of the Samoan group in 1900.

PAHANG, pâ-häng'. The largest of the Federated Malay States (q.v.), situated on the eastern coast of the Malay Peninsula and bounded by the independent native States of Kelantan and Trengganu on the north, the China Sea on the east, the States of Negri Sembilan and Johor on the south, and the protected States of Perak and Selangor on the west (Map: Burma, D 6). Its area is officially estimated at 14,000 square miles. It is a thickly wooded and partly mountainous region traversed by the shallow Pahang River, which is formed by the confluence of the Jelai and the Tembeling. The coast is mostly sandy and indented at the mouths of the rivers, which are accessible only during high tide. The climate is cooler than on the western coast and the soil well adapted for agriculture. The State is noted for its gold deposits, which are successfully worked by European mining companies, electricity being used as the motive power. Tin lodes are extensively worked along the Pahang River. The Malays are chiefly engaged in agriculture, while for mining Chinese are mostly employed. The financial condition of the State is unsatisfactory, but the revenue is gradually increasing. While Pahang is the largest of the Federated Malay States in area, it is the least populated. The census of 1901 gives the population as 84,113, including 134 Europeans, Americans, and Australians, 73,462 Malays and other natives (including 7340 aborigines), 8695 Chi-

nese, and 1227 Tamils and other natives of India. A British resident was first appointed to the Sultan of Pahang in 1888, and the State joined the Federation in 1895. The seat of administration is Kuala Lipis.

PAHARIA, pâ-hä'rê-ä. An alternative name for the Maler, of the Rajmahal Hills in Bengal, one of the northern Dravidian peoples. Farther south in the same region dwell the Mal-Paharias, whose affinities are not very clear. One of the sections of the population of Nepal, speaking a neo-Aryan dialect, is also called Paharia. Some account of the Dravidian Paharia will be found in Dalton, *Descriptive Ethnology of Bengal* (Calcutta, 1872), and the works of a general character relating to the Dravidian peoples. See DRAVIDIANS.

PAHLANPUR, pâ'lan-pöör'. A native State of India. See PALANPUR.

PAHLAVI (pâ'lä-vê) **LANGUAGE AND LITERATURE** (from Pers. *Pahlav*, hero, name of a district about Ispahan, from OPers. *Parθava*, Parthia; cf. Skt. *Pahlava*, Persian). The language and literature of the middle Persian period, extending from the third to the ninth or tenth century A.D. The language is closely akin to Old Persian (q.v.) and Modern Persian (see PERSIAN LANGUAGE), although it stands far nearer to the latter than to the former. In its phonology Pahlavi in the main agrees with modern Persian. The principal divergencies are as follows: Original initial *a*, lost in Persian, is still found in Pahlavi, as Pahlavi *anumid*, Persian *numid*, 'hopeless,' Pahlavi *anāk*, Persian *nāk*, 'evil;' the diphthongs *ē* and *ō* (Indo-Iranian *ai*, *au*, Sanskrit *ē*, *ō*, Avesta *aē*, *ao*) are retained unchanged in Pahlavi, except that in the later period before *m* and *n* they become *i*, *u*, while in Persian they are changed to *ī* and *ū* throughout, as Avesta *daēva*, Pahlavi *dēv* (cf. the Armenian loan-word *dev*), 'demon;' Avesta *raoçah*, Pahlavi *rōz* (cf. the Armenian loan-word *roçik*, 'daily bread'), Persian *rōz*, 'day;' but Avesta *daēna*, Pahlavi *dēn* (cf. the Armenian loan-word *den*), *dīn*, Persian *dīn*, 'creed;' Avesta *haoma*, Pahlavi, Persian *hūm*, 'sacred plant;' original intervocalic *k* and *p* are retained in Pahlavi, but become *g*, *d*, and *b* or *v* in Persian, as Old Persian *badaka*, 'slave,' Pahlavi *bandakān*, Persian *bandagān*, 'slaves;' Old Persian *api*, Pahlavi *āp*, Persian *āb*, 'water;' Old Persian *niyapišam*, 'I wrote,' Pahlavi *nipištan*, Persian *nivištan*, 'to write;' initial *v* remains unchanged in Pahlavi, but in Persian becomes *b* or *g*, as Old Persian *vasiy*, Pahlavi *vas*, Persian *bas*, 'much;' Avesta *vazra*, Pahlavi *vas*, Persian *bas*, 'much;' Iranian *s* is retained in Pahlavi, but becomes *h* in Persian, as Avesta *kasu*, Pahlavi *kas*, Persian *kah*, 'small.'

Like modern Persian, Pahlavi has lost all the nominal inflections excepting the plural ending, as *rūbān*, 'soul,' plural *rūbānān*, and the *i* or *izāfat* which serves to express the genitival and adjectival relations, as *granāk-i ātāš*, 'heat of the fire;' *zan-i pagōhar*, 'nobly born wife.' The other case relations are expressed by prepositions, as *ō ōy gūft*, 'he said to him;' *mahtist pa tanō*, 'greatest in body;' *fratām men marašn*, 'first of men.' Plural adjectives in Pahlavi receive no termination unless they are employed as substantives, and then, as a rule, only if there is no accompanying word to show the plural, as *darvandān*, 'wicked (men),' but *hamāk ān i*

buland kōf, 'all the high mountains,' while the attributive adjective is invariable, as *niūk bādand*, 'they are good.' The comparative and superlative degrees are formed by *-tar*, and *-tām* or *-tāt* respectively, as *hāp*, 'good,' *hāptar*, 'better;' *tag*, 'brave,' *tagatām*, 'bravest;' *kam*, 'few,' *kamist*, 'least.' The pronouns and numerals do not differ essentially from those found in modern Persian. The conjugation is very simple. The active voice alone remains, the passive being periphrastic in its formation. The moods are indicative, imperative, subjunctive (corresponding to the modern Persian precativ), and potential (corresponding to the Old Iranian optative), besides a present, a past, and a future participle, and an active infinitive. The old tenses are the present and preterite; the other tenses, perfect, pluperfect, future perfect, present and perfect conditional, and perfect subjunctive, are periphrastic. The inflection of the verb is almost the same both in Pahlavi and in modern Persian, as may be seen from the following comparative table of the present Pahlavi *darīdanō*, and Persian *darīdan*, 'to tear:'

	PAHLAVI.	PERSIAN.
Singular	<i>darēm</i>	<i>daram</i>
	<i>darē</i>	<i>dari</i>
	<i>darēd</i>	<i>darad</i>
Plural	<i>darēm</i>	<i>darīm</i>
	<i>darēd</i>	<i>darid</i>
	<i>darēnd</i>	<i>darand</i>

From the grammatical sketch just given one might reasonably infer that Pahlavi was one of the easiest of languages. On the contrary, it presents two problems of great difficulty. These are the alphabet and the Semitic forms which abound in the literature, which, though simple if the script were adequate, are often rendered extremely doubtful on account of the meagre alphabetical system. The Pahlavi alphabet, which is read from right to left, is based on an Aramaic script, and is closely related to that of the Avesta (q.v.). There are two varieties, the Chaldean Pahlavi, used only in two of the oldest inscriptions in the language, and the Sassanian Pahlavi, which became with some modifications the literary script, the so-called Book-Pahlavi. This latter alphabet is as follows:

𐭠	𐭡	𐭢	𐭣	𐭤	𐭥	𐭦	𐭧	𐭨
a	b	g	d	f	v	z	h,x	
𐭩	𐭪	𐭫	𐭬	𐭭	𐭮	𐭯	𐭰	
i,y	k	γ	l,r	m				
𐭱	𐭲	𐭳	𐭴	𐭵	𐭶	𐭷	𐭸	
n	s	p,f	č	r,l				
𐭹	𐭺							
š	t							

The ambiguity of these single characters is complicated by the ligatures, as 𐭠𐭡, *am*, 𐭠𐭢, *am*,

hm, *xm*, 𐭠𐭢𐭣, *madamam*, 𐭠𐭢𐭣𐭤, *ahū*, *axū*,

dān, *dhū*, *ahn*, *āxū*, *hāv*, *hān*, *xān*, *zān*, *šva*, *lān*, *dahiān*, *iyāv*, *iyān*, *ikān* or *igān*, *sān*, *yēhō*, etc., of which there are a little more than a hundred, many of which admit of several different read-

ings. The fact must be emphasized, however, that the ambiguity is not so great as it seems at first sight. Since the alphabet is Semitic, the vowels are not written, for initial *a* is a consonant in Semitic grammar, although *i* and *u* may be denoted, as in the Aramaic alphabet, by *y* and *v*. The Semitic words give a peculiar aspect to Pahlavi. They are not loan-words, as is the case with the Arabic element in Persian, but seem to have been logograms, i.e. Semitic words were written, but Iranian words were pronounced. This may not only be inferred from the statement of Ammianus Marcellinus that Shapur II. (c.309-c.379) was called *Saansaan* (i.e. *Shāhān-Shāh*, Old Persian *šāyādiya šāyādiyānām*, 'king of kings'), although his coins bear the Aramaic equivalent, *malkān malkā*, but it is stated positively by Ibn Mukaffa, who flourished about the middle of the tenth century. He says that in their spelling, called *Zavārišn*, one wrote for 'meat' the Aramaic *bisrā*, but read for this logogram the Iranian equivalent *gōšt*, and in like manner for 'bread,' one wrote the Aramaic *lahma*, but read for it the Iranian *nān*. The Pahlavi which contains both Iranian words and Aramaic logograms is called *Huzvaresch* (Pahlavi *Azvarīšn*, Persian *Zvāriš*, *Uzvāriš*, *Uzvārišn*). The meaning of this term is uncertain, but of the many explanations which have been advanced, that which connects the word with the Avesta *zbar*, 'to be distorted,' from which the Arabic verb *zavvara*, 'to conceal, distort, falsify, deceive, trick, mislead,' has been borrowed, seems quite probable. If this etymology is correct, the term seems to have been employed on account of the disguise of the Iranian words by the Aramaic logograms. Another plausible etymology connects the name with the obsolete Persian *zuvāridan*, 'to be old or worn out,' in allusion to the archaic Persian found in Pahlavi as compared with the modern language. There is a native lexicon, known as the *Sassanian Frahang* or *Frahang-i Pahlavīg*, which gives a list of about 1300 Semitic logograms with their Iranian equivalents. The difficulties of *Huzvaresch* led at a later period to a transcription from the Pahlavi characters. The Semitic logograms were then omitted, and in their stead their Iranian equivalents were written. The term applied to this Iranized Pahlavi is *Pazend* or *Parsi*, although usage differs somewhat, as some authorities call the texts *Pazend* and the language *Parsi*, while the more common and better distinction defines the transcription in Avesta letters as *Pazend*, while that in Persian and Gujarati script is called *Parsi*.

The correct forms of Pahlavi words are often problematical on account of the inadequate alphabet, and the traditional readings of many of them are certainly incorrect. The common means of determination by comparison with Avesta and Persian cognates, with the Aramaic equivalents of the logograms, and with the numerous Armenian loan-words from Middle Persian, often renders a fairly accurate restoration of the original form of the Pahlavi words possible.

Pahlavi literature is of considerable extent, although its literary value is slight. It may be divided into three classes—Pahlavi translations, intermingled with commentary, of the Avesta, texts on religion, and treatises on miscellaneous

subjects. Of the first class the most important published texts are the *Pahlavi Vendidad*, *Yasna*, and *Vispered*, the *Hātōst Nask*, the *Aogemadaēdā*, the latter two dealing mainly with eschatological subjects and with death, and the *Frahāng-i Oim-aēvak*, a dictionary of (Iranian) Pahlavi words, with their Avesta equivalents. Of the Pahlavi texts on religion, the principal are the *Dinkart*, a large work of which six books have been preserved, treating of Zoroastrian customs, doctrines, and literature; the *Būndahišn*, which gives the Iranian cosmogony; the *Dāstān-i Dinik*, a series of replies to ninety-two inquiries on religious questions; the *Šikand-gūmānīg Vijār* (of which only the Pazend text and a Sanskrit translation are thus far known), a most important source for a knowledge of Zoroastrian philosophy, and of interest also for its criticisms of Christianity, Manichæism, and Mohammedanism; the *Sāyast-lā-sāyast*, on the duties of Zoroastrians and the dangers which beset them; the *Dinā-i-Mainōg-i Xrat*, being the answers of the 'Spirit of Wisdom' to seventy-two inquiries concerning the faith; the eschatological treatises of the *Artā-i-Virāf Nāmak* and the *Bahman Yast*; and the *Mātīgān-i Yošt-i Fryānō*, containing Yosht's replies to thirty-three riddles propounded to him by the wizard Akht, whom he answers and destroys. The third division has as its most important texts the *Yātkār-i Zarīrān*, a history of the war resulting from Zoroaster's conversion of Vishtaspa (see ZOROASTER), the historical romance of the *Kār-nāmak-i Artaxšīr-i Pāpakān*, and a geographical treatise, the *Satrōiha-i-Airān*, which describes about a hundred cities in Iran.

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gūmānīg Vijār (Bombay, 1887); Andreas, *Book of the Mainyō-i-Khard* (Kiel, 1882); West, *Book of the Mainyō-i-Khard* (Stuttgart, 1871); Haug and West, *Book of Arda Viraf . . . Gosht i Fryāno, and Hadokht-Nask* (Bombay, 1872; this contains also a valuable table of Pahlavi ligatures and an outline of the grammar by West); Jamasp Asa, *Arda Viraf Nameh* (Bombay, 1902); Barthélemy, *Gujastak Abālis, relation d'une conférence théologique* (Paris, 1887); Peshotan, *Ganje-shāyagān, Andarze Atrepāt Mārāspandān, Mādīgāne Chatrang, and Andarze Khusrōe Kavātān* (Bombay, 1885); Sheriarjee Dadabhoy, *Pandnāme-i Aderbād Mānsarspand* (ib., 1869); Nöldeke, "Geschichte des Artachšīr-i Pāpakān, aus dem Pehlewi übersetzt," in Bezzenberger, *Beiträge zur Kunde der indogermanischen Sprachen*, vol. iv. (Göttingen, 1878); Modi, *Aiyādgār-i-Zarīrān, Shatrōiha-i-Airān, and Afdiya va Sahigiya-i-Sistān* (Bombay, 1899); id., *Mādīgān-i-Hazār Dāstān* (ib., 1901).

PAHLEN, pā'len, PETER LUDWIG (1745-1826). A Russian general best known as one of the murderers of the Emperor Paul I. (q.v.). Entering the military service at an early age, he fought in the wars against the Turks and participated in the storming of Otchakov in 1788. In 1790 he became lieutenant-general, three years later was made Governor of Livonia, and in 1795 of Curland. He was raised to the rank of count in 1799 and in the following year became head of the ministerial council. After taking a leading part in the conspiracy which brought about the death of Paul I. (March 23, 1801) he continued for some time in the service of Alexander I., but retired in 1804.

PAILA, pī'lā. A Hindu sage, who, according to the Puranas (q.v.), was a pupil of Vyasa (q.v.). When Vyasa had composed the Vedas (q.v.), he divided them into four parts, giving one to each of his four favorite pupils. In this way Paila became the teacher of the Rig-Veda, Vaisampayana of the Yajur-Veda, Jaimini of the Sama-Veda, and Sumantu of the Atharva-Veda, while the Itihasas and Puranas, also composed by Vyasa according to Indian tradition, were intrusted to Romaharshana. Consult Muir, *Original Sanskrit Texts*, vol. iii. (London, 1868).

PAILLERON, pā'ye-rōn', EDOUARD JULES HENRI (1834-99). A French dramatist and satirist, born in Paris. He began life as a notary's clerk, but at twenty-six gained notoriety by satiric verses, *Les parasites* (1860), and a comedy, *Le parasite* (1860). With *Le monde où l'on s'ennuie* (1881) popularity became fame. This is one of the wittiest satires on fashionable literary coteries ever written and is supposed to count among its *dramatis personæ* several contemporary Parisian celebrities, notably Professor Caro. In 1882 Pailleron was elected to the Academy. He wrote a few other plays, but he never equaled the success of *Le monde où l'on s'ennuie*. *La souris* (1887) is his only other noteworthy play. Consult his *Pièces et morceaux* (1897).

PAIN (OF., Fr. *peine*, from ML. *pena*, Lat. *pæna*, pain, punishment, from Gk. *πῶνῃ*, *poiñē*, penalty; connected with Gk. *τίσις*, *tinis*, to pay, Skt. *ci*, to avenge). A term employed by psychologists of the English associationist school (see ASSOCIATION OF IDEAS) for what we have

termed unpleasantness (see *AFFECTION*), pleasure and pain being the two fundamental qualities of the affective life. But the concrete pains of everyday experience are, as even a superficial introspection shows, partly matters of sensation. "Pain (*Schmerz*) is always at once a sensation and a violent feeling of unpleasantness (*Unlustgefühl*)" (Wundt). It is therefore impossible to restrict the term to the sphere of affection.

Under the heading *CUTANEOUS SENSATION*, it is noted that pain is, as a matter of fact, a distinct and specific cutaneous quality, having as its terminal organs the free nerve-endings in the epidermis. The pain-spots are constant in position, and pain-maps can be drawn which furnish as permanent and valid records of the pain sensitivity as do the pressure and temperature maps of their cutaneous qualities. We have here, then, merely to discuss pain as an organic sensation (q.v.).

It was formerly supposed that pain was a common sensation, excitable by excessive stimulation of any and every sensory nerve, optic, acoustic, etc. This theory still lingers in the belief, e.g. that there are special temperature pains producible and only producible by excessive thermal stimulation of the cutaneous surface.

But it found its chief support in the great variety of organic pains. There seems to be no internal organ, however insensitive during healthy function, that cannot mediate pain when the function is deranged. And the pains vary in character, according to their place or mode of origin. They may be throbbing, as in toothache; dull and gnawing, as in extreme hunger or in inflammation of the bowels; dull and

throbbing, as in lesion of the rectum; acute and shooting, as in neuralgia; acute and intermittent, as in colic; acute and constant, as in peritonitis; dull and nauseating, as in certain diseases of the ovaries and testicles; pressing, boring, constricting, cutting, piercing, as in headaches; burning or smarting, as in certain skin wounds; dragging, as in certain forms of rheumatism. It is very natural—indeed, it seems at first sight necessary—to explain these differences as differences of quality; to assume the existence of many different kinds of pain. If we look at the facts more closely, however, we see that certain of the descriptive adjectives point unmistakably to simple differences of time and of intensity. A throbbing pain is an interrupted pain; a shoot-

ing pain is one that shows, besides intermittence, a quick rise of intensity as it runs its course; a piercing pain is intensive, a dull pain weaker. Moreover, all the concrete pains are intermixed with the specific sensations (pressure, various organic qualities) peculiar to the organs which mediate them: a sickening pain contains the sensation of nausea, a dragging pain contains a mass of muscular sensations. These concomitant sensations, again, are variously localized: an acute pain seems to occupy a small area, a dull pain is massive, wide-spread. When we take these facts into account, and remember the specific differences to which variations of time and intensity may give rise in conscious complexes other than pains, we shall hardly resist the conclusion (suggested also by introspection) that the pain quality is one and the same throughout. There is one pain; there are many pains. The many pains differ temporally, intensively, and in their associations; not qualitatively. The organ of this organic pain quality must then be looked for in the muscle substance; but whether it consists of a free nerve-ending, like the pain-ending of the epidermis, we do not know. Consult: Titchener, *Experimental Psychology* (New York, 1901); Wundt, *Physiologische Psychologie* (Leipzig, 1893).

PAIN, BARRY (?—). An English author. He was educated at Cambridge, was an army tutor at Guilford, and in 1890 removed to London. He succeeded Jerome K. Jerome as editor of *To-Day*, in 1897. Pain is at his best as a parodist and fantastic humorist. He wrote: *In a Canadian Canoe* (1891); *Playthings and Parodies* (1892); *Stories and Interludes* (1892); *Græme and Cyril*, a juvenile (1893); *Wildmay*, and *Other Stories of Women* (1898); *Eliza* (1900); and *Another English Woman's Love Letters* (1901).

PAINE, CHARLES JACKSON (1833—). An American soldier and sportsman, born in Boston. He graduated at Harvard in 1853, and made a considerable fortune in railroad enterprises. In 1861 he entered the Federal service as a captain in the Twenty-second Massachusetts. The next year he was sent to Ship Island, Miss., and in October was commissioned colonel of the Second Louisiana Volunteers, a negro regiment. During the siege of Port Hudson (May 24-July 8, 1863), he commanded a division. On March 4, 1864, he resigned, but the following July again entered the service as a brigadier-general, and on September 29th led a division of negro troops at Newmarket, Va. On January 15, 1866, he was brevetted major-general of volunteers. During his later years he took a great interest in yachting and built, or helped to build, the *Puritan*, the *Mayflower*, and the *Volunteer*, each of which defended the America's Cup against a British challenger.

PAINE, JOHN ALSOP (1840—). An American archaeologist, born in Newark, N. J., and educated at Hamilton College and at Andover Theological Seminary. He left the ministry to take up botanical work for the Board of Regents of New York State (1862), was two years professor of natural science at Robert College, Constantinople (1867-69), and acted as archaeologist to the first expedition in the country east of the Jordan, sent out by the Palestine Exploration Society in 1872. He became curator of the



HAIR
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BIOMETER
FOR PAIN AND
PRESSURE
SPOTS.



MACDONALD'S
TEMPORAL
ALGOMETER.

Metropolitan Museum of Art, New York City, in 1889.

PAINE, JOHN KNOWLES (1839—). An American composer, born in Portland, Me. His most important home teacher was Kotzschmar at Portland, after which he went to Berlin, where he studied organ and counterpoint under Haupt, singing under Fischer, and instrumentation under Wieprecht. Returning to Boston in 1861, he settled there as an organist, and gave organ concerts in various cities. In 1862 he taught music at Harvard, and in 1876 was raised to full professor, and the first chair of music in an American university was created. His early compositions belong to the strictly classical school, of which he was for years an unyielding adherent, but his later works lean toward the romantic school. His works include: mass in D (1867); *Saint Peter*, oratorio (1873); *Centennial Hymn* (1876); music to *Œdipus Tyrannus*, of Sophocles, for male voices and orchestra (1881), considered by many to be his masterpiece; *The Realm of Fancy*, cantata for soprano solo, chorus, and orchestra (1882); *Phæbus, Arise*, cantata for tenor solo, male chorus, and orchestra (1882); *The Nativity*, cantata (1883); *Song of Promise*, cantata (1881); symphony in C minor (1876); *Spring*, symphony (1880), in which the first indications appeared of his conversion to the romantic school; overture to *As You Like It* (1878); overture to *The Tempest* (1877); duo concertante for violin and violoncello (1878); *An Island Fantasy*, symphonic poem (1888); chamber and pianoforte music, songs and part songs, and compositions for the organ.

PAINE, MARTYN (1794-1877). An American physician. He was born in Williamstown, Vt., and in 1813 graduated at Harvard. He was one of the founders of the University Medical College (1841) (now the medical department of the University of New York), where he was a professor from 1841 to 1867. Among his works the best known are; *Cholera Asphyxia of New York* (1832); *Medical and Physiological Commentaries* (1840-44); *Institutes of Medicine* (1847); and a *Review of Theoretical Geology* (1856).

PAINE, ROBERT TREAT (1731-1814). An American lawyer and patriot, one of the signers of the Declaration of Independence. He was born in Boston, Mass., graduated at Harvard in 1749, and then taught school and studied for the ministry, acting as chaplain of the Northern troops in 1755. He subsequently studied law, and in 1759 was admitted to the bar. In 1768 he was a delegate to a convention called by prominent citizens after Governor Bernard had dissolved the Legislature for refusing to rescind its circular letter to the other colonies, and in 1770 he managed, in the absence of the Attorney-General, the prosecution of Captain Preston and his men for firing upon the citizens on March 5th. (See BOSTON MASSACRE.) In 1773-74 he was a member of the Massachusetts Assembly; was one of the representatives of Massachusetts in the Continental Congress from 1774 to 1778; and was a signer of the Declaration of Independence. He was Speaker of the Massachusetts House of Representatives in 1777; helped draft the new State Constitution in 1779; was Attorney-General of the State from 1780 to 1790; and was an associate justice of the Massa-

chusetts Supreme Court from 1790 to 1804, when he resigned on account of deafness. Besides being an able lawyer, he was well known for his scholarly attainments, and in 1805 received the degree of LL.D. from Harvard. He was one of the founders (1780) of the American Academy of Arts and Sciences.

PAINE, ROBERT TREAT (1773-1811). An American poet, born at Taunton, Mass., December 9, 1773. His name was originally Thomas, which was changed in 1801 to that of his father. He was graduated from Harvard College in 1792. In 1794 he started a fortnightly literary paper called the *Federal Orrery*. For this he wrote the *Lyars* and the *Jacobiniad*, satirical poems full of personalities; these made him bitter enemies, and several times caused him to be assaulted. He then became interested in the theatre, and in 1795 he married Miss Baker, an actress. The same year, upon taking the degree of A.M., he read a poem upon *The Invention of Letters*, which brought him temporary reputation, as did also *The Ruling Passion* and *Adams and Liberty* (1798). He then took to the law, studying in Newburyport under Theophilus Parsons and practicing in Boston in 1802. The last years of his life were passed in destitution. His work is without lasting qualities.

PAINE, THOMAS (1737-1809). An Anglo-American political and philosophical writer and agitator. He was born at Thetford, Norfolk, England, January 29, 1737, the son of a Quaker. His schooling was over by the time he was thirteen, and he was then put to his father's trade of staymaking. In 1759 he established himself as a staymaker at Sandwich, Kent, and in 1762 he became an exciseman. In 1765 he was discharged because he had fraudulently testified to having performed certain duties which he had really neglected, and went back to his trade. In 1766 his petition for restoration was granted, but he did not take up the work again till 1768, supporting himself in the interval by teaching in London, where he also preached as a Methodist. In 1771 he kept a tobacco shop at Lewes, Sussex. In 1772 he was chosen by the excisemen to plead for an increase in their salaries, but was not successful. In 1774 he was again discharged from the excise service, this time on the ground, as officially stated, "of having quitted his business without obtaining the board's leave for so doing, and being gone off on account of the debts which he had contracted." In October, 1774, he emigrated to America with a letter from Benjamin Franklin to Richard Bache of Philadelphia, who introduced him to Robert Aitkin. He found employment as an editor for eighteen months of Aitkin's *Pennsylvania Magazine, or American Monthly Museum*. Paine entered heartily into the spirit of the times, allying himself from the first with the Patriot or Whig Party. On January 9, 1776, he published his famous pamphlet, entitled *Common Sense*, in which he argued that "government, even in its best estate, is a necessary evil," that there is no warrant or reason for "the distinction of men into kings and subjects," and that the American colonies, owing no real allegiance to the British Crown, from which they had suffered innumerable grievances, "should forthwith become independent." The pamphlet expressed with great force the views of the more radical Whig element, had

a remarkable influence throughout America, and did much to win over the timid and the wavering to the side of those who advocated separation from the mother country.

In the fall of 1776 Paine enlisted in the Continental Army, and for a time was a volunteer aide-de-camp on the staff of General Greene. His military experience was brief. It prompted the first issues of *The Crisis*, a series of sixteen pamphlets, which was written by him over the signature 'Common Sense' between December, 1776, and December, 1783, and which, like his earlier pamphlet, were much read and had a powerful influence over the people. In January, 1777, Paine was appointed secretary to the commission sent by Congress to treat with the Indians at Easton, Pa., and in April he was elected secretary to the Congressional Committee of Foreign Affairs. He was virtually compelled to resign, January 8, 1779, because he had used in print information which had come to him in his official capacity. He became a law clerk, and was clerk of the Pennsylvania Assembly for a year. In 1781 he went as secretary to John Laurens, who had been sent to France on a Government mission to raise money. The two were cordially received by the King, and returned "with 2,500,000 livres in silver, and in convoy a ship laden with clothing and military stores." In February, 1782, at the suggestion of Washington, Congress granted \$800 to Paine on condition that he should use his pen in support of the country. In 1784 the State of New York presented him with 277 acres of land at New Rochelle, and Pennsylvania with £500; and in 1785 Congress gave him \$3000. He was thus relieved from poverty, and employed his leisure in experimentation, especially in perfecting his iron bridge, an invention of merit.

In 1787 Paine went to France, where he exhibited his bridge to the Academy of Sciences in Paris. He also visited England, and was lionized in London by the party of Burke and Fox. He set up the model of his bridge on Paddington Green, and huge crowds went to see it. But he brought himself into odium by writing in 1791 and 1792 his pamphlet *The Rights of Man*, in reply to Burke's *Reflections Upon the Revolution in France*. Notwithstanding Burke's kind treatment of him and their former friendly relations, he accused Burke of ignorance, prejudice, and blind partisanship. The English Government brought a suit against him for his attack upon the English Constitution in the second part of the *Rights of Man*, and in his absence passed a sentence of outlawry (December, 1792). Paine had already gone to France. There he was enthusiastically received. The National Assembly gave him the title of citizen (August 26, 1792), along with Washington, Hamilton, and Madison, and several departments elected him as their deputy to the French Convention. Paine accepted the election of Pas-de-Calais, and attended the sessions of the Convention. He could not speak French, and had translations of speeches read for him while he stood upon the tribune. The most important business then in hand was the deposition of the King, and Paine was courageous enough to speak and vote against his execution. He even offered him a temporary asylum in the United States. When the Girondists, with whom he acted, fell from power, he was ejected from the Convention on the ground of being a for-

eigner, and on December 28, 1793, was committed to the Luxembourg Prison, where he was kept for ten months. Just before his arrest he had finished the first part of his *Age of Reason*, the famous exposition of Deism, and had committed it to his friend Joel Barlow. While in prison he worked upon the second part. His release (November 4, 1794) was mainly due to the change in the government. He was unanimously restored to his seat in the Convention, and sat there until its adjournment (October 26, 1795). In the same year he attracted considerable attention by making a bitter attack upon Washington, whom he charged, among other things, with inefficiency and treachery.

Paine returned to America in 1802, and landed at Baltimore, October 30th. He found that his services in the cause of the colonies were in some quarters gratefully remembered, but that his *Age of Reason* had cost him the esteem of the religious part of the community. He suffered also from ill health, and became careless in manners and morals. He lived successively at Bordentown, N. J., at New Rochelle, N. Y., and in New York City. He died in New York, June 8, 1809, and was buried in New Rochelle, where a monument was erected to him in 1839, although his body had been exhumed and carried to England by direction of William Cobbett in 1819. As a writer Paine was forceful and original. His versatility is shown by the variety of the topics which engaged his attention. His attack upon the Bible was unscholarly and ignorant, and his defiant assertion of Deism brought him into great ill repute in his time. The best edition of his works is by Moncreux D. Conway (4 vols., New York, 1894-96), who has also written his biography (ib., 1892; condensed ed. 1902). Consult, also, Tyler, *Literary History of the American Revolution* (New York, 1896).

PAINE, WILLIAM H. (1828-90). An American engineer, born in Chester, N. H. He did much to improve roads and engineering methods in California in 1849, surveyed a line for a railroad from Sacramento to Utah (1853), and in 1861 volunteered in the Union Army. He served throughout the war, attained the grade of colonel, and made valuable maps. He worked under Roebling as consulting engineer on the Brooklyn (N. Y.) Bridge, and for a time superintended the entire work. The cable system on the bridge was planned by Paine; and he built and engineered cable roads in New York City, Omaha, Denver, Kansas City, and Cleveland.

PAINESVILLE, pânz'vîl. A city and the county-seat of Lake County, Ohio, 29 miles east by north of Cleveland; on the Grand River, and on the New York, Chicago and Saint Louis, the Lake Shore and Michigan Southern, and the Pittsburg and Western railroads (Map: Ohio, H 2). It is the seat of Lake Erie College, opened in 1859, and has a public library with more than 5500 volumes. A massive stone viaduct spans the river at this point. Painesville is of considerable commercial importance, being situated but three miles from Fairport, on Lake Erie, where there is a fine natural harbor with extensive ore docks. Its industrial establishments include a grain elevator and flouring mills, foundries and machine shops, and large veneer machine and brick machine works. The water-works and electric light plant are owned by

the municipality. Population, in 1890, 4755; in 1900, 5024.

PAINT, LUMINOUS. See LUMINOUS PAINT.

PAINTED QUAIL. (1) The mountain quail (*Oreortyx pictus*). See QUAIL. (2) A small quail-like partridge of China (*Excalfatoria Sinensis*) found from India to Ceylon and Formosa. It has a plumage of varied colors, in which chestnut is conspicuous, and is much hunted. A darker race inhabits the Philippines, Malayan islands, and Australia; and similar species occur in New Britain and neighboring islands, and in Central and Southern Africa. The Australian form is called 'least swamp-quail.'

PAINTED TURTLE, or PAINTED TERRAPIN. The commonest pond turtle (*Chrysemys picta*) of the Eastern United States. It is greenish above with yellow and red markings, and yellow and brown below.

PAINTER, WILLIAM (1540?-94). An English translator, educated at Saint John's College, Oxford. In 1560 he became clerk of the ordnance in the Tower of London. Notwithstanding his denials, he seems to have pilfered the Queen's funds. He is known for *The Palace of Pleasure* (vol. i., 1566; vol. ii., 1567), a collection of one hundred tales, translated from Latin, Greek, French, and Italian. Painter may be said to have made Bandello, Boccaccio, Cinthio, and various other Italians familiar to English readers. The collection was immensely popular and led to many similar compilations. From it the English dramatists drew freely for their plots. Consult the reprint, ed. by Jacobs (London, 1890).

PAINTER-ENGRAVER. An artist who engraves his own designs—that is, an original engraver, one occupied in expressing his artistic thoughts by means of some process of engraving, as distinguished from one who engraves the designs of others. The term is adopted from the French, *peintre-graveur*. Albrecht Dürer was very eminent as a painter-engraver with the burin; Rembrandt in etching; T. M. W. Turner in mezzotint. So, among men of our own time, there may be named Gaillard, in live work, and Whistler as an etcher.

PAINTERS' COLORS. The number of colors used by painters in their art has greatly varied. Until the time of Apelles but four were known—white, yellow, red, and black. Green, purple, and blue were discovered later. The discoveries of modern chemistry have greatly increased the number available, which are derived from the mineral, vegetable, and animal worlds. But although the painter of the present day has a long list to choose from, a dozen is quite sufficient for the richest palette. They are prepared for use by calcining and washing; oil paints are ground in poppy or linseed oil, and preserved in tin tubes. In general, colors are either opaque or transparent, the former being used for the lights, the latter for the shadows and dark portions of the picture. For the sources and character of painters' colors, consult the subdivision *Pigments* of the article PAINTS, and the articles on the special colors, such as BLUE; CARMINE; PURPLE COLORS; ULTRAMARINE, etc. For the quality of color in a painting, see COLOR.

PAINTING. In the fine arts, the representation by means of color and line upon a flat surface, of objects of nature and of the imagination. According to the flat surface used, painting may be mural, panel, easel, etc. (See MURAL DECORATION.) As regards the materials used the principal varieties of painting are encaustic, fresco, oil-painting, pastel, tempera, stereochrome, and water color. (See these titles.) According to the subjects represented, the principal varieties are figure, genre (q.v.), history, portraiture (q.v.), landscape (q.v.), animal, and still life painting. For the implements used by the painters, see CANVAS; EASEL; GROUND. The following historical sketch is concerned chiefly with expressive rather than decorative painting, and will trace the evolution of painting in the Western world. The purely decorative arts of China, Japan, and other Oriental countries are treated under CHINESE ART, etc. See also DECORATIVE ART. Special articles will also be found on every painter of importance mentioned in the historical sketch.

ANCIENT PAINTING.

EGYPT. The ancient Egyptians made large use of color in their art. All sculpture in wood, clay, or ordinary stone was painted, and even hard stones, such as granite and basalt, do not often escape coloring. On flat surfaces the Egyptian artist preferred to color a very low relief, or a slightly sunk design; and even where no sculpture was employed, the drawing and conventions were the same. There was no knowledge of the laws of perspective, and apparently no attempt to attain any real effect of depth. Objects on the same level may be drawn one above the other, or so that they overlap. Allowing for such conventions, however, the Egyptian artist shows skill in drawing, and great vivacity and naturalness in the treatment of his subject, especially in the depiction of animals or in the numerous scenes from daily life which decorate the tombs. In dealing with religious scenes, his freedom was fettered by strict conventions. Any play of light and shade was, of course, unthought of, but the Egyptian palette was well supplied with colors. The colors were prepared in fine powders and mixed with water and gum for use.

The remains of painting in Babylonia and Assyria are very scanty. The favorite method of decoration was by enameled brick, bearing figures in relief, which can scarcely be called painting in any strict sense. See ASSYRIAN ART and BABYLONIAN ART.

GREECE. It was in Greece that ancient painting, like other forms of art, reached its highest development, in the fifth and fourth centuries B.C. Not that skillful fresco painting had not been common earlier. The fragments from Tiryns, and still more the splendid decorations from Cnossus in Crete, show that the Mycenaean Age (about 1500-1200 B.C.) possessed much of the technical skill of the Egyptian artist and far greater freedom and originality. With the fall, however, of Aegean civilization, we lose all examples of painting properly so called, though the vases (see VASES) enable us to trace the progress of drawing, and the statues and remains of buildings show how extensively color was employed as an auxiliary to the sister arts of sculpture and architecture. Indeed, this use continued throughout the classical period. (See

GREEK ART.) There are traditions of Corinthian and Sicyonian painters, who drew outlines on walls or whitened tablets of clay by the aid of shadows, and indicated details by a few lines, but used only one color. There are also records of paintings which would carry back the art into the eighth century. Eumares of Athens is said to have distinguished the sexes, probably by the use of different colors, in distinction from the early monochrome artists, and Cimon of Cleonæ to have introduced correct drawing in profile, probably of the eye, and variety in the direction of the glance. These artists, who have some claim to be considered real persons, must have lived about the middle or end of the sixth century.

In the great outburst of Greek genius which followed the Persian wars, and which centred in Athens, painting rose to an equality with sculpture. This advance is directly connected with Polygnotus (q.v.) of Thasos, whom Theophrastus describes as the discoverer of the art. His works were large scenes covering the walls of public buildings, such as the "Painted Portico" at Athens and the "Lesche" of the Cnidians at Delphi. In general his subjects were mythological, but his contemporaries and fellow-workers Micon and Panæus, brother of Phidias, seem to have treated also events in recent history. At this time painting, like sculpture, is found in the service of the State for the decoration of public buildings and temples. As to the style of these artists, it is safe to say that true perspective was wanting, nor were light and shade indicated. The figures were on different levels, and there was some indication of broken ground. Polygnotus's palette, we are told, contained only black, white, yellow, and red, with which he succeeded, however, in producing a variety of shades. In spite of the flat color, Polygnotus was famed for his fine composition, dignity, and perfection of characterization, and severe, yet expressive, drawing.

The most important advance was made shortly after by the scene-painter Agatharchus of Samos, who discovered some of the applications of perspective and shading. His book on his new discoveries led the philosophers Anaxagoras and Democritus to serious investigation of the laws of perspective. The new methods were transferred from the large surfaces to panels by Apollodorus of Athens, and thus within a century the way fairly cleared for a growth of the art beyond all that the Egyptians had achieved in three thousand years. The school which now arose, about the end of the fifth century, is commonly called the Asiatic or Ionic school, and is best represented by the two great rivals Zeuxis (q.v.) of Heraclea and Parrhasius (q.v.) of Ephesus. The former was famed for his truthful and even deceptive reproduction of nature, and the latter for his delicate drawing, but both must have been masters of chiaroscuro, if any reliance can be placed in the comments that have survived. To this school also belonged Timanthes of Cythnos, famous for the variety and depth of facial expression.

In the early fourth century B.C. the centre of painting seems to have been at Sicyon, where Timanthes lived late in life. Its founder was Eupompus, who was succeeded by Pamphilus (q.v.) and Melanthius, who laid great stress on systematic instruction, especially in drawing,

which was introduced into the schools of the city. A pupil of the school, Pausias, perfected the encaustic painting (q.v.), which, however, did not drive out the old tempera (q.v.) process. How far the school had advanced in handling of light and shade may be judged from the praise given the black ox of Pausias. In the second quarter of the fourth century a school of Theban and Attic artists arose who seem to have given especial attention to pathos, and whose favorite subjects were battle pieces. The tendency away from the severe and lofty, which is found in sculpture, also manifested itself in painting, and many of these artists are also credited with genre scenes, flower pieces, and trifling subjects. In contrast to this tendency Nicias of Athens, who seems to have survived Alexander, insisted on the importance of great subjects. It seems very probable that the release of Io by Hermes, in the "House of Livia" on the Palatine Hill in Rome, is a copy of one of his works. The highest technical skill and artistic merit were claimed by the ancients for the two great masters of the younger Ionian school, Apelles of Ephesus and Protogenes of Caunus; the former famed for his grace, the latter for his painstaking, which in the opinion of some led him to weaken the spontaneity of his pictures. The paintings in the Etruscan tombs, though undoubtedly influenced by Greek models, are far too rude to serve as standards of reconstruction, and most of them are not later than the middle of the fourth century. Of more value is a sarcophagus from Corneto, now in Florence, on which is painted in tempera a wonderfully vigorous battle of the Greeks and Amazons, probably the work of an Etruscan artist of the early third century B.C., but evidently a close copy of a Greek model, which must have ranked in beauty and power little below the works of the best period.

The Hellenistic age shows in painting, as in sculpture, two tendencies. One was toward the rendering of mythical scenes, which afforded opportunity for pathetic or tragic expression, as in the famous picture of Timomachus of Byzantium, representing Medea meditating the slaughter of her children, of which some reminiscences seem preserved in Pompeian paintings. On the other hand, many painters seem to have preferred lighter themes. They also rendered the landscape with pleasure, and even experimented with effects of artificial light, as in a painting of a boy blowing a fire. Often the choice is low, and triviality, not to say sensuality, is a prominent characteristic. The walls of Pompeii furnish abundant examples of these tendencies. It is only from this late period of Hellenistic art that many works have come down to us. In Rome are the Aldobrandini marriage, a series of landscapes illustrating the *Odyssey*, and a rather poor series of panels representing victims of unnatural love, while the baths, palaces, and tombs have from time to time yielded others, many of which have now perished. Among these the first place must be given to those from the Farnesina Gardens, some of which recall the best Athenian lecythi of the fourth century. The largest number are, however, from the buried cities of Pompeii and Herculaneum, and of especial value are the portraits of the second century A.D., discovered in the Fayum, Egypt, where they were used to cover the faces of mummies.

ROMAN PAINTING. A mere appendix to the

Greek, Roman painting developed little originality, and, being decorative in character, will be found treated under ROMAN ART.

MEDIEVAL PERIOD.

The painting of the Middle Ages is, in the main, decorative and dependent upon architecture. (See CHRISTIAN, BYZANTINE, ROMANESQUE, and GOTHIC ART.) It exercised little influence upon the general development of painting except during the Gothic period in Italy.

ITALY. In the free cities of Italy, especially in those of Tuscany, Gothic painting reached its highest development. Here Gothic architecture was purely decorative in character, and left large wall surfaces which afforded ample opportunity for paintings. The technique used was fresco (q.v.). About the middle of the thirteenth century a number of painters in different parts of Italy began to modify, though at first slightly, the Byzantine manner. The most important of these painters was Cimabue at Florence (died after 1302), who displayed a leaning toward the Gothic, which took the form of a slight naturalism. He painted the draperies less rigid, and put more expression in the faces and life into the movements of the figures.

By far the greatest progress before the Renaissance was made by Giotto (1266-1337) at Florence. It is generally accepted that he was a pupil of Cimabue, although late authorities maintain that his art is related to that of Pietro Cavallini. The faces are still typical, rather than individual, but they are strong and the figures are dramatic in action and very characteristic. The drapery is no longer stiff, but falls in broad masses, showing the movement of the body beneath. The accessories, such as animals, landscape, and architecture, are symbolic, and conceived in a decorative sense, as is indeed the entire composition. The scale of color was limited and determined by decorative harmonies, the method being to fill in the outlines with color. What most impressed contemporaries was his great step toward naturalism. By none of his immediate followers was real progress made. By far the most important was Andrea Orcagna (d. 1368), who, in his startling frescoes and altar-pieces in the Strozzi Chapel, Santa Maria Novella, Florence, surpassed Giotto in depicting the human figure, and in the treatment of light and shadow, and even had an elementary knowledge of perspective, anticipating the discoveries of the Renaissance.

Contemporary with the Florentine, there flourished at Siena a school which retained more of the Byzantine character. (For its chief characteristics, see SIENESE SCHOOL OF PAINTING.) Duccio, its real founder, was, on the whole, a more finished painter than his contemporary, Cimabue. He perfected the hands and feet, and gave a sweet, tender expression to the long Byzantine face. Among his successors the greatest progress was made by Simone Martini (d. 1344), who strengthened the type by rounding it and adding emphasis of expression. The most important Sieneese artists of the following generation were the brothers Lorenzetti (middle of fourteenth century), whose works show a strong intellectual grasp and forceful methods.

At Rome, during the Gothic period, some good mosaics were produced, but no painting. (See MOSAICS.) Elsewhere in Italy the manner of Giotto prevailed throughout the fourteenth cen-

tury, even in Naples and the South, but none of these local schools were important except those of Verona and Padua, where schools, inspired by the work of Giotto in the Arena Chapel, arose. The most important master of this region was Altichiero da Zevio of Verona, who worked conjointly with Jacopo Avanzi. Their works have all the seriousness and depth of Giotto's, but without his pathos; they are not so vehement in action, but softer and more tender in emotion.

As *Transition Painters* we may classify other Italian painters of the fifteenth century, who are nevertheless Gothic in sentiment and technique. The art of Fra Angelico (1387-1455) is distinguished for devout religious sentiment, in which last respect it has never been excelled. His younger contemporary, Gentile da Fabriano, who belonged rather to the Sieneese school, produced an art rich in color and detail, and he seems to have been the first to show the effect of sunlight upon landscape.

THE RENAISSANCE (1400-1600).

Renaissance art was not altogether a revival of the antique, although this was one of its essential features, especially in Italy. It was equally a revival of natural truth, especially in painting. As no antique paintings survived, the painter was compelled to go directly to nature for inspiration, unlike the sculptor, whose models were the statues of antiquity. In Northern Europe not even statues survived, and nature was the only guide. Here the Renaissance took its earliest and simplest form, spreading to Germany, France, and Spain, during the fifteenth century. Almost contemporaneously a more important development had taken place in Italy, which during the latter fifteenth century began to make itself felt in France and Spain, and during the sixteenth, replacing the Flemish influence, became dominant in Europe. Our method of treatment is suggested by the development just outlined. The period naturally falls in three divisions—the Early Renaissance, corresponding, roughly speaking, with the fifteenth century; the High Renaissance (c. 1500-50); and the Decline (c. 1550-1600), during which period Italian art predominated throughout Europe.

EARLY RENAISSANCE. Under the patronage of the Court of Burgundy, and of the rich burghers of the Netherlands, a school of painting arose during the latter fourteenth century, which appears highly developed in Flanders in the art of Huybrecht and Jan van Eyck (d. 1440). In their works, the most important of which is the Ghent altarpiece, we find already solved some of the chief problems of painting—a fine color, bright, but in a low key; an aerial perspective, with true rendering of atmosphere, and of light and shade. For the first time the landscape is used as a background to give sentiment to the picture, and to promote its unity, which is somewhat interfered with by the highly detailed finish. More startling still is the uncompromising naturalism of the figures, and the remarkable technique of oil painting which they invented, and which was universally adopted in modern art. (See EYCK.) Among the followers of Jan van Eyck in the school of Bruges, which he founded, was Petrus Cristus, while at Ghent flourished Hugo van der Goes and Jodocus van Ghent. The chief follower (or rival) of Jan van Eyck was Rogier van der Weyden,

who established the school of Brabant, at Brussels, and added dramatic power and vehemence of expression.

Of the work of the early Dutch school few pictures survive. Haarlem was its centre, and Aelbert van Ouwater, celebrated for his landscape backgrounds, was the reputed founder. The work of his pupil, Gerrit van Haarlem, resembles contemporary Flemish painting, as does also the later work of Dierik Bouts (d. 1475), of Haarlem, founder of a school at Louvain. He excelled in luminous treatment and improved the landscape, contributing depth and variety of character to the school. The greatest master of the next generation is Hans Memling (d. 1495), who surpassed other Flemish masters in delicate brushwork and refined sentiment. Among his followers was Gheeradt David (d. 1523), who introduced breadth of treatment, especially in landscapes, though real freedom of style only came with the influence of Italy.

During the fifteenth century a Renaissance had also begun in Germany, differing from the Flemish in that, although showing a strong impulse toward realism, it retained the gold backgrounds, with an innocent fervor and a graceful sentimentalism derived from the Gothic. The chief seat of this art was Cologne, and its principal master was Stephan Lochener (d. 1451). About 1450 the Flemish influence made itself felt in Germany, and during the same period important local schools flourished in Southern Germany, commonly grouped together under the name of the Suabian school. At Kolmar the chief master was Martin Schongauer (d. 1488). The chief seat of the school of Franconia is Nuremberg, and its principal master is Michael Wolgemut (1434-1519). Nuremberg also dominated the art of Bohemia, Silesia, and Poland (Cracow). On the whole, German art in the fifteenth century was unprogressive in character, and not until the sixteenth century, under Italian influence, did it pass this primitive stage.

In France, Spain, and Portugal the Flemish influence predominated for the most part during the fifteenth century, though finally yielding to the Italian. In France pictorial art found more expression in miniatures (see MANUSCRIPTS, ILLUMINATION OF) than in panel painting. The art resembled the Flemish, except that the advance to realism was slower and less marked. The chief master was Jean Fouquet of Tours, a portrait painter and illuminator, who practiced a detailed and exact art, like the Flemish, but with softer color, individual French characteristics, and some Italian influence.

In Spain paintings were imported during the fourteenth century from the Netherlands and from Italy. Jan van Eyck himself visited Spain, and some of the best works of Petrus Cristus and Roger van der Weyden went there. In Aragon Florentine influence was predominant, but in Castile, where artistic production was greater, there was more Flemish, while Seville shows an amalgamation of both. The most famous artist of the fifteenth century was Antonio del Rincon (1446-1500), Court painter to Ferdinand and Isabella, who is said to have abandoned Flemish art for Florentine, as did also Alejo Fernandez at Seville. Another important name is Juan de Borgofia (1495-1533), who labored chiefly at Avila and Toledo. Not-

withstanding foreign influence, the Spanish painters of the early Renaissance display a distinct national tendency, chiefly evident in a general brownish tone and in the landscapes. In Portugal Flemish influence prevailed until late in the sixteenth century, when it was replaced by the Italian.

EARLY RENAISSANCE—ITALY. Italian painting had the great advantage of flourishing contemporaneously with a very high intellectual and a general artistic development. What the Northern knew but imperfectly, as a result of his own observation, the Italian based on scientific knowledge of natural laws. The laws of linear perspective (q.v.) were discovered and applied by Brunelleschi and Alberti; anatomy was scientifically studied, even the skeleton being drawn before the flesh and the draperies. Renaissance architecture afforded large wall spaces for decoration and the resulting frescoes gave a monumental character to painting. The study of the antique tended to idealize art and afforded decorative motives; but the Italians only saw in it a means of approaching nature. Finally, a natural tact prompted them to subordinate detail, while not neglecting it, to higher poetic truth, thus giving their art the charming naturalism which is its chief characteristic during the fifteenth century.

During the fifteenth century Florence retained its primacy of Italy, both as to the number of artists and the character of work produced. Florentine work was especially good in intellectual qualities, excelling in all respects except in color. (See FLORENTINE SCHOOL OF PAINTING.) The first painter who can be distinctly classed as belonging to the Renaissance is Masolino (1383-1447), whose works show advance in perspective, composition, and anatomy. All of these qualities were achieved to a greater extent by Masaccio (1401-28), the most prominent figure in Italian painting between Giotto and High Renaissance. His figures are powerful and dramatic, and show complete mastery of perspective. Every detail has its purpose, and in his composition every figure is a necessity. His frescoes in the Brancacci Chapel were the models of the century, and their influence may even be seen in the works of Michelangelo and Raphael.

None of Masaccio's followers or contemporaries equaled him. A group of Naturalists, the head of which was Paolo Uccello (1397-1475), made valuable experiments in perspective and were good in drawing, but lacked composition and pictorial feeling. Other members of this school were Andrea del Castagno, Domenico Veneziano, and Alesso Baldovinetti. Masaccio's real successor was Filippo Lippi (1406-69), a painter of great imagination and charm, who excelled in the essentially pictorial qualities of color, light, and shade, and was the first to portray individual faces in the sacred pictures. (See MADONNA.) The school of Filippo Lippi contains important names. Sandro Botticelli's (c.1447-c.1510) paintings are full of poetic sentiment and deep spirituality. His art is the most subtle of the century, though highly individualized, both in his dreamy Madonnas and in his large mythological pictures. Fillipino Lippi's (1457-1504) painting, modeled upon that of his father and Masaccio and influenced by Botticelli, is also full of grace and sentiment.

Among other Florentine painters of the period were Benozzo Gozzoli, a pupil of Fra Angelico, who painted attractive frescoes with portrait heads, and Piero di Cosimo, known by his mythological pictures on a small scale. Another distinct group was composed of painters who were at the same time goldsmiths. Their habit of metal work is seen in the treatment of flesh, which is bronze-like in color, in the rigid draperies, and the high relief in which the figures are modeled. Chief among this group are the Pollaiuolo brothers, who flourished in the latter half of the century, and especially Andrea Verrocchio (1435-88). Among Verrocchio's pupils were Leonardo da Vinci (see below) and Lorenzo di Credi, whose work is less strong than graceful. Finally, Domenico Ghirlandajo (1449-94) combined in his art the various tendencies of the century, being an able technician in most respects, and a pleasing artist, but one who lacked the genius to produce a new style.

During the fifteenth century the Sienese school lagged behind the Florentine, the true heir of its sentiment and color being the *Umbrian school* (q.v.), which developed an ecstatic and sentimental type, although throughout its life the school was influenced by the Florentine. The first painter in whom we find this distinctly Umbrian sentiment is Niccolo da Foligno (d. 1502), a pupil of Benozzo Gozzoli. At Perugia some progress was made by Benedetto di Buonfiglio (d. c.1496), although he never mastered drawing, and by Fiorenzo di Lorenzo (d. 1521). The first to accept the Florentine Renaissance was Piero degli Franceschi (d. 1492), a learned painter who wrote a treatise on perspective. His pupil, Melozzo da Forlì (1438-94), achieved admirable results in foreshortening, but the pupil of Franceschi and Da Forlì, Giovanni Santi (d. 1494), the father of Raphael, was an artist of little originality. The most distinguished pupil of Piero degli Franceschi was Luca Signorelli (1441?-1523), who was rather Florentine than Umbrian in spirit. A master of anatomy, he relied only upon the human figure to express emotion, foreshadowing in this regard and in his exaggerated action the genius of Michelangelo. More distinctly Umbrian was Pietro Perugino (1446-1523), the master of Raphael, who clothed Umbrian sentiment in a Florentine garb. His strong points were grace in composition and a richness of color, due to his successful use of oil painting. The art of Pinturicchio (1454-1513) resembled that of Perugino in type and sentiment, save that it was decorative in character. At Rome the popes were munificent patrons, but there was no native school, the talent being imported from other parts of Italy. Nor was there a noteworthy native school in Naples or in Sicily, where the taste rather inclined to the art of the Netherlands.

There is no connection between *Paduan* painting of the fourteenth century and the school established by Francesco Squarcione (1394-1474) in the latter half of the fifteenth. Its chief characteristics were the statuesque character of the figures, which are usually coarse and heavy, and the wealth of classic ornamentation employed. (See SQUARCIONE.) Andrea Mantegna (1431-1506), the chief master of the school, understood the antique more thoroughly than any other painter of the Early Renaissance, combining with this knowledge a trenchant real-

ism, and achieved the greatest results of the century in foreshortening. The influence of the school of Padua extended throughout Northern Italy, where it occupied a position analogous to that of the Florentine in Middle Italy.

At *Venice* Byzantine art dominated longer than anywhere else in Europe, and even in the early fifteenth century the painters were craftsmen rather than artists. A great influence, however, was exercised by Gentile da Fabriano, especially upon the school of the outlying island Murano, the chief representatives of which belonged to the Vivarini family, whose work also shows Paduan influence. Carlo Crivelli (d. 1494?) in his repulsive figures and decorative motifs was essentially Paduan, only revealing his Venetian origin in a superior color. The eldest member of the Bellini family, Jacopo (d. 1470), followed Gentile da Fabriano to Florence, but also worked in Padua, where Mantegna became his son-in-law. His son, Gentile (d. 1507), treated Venetian subjects with open-air effects and knowledge of light and atmosphere. A second son, Giovanni (d. 1516), was the true founder of those qualities of color which distinguished the Venetian school. At first under Paduan influence, he adopted the oil technique recently introduced into Venice, securing transparent and harmonious effects. Of the pupils of the Bellini, Vittore Carpaccio (d. c.1522) developed legendary subjects, while Cima da Conegliano (d. after 1508) excelled in modeling and in light and shade. Marco Basaiti (d. 1521), although he brought oil technique to high perfection, possessed little originality, as is also true of Vincenzo Catena (d. 1531), the portraitist. Of very great importance for Venetian and Italian art was the Sicilian portrait painter Antonello da Messina (d. 1493), by whom oil painting was introduced from Flanders into Italy.

At *Ferrara* a school arose, chiefly under Paduan influence, but more charming in color. (See FERRARESE SCHOOL OF PAINTING.) The founder was Cosimo Tura (d. 1498?), and its chief artists were his followers, Francesco Cossa and Lorenzo Costa (1460-1535). They afterwards removed to Bologna, where Costa's rugged and manly style was softened by Umbrian sentiment. He was probably the master of the Bolognese Francia (1450-1518), in whom Umbrian sentiment preponderated, and who was in later life somewhat influenced by Raphael. The work of Francia's pupil Timoteo Viti (1469-1523) is pervaded by delightful sentiment and a deep poetic feeling, which he probably imparted to Raphael.

In the cities of *Lombardy* were schools of some importance, though none of them, during the fourteenth century, achieved the eminence of the Paduan or Venetian schools. The school of Verona, founded by Vittore Pisano (d. 1456), was influenced by Padua as regards the modeling of the figure, but was independent in its color scheme, which, notwithstanding the use of several bright tints, tended to be gray or brown. The founder of the early Milanese school was Vincenzo Foppa (d. 1492), and its greatest representatives were Borgognone (d. 1523) and Bartolomeo Suardi (d. 1529-36), called Bramantino.

HIGH RENAISSANCE (1500-50)—ITALY. The highest development of Italian painting falls,

roughly speaking, in the first half of the sixteenth century, though works belonging properly to the High Renaissance were produced in the last decade of the fifteenth, and the Venetian school maintained its excellence almost to the end of the century. A deeper study of the antique, though not to the neglect of nature, brought artists nearer the ideal type. Certain mighty geniuses arose, uniting in themselves, each in a different fashion, the best elements in the rich art of the fifteenth century, and produced the highest development of figure painting the world has ever seen.

Most of the leaders of the movement were either born or trained at Florence. Leonardo da Vinci (1452-1519) was the pioneer. The greatest all-round scientist of the day, besides being a musician and a sculptor, he was also the greatest theorist on art, which especially qualified him for teaching. He achieved the greatest mastery hitherto attained over atmosphere, light, and modeling. Nevertheless, his paintings charm more by the sweet and majestic presence of his figures, and by mysterious sentiment, which pervades them, than by their technical qualities. Though Michelangelo Buonarroti (1475-1564) was primarily a sculptor, no artist of the Renaissance had a greater influence upon painting. He made no progress over his contemporaries in the essentially pictorial qualities, but in his great fresco cycle in the Sistine Chapel he obtained the highest possible perfection in drawing of the human figure and in decorative effect. The quality of his purely subjective art which most impressed itself on his contemporaries was his tendency toward the gigantic in form and the violent in action. Directly the opposite was Raphael (1483-1520), the most objective of painters, whose art was a composite of the best elements in Middle Italian art. Himself an Umbrian, he acquired poetic sentiment from Timoteo Viti and tenderness from Perugino; at Florence he learned composition from Fra Bartolommeo, modeling and subtle charm from Leonardo, and from Michelangelo drawing and force. But all these qualities were duly assimilated, and his art was pervaded by an individuality, which especially revealed itself in a wonderful harmony.

Even after this great trinity had left Florence, important artists remained. The works of Fra Bartolommeo (1475-1517), a pupil of Roselli, are pervaded by deep religious feeling, and reveal high technical qualities, especially in color. His co-worker Albertinelli (1474-1515) has an art resembling his, though it was less religious. Of greater importance than either was Andrea del Sarto, the best colorist of the Florentine school, in fresco as in oils. He attained the highest technical qualities that had hitherto been attained in brushwork, warmth of color, and atmospheric effects. His chief pupils were Franciabigio, who excelled in portrait painting, Jacopo Pontormo, and Il Rosso.

At Milan, from about 1485 till 1499, Leonardo da Vinci was at the head of the academy founded by Lodovico Sforza, exercising a predominant influence upon painting there. The most important of his pupils and followers were Andrea Solari (born c.1460), who attained many of his master's high qualities; Bernardino Luini (d. 1531?), the most important of the group, in whose art Leonardo's vigor is replaced by graceful, pathetic sweetness; and Gaudenzio Ferrari

(d. 1546), who was grander in style and more brilliant in colors, though often excessively sentimental. Among the less important though still good painters of the school were Beltraffio (1467-1516), Marco d'Oggiono (d. 1530), and Cesare da Sesto.

Properly speaking, there was no distinctly Roman school of painting, the term being applied to the pupils of Michelangelo and Raphael, and the Mannerists who labored there after them. Of Michelangelo's pupils, the principal was Sebastiano del Piombo (d. 1547), a Venetian, who had studied under Bellini and Giorgione, and attempted to unite Venetian color with Michelangelo's line; others were Marc'cello Venusti (b. 1515) and Daniele da Volterra (1509-66). Of Raphael's pupils, Giulio Pippi (Romano) (1492-1546) was the chief, but even in his work Michelangelo's influence is predominant. Though excellent as a draughtsman, his violent compositions tended toward the Baroque. Others among Raphael's pupils were Francesco Penni (died 1528), Giovanni da Udine, Perino della Vaga (1500-47), and Polidoro da Caravaggio, the last three being mainly decorators. Andrea Sabbatino (died c.1545) transmitted Raphael's art to the south of Italy, where it prevailed for the remainder of the century.

At Siena, art, which had lain dormant during the fifteenth century, was resuscitated in the sixteenth by Antonio Bazzi (1477-1549), generally known as Sodoma, a pupil of Leonardo, who treated the human figure with much grace and expression. The most important of his numerous pupils was Baldassare Peruzzi (1481-1536), an architect and a fine decorative painter. Girolamo della Pacehia (born 1477) was rather a rival than a pupil of Sodoma.

The painters of Ferrara and Bologna are often classed as followers of Raphael, though wrongly so, since they maintained a distinct local character. Their chief characteristics were a cool though pure scheme of color, a less conventional composition than the Romans, and an original use of landscapes as background. The most important representatives were Dosso Dossi (c.1479-1542), a pupil of Costa, who was also influenced by the Venetians; Garofalo (1481-1559), best known from pictures on a small scale from Bible history, who was influenced by Raphael. Other prominent contemporary artists of the school were Mazzolino, Bagnacavallo, and Innocenzo da Imola. The High Renaissance of Northern Italy (outside of Venice) found its greatest master in Correggio (1494-1534). The pupil of various obscure masters, but active chiefly in Parma, he was the principal exponent of the nature worship of the Renaissance—of the material beauty of things, and of poetic sensuality. His technical advances were in the treatment of light and shade, and in perspective.

The Venetian school of painting (q.v.) differed from others principally in this respect, that it sought only pictorial effects. Its painters developed color as it had been developed nowhere else in the world, treating light and shade in such a manner as to bring out all local tints, and were the first to practice a broad and facile brushwork. The chief painters of the High Renaissance in Venice were directly or indirectly pupils of Bellini. The pioneer was Giorgione da Castelfranco (c.1478-1511), in whose

hand the new oil medium was used with subtle skill to portray the effects of light and color in landscape, which he created on a new and unprecedented scale, as well as upon the human figure. Palma Vecchio's (d. 1528) color was gaudier than Giorgione's, and he painted everything in a bright golden light. He is chiefly known by female portraits of highly developed charms. Lorenzo Lotto's (d. 1556) art was more subtle, being charming, even coquettish, in style.

As a painter pure and simple, Titian (1477-1576) was the greatest of the Italian school. He was the first to handle a brush with absolute freedom and facility, and in his art the sensual beauty, harmony, repose, and gorgeous glow of color of the Venetian school found its culmination. He has shown us, perhaps, as no other has done, the ideal, free and happy, unfettered by the real. Among the large number of his assistants and pupils was Paris Bordone (1500-71), whose art resembles Titian's, though it is more realistic, and found its best expression in portraits. The works of the three Bonifazi are idyllic in feeling, brilliant, and rich in color. Likewise under Palma's influence stood Rocco Marconi (born c.1505), who learned the elements of his art from Bellini.

The Renaissance lasted longer in Venice than elsewhere, and almost to the end of the century painters of the highest rank appear. Among these, Tintoretto (1518-92) sought to combine with the color of Titian the line of Michelangelo in his violent and impetuous style. Paolo Veronese (1528-88) continued the original tendencies of the Venetian school, both as to color and subject, developing *Existenz-Malerei* (painting expressions of the joy of living) to its highest extent. It was mostly decorative. He was par excellence the great painter of banquet scenes.

The artistic influence of Venice also extended to its subject territories on the mainland. At Udine Pellegrino (d. 1547) and Pordenone (1483-1539), a decorative painter of high dramatic power, were active. Though under Venetian influence, the Brescian school had very distinct characteristics, chief among which was a silvery tone. Its chief master was Moretto (1498-1555), a very individual artist, able in composition, fine in line, and delicate in color. His pupil Moroni (d. 1578) excelled in his portraits, which are essentially modern and realistic in spirit.

HIGH RENAISSANCE—GERMANY. In the early sixteenth century German painting reached its highest development. Gradually emancipating itself from the detailed execution incidental to its connection with engraving, it paid more regard to the ensemble, and while holding fast to the realism peculiar to German art, it aimed at a loftier and more ideal treatment. Although this change was in part due to Italian influence, German art continued to maintain a distinct national character.

It was reserved for Nuremberg to produce the most original and imaginative German artist of all times. The pupil of Wolgemut, Albrecht Dürer (1471-1528), inherited the angularity of line and detail of the German school. The Italian influence (Barbari and Bellini), to which he was subjected, tended to soften and idealize his art, but without loss of individuality. Perhaps greatest as an engraver, he was, nevertheless, strong and effective as a painter, admirable in line and often excellent

in color. His pupils Schäufelin and Hans von Kulmbach combined his style, the latter inclining more to Italian methods. Followers of Dürer also were the 'Little Masters,' rather engravers than painters, and so called because of the size of their plates. They included such artists as Georg Penz (d. 1550) and the two Behams.

In the sixteenth century the centre of the *Suabian school* shifted to Augsburg, where the Renaissance developed a more restful composition, better use of color, and more sense of the ensemble than anywhere else in Germany. The founder of the school was Hans Burckmair (1473-1531), a pupil of Schongauer, and about 1508 Hans Holbein the elder adopted the Renaissance, bequeathing to his son his realistic style and conception. Hans Holbein the younger (1497-1543), the greatest painter Germany ever produced, excelled in all the essentially pictorial qualities, and knew how to combine fine detail with a good ensemble. Although influenced by Mantegna, he was self-sufficient and individual in his forceful realism. The other centres of the Suabian school are less important. The Renaissance came into Ulm through Martin Schaffner (mentioned c.1500-1535), remarkable for his graceful and fine composition; prominent as a portraitist was Bernard Strigel (d. 1528?). At Kolmar (Alsace) flourished Matthias Grünewald, the 'Correggio of Germany,' unique among German painters in his attention to color, light, and atmosphere, rather than detail. The chief painter at Strassburg was Hans Grün Baldung (c.1476-1545), whose works show the influence of Schongauer and Dürer. The so-called Saxon school was founded by Lucas Cranach (1472-1553), a Franconian master, whose work, though typical and interesting, is angular and strained, without shadows or aerial perspective.

THE DECLINE. As early as 1530 the decline of the Renaissance in Italy began. In the forms of Raphael and Michelangelo the *Mannerists* (q.v.) executed great crowded compositions, of exaggerated action and striking effects of light and shade, and only in portraiture were they tolerable. At Florence Bronzino (d. 1572) and Vasari (1511-74) were among the chief masters; at Parma Parmegiano (1504-40), at Urbino Barocci (1528-1612), who followed Correggio; at Rome the brothers Zuccari and many lesser masters. The Siennese school alone remained true to nature, as did Luca Cambiaso (1527-85) at Genoa. At Venice the Mannerists came later, and maintained still something of the glory of Venetian color, as is evident in the dashing technique of Palma Giovane (1544-1628) and the fine color of Padovanino (1590-1650).

In the *Netherlands* the influence of Italian art did not at first destroy the native development. The principal Flemish painter of the early sixteenth century, Quentin Massys (d. 1530), introduced genre painting, life size figures and Renaissance background, the last under Italian influence, to which he became subjected late in life. So did Lucas van Leyden (1494-1533), the most important painter of the early Dutch school, whose works are original in composition and type, and brilliant in color. Massys founded the school of Antwerp, which henceforth becomes the centre of Flemish painting. Its painters sought to graft Italian art upon the Flemish stock, as did also the less numerous contemporary Dutchmen. Among the principal represen-

tatives are Jan Mabuse (d. 1541), Barend van Orley (d. 1542), Lambert Lombard (1505-66), Frans Floris (d. 1570), and others; the portraitists Jan van Scorel and Antonis Mor; the landscapists Joachim Patinir (d. 1524), Hendrik Bas (Civetta), Paul Bril, and the Breughels.

In France during the sixteenth century Flemish art, as well as Italian, found patronage at the Court of Francis I. Jehan Clouet (d. 1541?) and his son François (d. 1572), Court painters to Francis I., were thorough Flemings. But the King's chief importations were Italians, and the extensive decorations of Il Rosso, Primaticcio, and others at Fontainebleau, gave the tone to French art of the century. The principal native artist was Jean Cousin (d. 1589), a man of great talent and versatility, whose surviving works show Italian influence.

In Spain the Netherlandish influence disappeared, except in portraiture, both Alonzo Sanchez Coello (died 1590) and his pupil Pantoja de la Cruz (d. 1609) preserving the manner of Antonis Mor. All native originality was engulfed in a mannered Italian style, as exemplified in Berruguete (d. 1561), Becerra (d. 1570), and Morales (d. 1586), of the Castilian school; and in Vergas (d. 1568) and Vicente Joanes (d. 1579), founders respectively of the schools of Andalusia and Valencia. Toward the end of the century the influence of the Venetian colorists, combined with some originality, appears in the works of Navarette (d. 1579), called 'El Mudo,' and of Theotocopuli 'El Greco' (d. 1625), at Toledo, whose chief pupil was Tristan (1586-1640). The same tendency may be seen in the works of Roelas (d. 1625), the chief master of the early Andalusian school, in whose works the national Spanish characteristics first appear. Pacheco (d. 1654), the master of Velazquez, was a mere teacher. At Valencia Francisco de Ribalta (d. 1628) was a pupil of the Carracci, and was influenced by Sebastiano del Piombo. The Valencian school, however, became absorbed in the Andalusian, with a centre at Seville, chiefly under Church patronage, while the chief seat of the Castilian school became Madrid, under Court patronage. The difference between the Spanish schools is rather geographical than artistic.

THE SEVENTEENTH AND EIGHTEENTH CENTURIES.

From a technical standpoint the seventeenth century is the golden age of painting. Technical perfection had been achieved by a few great masters during the Renaissance; but it was not prevalent to the same general extent, and the seventeenth century certainly made advances in the treatment of atmosphere and of light and shade. It saw a broadening of the sphere far beyond the bounds of the old monumental figure painting—an unprecedented development of landscape, genre, and portrait painting. Although it saw the rise of Eclectics as well as Naturalists, it was a realistic rather than an idealistic period. It developed easel painting rather than great decorative pieces. Italy was no longer the seat of the highest artistic development, the sceptre passing to France, and especially to Spain and the Netherlands, where great naturalistic schools developed.

ITALY. Toward the end of the sixteenth century the reaction against Mannerism became manifest in two widely different schools: the Eclectic and the Naturalistic. While not neglecting the study of the antique and of na-

ture, the *Eclectics* sought to combine the excellence of all schools: Michelangelo's line, Titian's color, Correggio's light and shade, Raphael's grace. The pioneers of the movement were the three Carracci brothers, who about 1580 founded the first art academy, in the modern sense, at Bologna. (See BOLOGNESE SCHOOL OF PAINTING; CARRACCI.) They produced an art admirable in technical qualities, but lacking in originality and genius. Of their pupils Domenichino (1581-1641) was the strongest and most conscientious; Guido Reni (1575-1642) the most gifted, but inclined to sentimentality. There were less important schools at Milan, Cremona, Ferrara, and at Rome, where flourished Carlo Maratti (1625-1713), an inferior kind of Guido Reni. The Florentine school maintained a semi-independent position, deriving inspiration from Andrea del Sarto.

Contemporary with the Eclectics there flourished in Italy the *Naturalists*, who went more directly to nature than they. Their version of nature was an extravagant one, delighting in scenes of passion and bloodshed. Their chief technical characteristics are the use of dark shadow masses, whence the name the 'Darklings' (*Tenebrosi*), and strong light effects; their line was coarse and strong, and their brushwork harsh. The chief seat of the school was Naples, where it maintained its position as much by the use of poison and the dagger as by artistic production. Caravaggio (1569-1609), the founder of the school, painted figures of the street as saints and angels and genre pictures with much dramatic power. His chief pupil, the Spaniard Ribera (1588-1656), a painter of great strength and fine color instincts, delighted in the gloomy subjects favored by his race. Salvator Rosa (1615-73), likewise of Naples, was a remarkably versatile painter of historical genre and landscape subjects.

FRANCE. Throughout the seventeenth century the Italian influence prevailed in France. The Realists, like the three brothers Le Nain, and Valentin, a follower of Caravaggio, were in the minority. Men like Freminet (d. 1619) and Vouet (d. 1649) were Mannerists after Italian models. The most important French painter of the century is Nicolas Poussin (1593-1665), the founder of the classic element in French art, whose works represent a purer classical sentiment than Mannerism. He was practically the founder of the so-called heroic landscape (q.v.), which was further developed by Gaspard Poussin (1613-75), and to its highest extent by Claude Lorrain (1600-82). Beautiful and rich in color, and pervaded by a golden or silver haze, his landscapes are full of profound poetic feeling. The establishment of the French Academy at Rome strengthened the connection of French and Italian art. Charles Lebrun (1619-90), who dominated the art of the reign of Louis XIV., painted enormous canvases of classical subjects glorifying the King—works of some decorative merit and original in composition, but poor in other respects. Of about the same merit were the religious paintings of Lesueur (1616-55), an imitator of Raphael. Sébastien Bourdon (1616-71) was more of a colorist, as was also Pierre Mignard (d. 1695), who succeeded Lebrun. The portraitists of the epoch, of whom the chief representative is Philippe de Champagne (1602-74), are far more pleasing.

SPAIN. The seventeenth century was the golden age of Spanish painting. An art distinctly national in character arose, with a trenchant realism, combined with Catholic devotion, emphasis of light and shade, and a broad execution as its chief characteristics. In the works of Herrera the Elder (1576-1633), at Seville, first appears the striking realism developed so consistently by his pupil Velazquez (1599-1660), who was not only the chief master of the Spanish school, but who, perhaps, achieved the highest technical perfection ever attained. He paints his figures in full atmosphere without artifice in light and shade. They are frankly naturalistic, but individual and characteristic. The color values and the relation of light and shade are perfectly rendered, the brushwork is sure and without effort. His pupils, Mazo (d. 1667), Carreño de Miranda (d. 1685), and others, continued his manner, and the last important painter of the Castilian school was Claudio Coello (d. 1693), whose style was founded upon Titian and Rubens. At Seville Zurbaran (1598-1662), a pupil of Roelas, painted ecstatic religious subjects with Venetian breadth of treatment and heavy shadows, reminiscent of Caravaggio, while Cano's (1601-67) paintings were statuesque in character. The chief master of the Andalusian school was Murillo (1618-82), in whose works the Spanish characteristics, realism and religious ecstasy, are gracefully blended, with charming color effects.

FLANDERS. Under the leadership of Rubens (1577-1640), the Antwerp school developed an art which, though essentially Flemish as regards its characteristic realism, was much influenced by Italy. His figures lack beauty of face and tenderness of feeling, but they are strong and robust, full of life and spirit. No painter ever produced pictures more brilliant in line and color. His chief pupil was Van Dyck (1599-1641), celebrated for refined aristocratic portraits. Jordaens (1593-1678), coarser and more Flemish than Rubens himself, was rather his follower. Other followers were the portrait painter Cornelius de Vos, and Snyder (d. 1657) and Fyt (d. 1661), painters of game, still life, fruits, and flowers. At the same time there flourished a school of genre painting more distinctly Flemish in character, and resembling the contemporary 'Little Masters' of Holland. The chief representatives are Teniers the Younger (1610-90), who pictured scenes from ordinary life, and Gonzales Coques (1618-84), whose subjects were more refined.

HOLLAND. Dutch painting differed from that of other countries in that it was bourgeois instead of aristocratic. Its prime object was the decoration of the home, and it consequently produced chiefly the small panel pictures. Beginning with portraits, Dutch painting developed in every direction, genre, landscape, cattle, still life, all within a single century—the seventeenth. Among the earliest portraitists were Mierevelt (1567-1641), Ravesteyn (d. 1657), and Keyser (d. 1667), but the chief master of the Haarlem school was Frans Hals (c.1584-1666), one of the greatest portraitists of all times. An astonishing realist of delightful humor, he painted his pictures in full light, and excelled in all pictorial qualities, his strength being only equaled by his facility. The greatest painter in Dutch art was Rembrandt (1606-69), of the

Amsterdam school, the master of light and shade. In the emphasis achieved by the use of high lights, in luminosity and transparency of shadows, and in harmony of warm, rich color, he has never been surpassed. A master of realism and characterization in portraiture, he nevertheless grasped universal truths, and in landscape and genre he showed the same breadth of view. His chief pupils were Bol, Flinck, and Eeckhout. Of quite a different character was Van der Helst (d. 1670), whose well-modeled heads were more precise and detailed. Among Dutch genre painters, one class devoted itself to peasant scenes, especially in the tavern, coarse in subject, but highly picturesque in character and fine in color; the chief representatives were Adriaen van Ostade, Brouwer, and Jan Steen. Another class, including Gerard Dou, Metsu, Frans van Mieris the elder, Netscher, Jan van der Meer of Delft, and Egdon van der Neer, devoted itself to society of a higher social scale, usually interiors, painted with the greatest detail; the best of this group are the refined Terborg and Pieter de Hooghe.

The Dutch landscape differs from the classic in its realism (see LANDSCAPE), and in the substitution of beauty of tone for that of color, which is subordinated to a prevailing brown scheme. It shows a thorough knowledge of the forms of natural objects and of aerial perspective. Following earlier landscapists like Van Goyen (d. 1656) and Salomon van Ruysdael (d. 1670), the school culminated in Jacob van Ruysdael (c.1625-82) and Hobbema (c.1638-1709). The former's talent was of a gloomy and tragic character; the latter's a sunnier and more friendly. Both confined themselves chiefly to Dutch scenes, while others of the Dutch landscapists made extensive travels. Allart van Everdingen (d. 1675) visited Norway, while Berchem, Dujardin, and Pynacker produced classic Italian pieces. Among cattle painters with whom, however, the landscape is of equal importance, were Paul Potter (1625-54), a harsh realist, Adriaen van de Velde (d. 1672), and Albert Cuyp (1620-91). Of marine painters the most important were Backhuysen (d. 1709), who portrayed the tempest, and Willem van de Velde the younger (d. 1707), who preferred the smooth haven, with ships riding at anchor. The work of the numerous still-life painters is characterized by emphasis of detail. Among these the principal painters of flowers were Jan de Heem, Van Huysum, and Rachel Ruysch; of dead game, Weenix and Van Aelst; of poultry, Hondcoeter; of pots, pans, dishes, and vegetables, Kalf.

Eighteenth Century. The eighteenth century is the transition from the aristocratic art of the seventeenth to the more democratic art of the nineteenth. On the one hand it witnessed, especially in France, an after-development and the decline of the art of the seventeenth; on the other, it saw in England the rise of what may be called an art of the middle classes, which came to prevail universally in the nineteenth century.

With the Regency and the reign of Louis XV., painting in France assumed the frivolous character of the changed Court life, producing admirable decorative pieces for boudoir and hall, charming in color and light in touch. The most important master of the period was Watteau (1684-1721), who depicted the delicate and skillful genre pieces of fashionable life. His best pupils

were Lancret and Pater, who continued his style with success, but with Van Loo and Boucher it degenerated into extravagances. Fragonard (1732-1806) was a superior painter, especially in color effects. The principal landscape painter of the day was Joseph Vernet, the chief portraitist Hyacinthe Rigaud. Contemporary with the Court painters were others who painted genre scenes from the life of the middle classes, like Chardin, a good colorist and an able realist, and Greuze, well known through his heads of young girls.

In Italy a style prevailed, originated by Pietro da Cortona (1596-1669), and developed by Luca Giordano (1632-1705), the principal characteristic of which was rapidity of execution. Only in Venice was there real artistic activity. The genre painters Piazzetta and Longhi were followed by Tiepolo (1697-1770), the last great Venetian. With an art based upon Veronese, though lighter in color, he painted in a dashing style, but with a strong, picturesque realism. Canaletto and Guardi painted Venetian scenes with fine color effect. In Spain the dearth of talent was broken by Goya (1746-1828), an intense realist of grotesque imagination, who handled his brush with almost the ease of Velazquez, and treated light and shade in a peculiarly individual manner.

ENGLAND. A prelude to modern painting took place in England during the eighteenth century, which, however important, stands apart from the general development. Up to this time the demand for artists had been supplied by importations, chief among whom were Holbein, Van Dyck, Lely, and Kneller. Consequently there was no tradition to break, and English artists were the first to turn directly to nature. The first native painter of note was William Hogarth (1697-1764), a coarse realist of original technique, who used art as a vehicle of inculcating moral ideas. He was, however, less influential than Sir Joshua Reynolds (1723-92), the founder of the academic element in English painting. His art was eclectic, but his portraits are dignified realistic presentations. Far more original was Gainsborough (1727-88), who went directly to nature for inspiration, and whose highly poetic temperament is as evident in his portraiture as in his landscapes, in which he is an innovator. The art of Romney (1734-1802), another portraitist, was midway between that of Reynolds and Gainsborough. In landscape Richard Wilson (1713-82) continued the classic manner of Claude, while in Morland (1763-1804) England produced a most able painter of genre and animal subjects. At the same time a school of water-colorists, founded by Cozens (1752-99) and Girtin (1775-1802), introduced brightness of tone and *plein air* methods, preparing the way for the modern landscape. This medium, further developed by Thomas Stothard (1755-1834) and Turner, has always been one of the strong points of the English school.

MODERN PAINTING.

FRANCE. Owing to the intelligent patronage of the State, as well as to the artistic character of the people, the hegemony in the fine arts in the nineteenth century, especially in painting, has belonged to France. Here the epoch-making movements in its development have originated, and the chief representatives have appeared.

The first great factor in modern painting was the *Classical Reaction* upon the Rococo

art of the *ancien régime* corresponding with the French Revolution in politics. Neglecting the essentially pictorial attributes, it sought the chief beauty of art in form, as shown in ancient sculpture, and preferred to depict strictly classic subjects. The leader was David (1748-1825), dictator of art under the Republic and the first Empire, where his teachings prevailed for half a century. His dignified and statuesque style was continued by many pupils, among whom were Girodet, Guérin, Regnault, Vincent, Prud'hun (1758-1823), a good colorist, who stood rather apart from the rest, while Gros (1771-1835), in his Napoleonic battle-pieces, led the way toward Romanticism. Ingres (1780-1867) modified Classicism by the study of Raphael and the great Italians, greatly improving its modeling. To his influence the fine draughtsmanship of the modern French school is perhaps chiefly due.

Corresponding with the romantic revolt in literature was one against the prevailing classic traditions in painting, which began about 1830. Romanticism saw in the expression of the painter's emotional nature the highest beauty of art. Disregarding classical restraint in line and composition, it placed the chief emphasis upon color and natural truth. Géricault (1791-1824) made the beginning, but upon his early death the leadership passed to Delacroix (1799-1863). In warm prismatic colors and with regard for the general effect only, he depicted tragic subjects in a highly dramatic manner. His disciples include the realist Gigoux, the younger Isabey, and others who painted historical subjects, like Devéria, Cogniet, Roqueplan, Robert Fleury. The Orientalists were Romanticists, who, following Delacroix's example, went to the Orient for subjects. Among the best known are Decamps (1803-60), Marilhat (1811-47), and Fromentin (1820-76). To the same group belong later the painters Théodore Frère and Ziem, the latter famous for Venetian scenes, and Regnault (1843-71), also a fine portraitist.

The *Barbison* painters represented the emotional impulse of Romanticism as applied to landscape. Influenced by the *plein air* work of Constable and Bonington, they went directly to nature, portraying it with fine feeling for light, atmosphere, and color. Their pictures were never photographic, but expressions of poetic moods. Corot (1796-1875) was the lyric talent of the group, the painter of the silvery tones of morning and evening; Rousseau (1812-67), the epic, treating the majestic phases of nature; Jules Dupré, the dramatic; Diaz, the fantastic. To the same group belong Daubigny (1817-78), Chintreuil, and Français, and later painters like Cazin and Harpignies, the latter being rather realistic. The most prominent animal painters were Troyon (1810-65), who renders the character of cattle in truthful fashion; Jaques, the sheep painter, and Van Marcke, pupil of Troyon. More realistic and far less artistic in feeling are the animal painters Auguste and Rosa Bonheur. At Barbison also lived Jean François Millet (1814-75), who has depicted the dignity of life and labor of the French peasant with great force and simplicity and high artistic feeling. Jules Breton (1827—) is more academic and less of a thinker.

Meanwhile painters had begun to unite the excellencies of the contending factions. Under

Louis Philippe, Delaroche (1797-1856), a popular but weak painter of historical scenes, united romantic subjects and color with classic line, as did Horace Vernet, the battle painter, and Ary Scheffer. More classic in character were Flandin, 'the religious painter of France,' Gleyre, and the Neo-Greeks, like Hamon, Aubert, and Gérôme, in the earlier part of his career. The term Semi-Classicists is applied to a group of painters under the Second Empire, who combine academic training, romantic color, and realistic treatment, like Cabanel, Bouguereau, Gérôme, Lefebvre, and perhaps Henner. Among the chief portrait painters are Bonnat, the realist, and Carolus-Duran, while Laurens (1838—), Benjamin Constant, and Rochegrosse treat historical subjects. Baudry (1828-86), the decorator of the New Opera, is rather a follower of the Italians of the sixteenth century. In a class by himself stands the idealistic Puvis de Chavannes (1824-98), the great French decorative painter, whose art reminds rather of the early Florentines.

The third great factor in French art is *Realism*, as established in the forties by Gustave Courbet (1819-77). He advocated the abolition of academic law and of sentiment, and the portrayal of nature just as it is (see *REALISM*), and he practiced these theories in his strong materialistic painting. He had no direct pupils, but his influence has permeated French painting. The painters of military subjects and genre show realistic influence, like Meissonier (1815-91), whose art, however, is based upon seventeenth-century Dutch. Among his followers in fashionable genre Vibert is the best known; among the military painters are De Neuville and Detaille. The genre scenes of Ribot and Roybet are of a different kind and more artistic, while among still-life painters Vollon (1833—) has never been surpassed.

The fourth great factor in the art of the present day is so-called *Impressionism*, the advocates of which organized in 1874. Their progress consists in the abolition of the traditions of color and modeling, which the realists retained, and by rendering the impression they attained a better portrayal of life and motion. (See *IMPRESSIONIST SCHOOL OF PAINTING*.) Manet (1833-83) was the founder of the school; the present head is Claude Monet, the painter of pure daylight, and among its chief representatives are Pissaro, the founder of *pointillisme* (dotting with pure tints), and the figure painters Degas and Renoir. Akin to their art is the work of Monticelli (d. 1886). Their doctrine soon spread among other artists, winning such men as Besnard, Carrière, and Raffaelli, who have portrayed the picturesqueness of the lower classes. The art of Bastien-Lepage (d. 1884) is a compromise between realism and the new high light painting, as is that of his many followers, like Renouf, Dagnan-Bouveret, and Fantin-Latour. In late years an imaginative reaction against the materialistic side of impressionism, a new idealism, found expression especially in the Exhibition of 1900, in such men as Henri Martin, Aman-Jean, Fournier. The greatest of this group is Gustave Moreau (1826-98), whose numerous pupils have applied his maxims to every phase of modern life.

GERMANY. A great influence upon German art was exercised by the writings of the archaeologist Winckelmann (d. 1768). Raphael Mengs

(1728-79) put his theories into practice, and Carstens (1754-98) followed them to their logical consequence, utterly neglecting color and inaugurating the cartoon style, which so long dominated German art.

The reaction against Classicism took the form of an imitation both in form and religious spirit of Italian masters of the fifteenth century, inaugurated at Rome about 1815 by German painters generally known as the 'Nazarenes' under the leadership of Overbeck (1789-1869). (See *PRE-RAPHAELITES*.) Of these painters Cornelius (1783-1867) became head of the Munich school, and to meet the great demand for mural decoration, he practiced the cartoon style of painting, good in drawing and composition, but in which pictorial qualities were neglected. His chief follower was Kaulbach (1805-74), who used cartoon painting to express philosophic ideas. At Düsseldorf, on the other hand, under the teaching of Schadow, a school of painting arose, which paid attention to color, and represented the romantic tendencies of German art. (See *DÜSSELDORF SCHOOL OF PAINTING*.) The greatest German mural painter of the nineteenth century, Alfred Rethel (1816-59), was from the school of Düsseldorf, while the principal romantic painter, Moritz von Schwind (1804-71), came from Munich. Romantic landscape found its highest development in Karl Friedrich Lessing and his pupils, like the brothers Achenbach, while Friedrich Preller and Rottmann, by a revival of the heroic landscape, represented the classical tendencies.

A great change was effected in German painting by the French and Belgian colorists, and to the generation of the fifties Paris was the high school of art. The earliest of these French trained artists was Anselm Feuerbach, who refined the French influence by contact with the Italian. At Munich Piloty (1826-86) engrafted French color on the cartoonist style. Among his numerous pupils were the Austrian Makart (1840-84), who was a still greater colorist, and Gabriel Max. Meanwhile the genre pictures began to bring art back to real life; especially well known in this line are Knaus, Vawtier, Ramberg, Defregger, and Grützner.

The greatest change over German art, however, came after 1870, when historical painting definitely gave place to that of life—to realism. Most prominent among German realists is Menzel (1815—) of the Berlin school, likewise a great colorist. Neither he nor Pettenkofen (1822-89), a figure painter on realistic lines at Vienna, had influential following. In Munich there was a period of fruitful study of the old masters, the greatest product of which was the portraitist Lenbach (1836—), a brilliant colorist and delineator of character. Leibl occupied at Munich the same position as Courbet in Paris.

With the Munich exhibition of 1879, French Impressionist painting became known in Germany. The chief representatives of the new art are Liebermann at Berlin, a genre painter; Uhde, who paints Scriptural subjects in contemporary life and costume; and Max Klinger, the most brilliant of the younger painters. In a class for himself stands the Swiss Arnold Böcklin (d. 1901), brilliant in color, weird in imagination. At Vienna Klimt, leader of the Secessionists, represents Impressionist views. Munkácsy (d.

1900), the best known Hungarian painter, was rather Parisian in technique.

GREAT BRITAIN. Until late years English art was little affected by that of the Continent. Among portrait painters were the dignified and impressive Scotchman Raeburn (d. 1823), the vivacious and clever Laurence (d. 1830). The tendency was toward the historical picture of an academic order, in which two Americans, Copley (d. 1815) and Benjamin West (d. 1820), had high repute, as had Etty (d. 1849), Haydon (d. 1846), and Eastlake (d. 1865)—all mediocre as painters. The greatest of all, though without color sense or technical training, was the imaginative genius William Blake (1757-1827). England is the home of genre painting executed with high detail, like that of the Scotchman Wilkie (d. 1841), Mulready, Collins, Newton, and Frith. In landscape the English have been peculiarly original. Turner (1775-1851) is the great representative of the heroic landscape, which he developed with modern methods and dazzling color effects. Here also the *paysage intime* (see LANDSCAPE) originated, chiefly through John Constable (1776-1837), who was the first to eliminate the brown tone in favor of nature's blues and greens. Cox was his chief pupil, and Bonington the intermediary between his art and French.

The reaction against English academic tendencies came in 1848 through the Pre-Raphaelites (q.v.), among whom Rossetti was the best colorist, Holman Hunt the most detailed and laborious, Burne-Jones (d. 1898) the most decorative. Millais (d. 1896) soon became more of a realist, but Madox-Brown, Walter Crane, and Watts lean toward the Pre-Raphaelites in sentiment. Leighton (d. 1896) is more classical and academic. Among the best known contemporary painters are Holl, Herkomer, and Shannon; among landscapists Cecil Lawson, Stanhope Forbes, Alfred Parsons, Luke Fildes, and Henry Moore for marines. At Glasgow is a school having more affinity with Paris than with England, and which has been influenced by Whistler.

OTHER EUROPEAN COUNTRIES. Spanish painting after Goya followed the French, though adding some national touches. The greatest influence of the century was wielded by Fortuny (1839-74), a sparkling genre painter—a follower of Meissonier. Other important names are Madrazo, a facile portraitist, Zamañois, Zuloaga, a high light painter, and Rico, a painter of Venetian scenes. Italy has fluctuated between German and French influence, of late years the latter. The chief painter of the century is Segantini (d. 1903), the Italian Millet, whose grand Alpine peasant scenes are of a strikingly original style. Genre painting, in imitation of Fortuny, is much practiced by such well-known artists as Michetti, De Nittis, Boldini, and others, the last named being a portraitist Parisian in technique.

In Scandinavian countries the influence was at first German, but in late years, under Parisian teaching, important schools of high-light painters have arisen. The Danish (Johansen) is homelike and quiet in color, the Swedish more cosmopolitan and Parisian (Zorn), the Norwegian primitive (Thaulow). In Russia the early influences were Byzantine; but of late years a modern school has arisen, chiefly under French

influence, but with some strong national traits. Among the best known are Vereshchagin, the military painter, Repin, for historical, and Malyavine for figure subjects. In Poland there is a school extremely national in subjects, though not especially in technique, the chief representatives of which are Matejko and Semerazki. For the Belgian and Dutch schools, see NETHERLANDS SCHOOL OF PAINTING.

UNITED STATES. In the Colonial period British portraitists were active in America, but none of these possessed essentially American qualities. The Americans Copley, West, Lesley, and Newton were British painters, who passed most of their lives in England. Even after the Revolution American painting remained under British influence, although there was an inclination to follow the Italians in larger subjects. The principal historical painter of this early period was Trumbull (1756-1843), who depicted Revolutionary subjects. Gilbert Stuart (1755-1828), famous for his portraits of Washington, was the chief portraitist, and for the period an excellent colorist. Among other portraitists were Vanderlyn, Allston, the two Peales, Jarvis, and Sully—none of them, except Sully, ever rising above mediocrity.

About 1825 an indigenous art began to appear. It manifested itself principally in the landscape painters of the Hudson River school (q.v.), founded by Thomas Cole. The earliest painters of this school were self-taught, but its work improved with men like Durand, Kensett, and F. E. Church. Connected with this school, at least in sentiment, was the work of Hubbard, Bierstadt, Moran, and others, who painted extensive panoramas of the Rocky Mountains and similar grand scenery, and the work of Sanford, McEntee, Whittredge, Bradford, and Richards, who painted smaller but much better canvases. The portrait painters of the period were Harding, Elliott, Inman, Huntington, and Healey.

Meanwhile the influence of foreign schools, which was to some extent evident in the work of these men, began to make itself felt with greater force. That of the Düsseldorf school was represented by Leutze (1816-68), the painter of Revolutionary subjects. More important was the French influence, introduced by Hicks (1823-90), a pupil of Couture, and especially by W. M. Hunt (1824-79), who was a disciple of the Barbison school, the methods of which he introduced into this country. Important contemporary figure painters were George Fuller, Eastman Johnson, and Vedder, and especially John La Farge and Winslow Homer, both men of high technical accomplishments and great originality. In landscape there were Wyant, Inness (d. 1897), the most original and able American landscape painter, and Homer Martin (d. 1897).

The latest development may be said to have begun with the Centennial Exhibition of 1876, which revealed to American artists the achievements of foreign schools. Since that time it has been the general custom to study abroad, to some extent at Munich, but principally at Paris. Indeed, French methods have become quite generally adopted, although American art has remained national in its choice of subjects and in its conceptions. The principal centre of art is New York, and the new development is especially represented by the Society of American Artists (q.v.), founded in 1878, in opposition to the more

conservative National Academy (q.v.). Among the more important contemporary artists residing in America are W. M. Chase, an excellent technician in all respects, and in all subjects, Blum, Dewing, Thayer, and Kenyon Cox. Figure and genre painting are further represented by men like Simmons, Hassam, Wiles, Blashfield, and Turner; portraiture by Lockwood, Tarbell, and Vinton; landscape by Weir, Twachtman, Theodore Robinson (d. 1896), Horatio Walker and Maynard.

There is nothing essentially national about the American painters who practice abroad. Probably the most important artist of American birth was Whistler (1834-1903), the essence of whose work is refinement, both in conception and color. The work of the other Americans residing at Paris and elsewhere, like Alexander Harrison, Melchers, and Walter Gay, is rather French than anything else. Among the Americans at London E. A. Abbey (1852—) is a good colorist, and Sargent (1856—) is in many respects the greatest portrait painter of the present day.

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PAINTS. A paint is composed of a pigment, which is a solid substance ground to a fine powder, mixed with a liquid of such a nature that when spread in a thin film and exposed to the air it will turn into an adhesive and more or less tough solid substance, thus cementing the particles of pigment to each other and to the coated surface. The pigments used in paint-making are of various origins and compositions, but all are of such a nature as to have little or no chemical action on the liquid component. This liquid may be watery, like the solution of glue used in kalsomine, or an oil, like linseed oil; or it may be any kind of varnish. In all cases this liquid part of the paint is, while liquid,

called the *vehicle*, and when dry the *binder*. To the mixture of pigment and vehicle there is usually added a *drier* and a *solvent* or *thinner*. Special paints, like 'fire-proof' paints and ships' bottom paints, are considered separately in succeeding sections.

PIGMENTS. The only *white pigments* are white lead and white zinc, the former being a mixture of carbonate and hydrate of lead, and the latter an oxide of zinc. The *black pigments* are lampblack, boneblack, and graphite. Lampblack is mainly carbon, and results from the imperfect combustion of oil or gas, the latter being also known as gas black and carbon black. Lampblack is the finest in texture of all pigments, but different lots differ greatly in this respect. The finer grades are the more valuable. It contains some peculiar oily matter, and retards the drying of oil more than any other pigment, but it is, on the other hand, the most durable. The black pigment most commonly used (except in the special class of anti-corrosive paints) is boneblack, known also as drop black, and in the finer grades as ivory black. This contains about 10 or 12 per cent. of free carbon, to which it owes its color, the remainder being the mineral matter of the bone, 3 or 4 per cent. of carbonate, and most of the rest phosphate of lime. Graphite, or mineral crystallized carbon, is extensively used in anti-rust paints; it is flaky in structure and brownish-black in color; like all carbon pigments, it is extremely opaque; it is difficult to grind it to a fine powder. The most brilliant *red pigments* are vermilion and carmine. True vermilion, or English vermilion, is a sulphide of mercury. It is a pigment of great opacity and beautiful color, and tolerably permanent in ordinary use. Carmine is the most brilliant red known, and is an organic compound of alumina, such as is technically called a lake. It is rather transparent and is used as a finishing color. Some of the coal-tar dyes also make red lakes of great permanence and beauty. These reds are the only pigments of importance derived from coal-tar colors. Various iron oxides form the ordinary *brownish-red and brown pigments*; some of these are of a purple shade; all are deep in color and have great opacity. The hydrated oxides are brighter in color than the anhydrous. Many of these oxide pigments are made from ores containing clays, which make them brown, or, in the case of ochres, yellow. Sienna, which, when roasted, is exactly the color of old mahogany, and is used to stain light woods, is one of these earthy oxides. The most common *yellow pigment* is chromate of lead, which is an orange-yellow substance; the paler shades are made by the addition of sulphate of lead at the time of making the chromate. The pure orange chromate of lead is made by the addition of a solution of bichromate of soda to a solution of nitrate or acetate of lead; by adding sulphate of soda to the bichromate solution, and then mixing this with the lead solution, a mixed precipitate of chromate and sulphate of lead is produced; the sulphate is, therefore, a proper ingredient in medium and light chrome yellows. By precipitating Prussian blue in a similar manner with chromate of lead, chrome green is made. Cadmium yellow is a brilliant and valuable pigment, a sulphide of cadmium; the chromate of strontium is known as perfect yellow. Ochre makes a dull and impure kind of yellow. *Chrome*

green is the principal green; it fades badly. Paris green is an arsenical compound of copper, very brilliant, but not a very opaque pigment. Chrome oxide makes an olive green of a subdued but handsome color. It is probably the only permanent green. *Prussian blue* is a ferrocyanide of iron, dark blue, somewhat resembling indigo; but the most common blue is ultramarine, an artificial substance whose somewhat variable composition is known accurately only to its makers. It is only moderately permanent. The high price of cobalt blue prevents its extensive use; it is more permanent than other blues. The foregoing are the principal opaque body colors. Besides these there is a large class known as *lakes*, which are made by precipitating the color ingredients of various dyestuffs with suitable chemicals, usually compounds of alumina, barium, or lead. These lakes are commonly used to impart a desired tone to the more opaque pigments. *Madder lakes* are prepared from madder, and may vary in shade from pink through red and yellow to purple and brown. See **MADDER**.

VEHICLES. The principal oil used as a vehicle is linseed. This is made by expression from flaxseed; the crude oil is purified by settling, letting it stand two or three months in tanks at a temperature not lower than 70° F.; it is finally filtered. Linseed oil when spread in a thin film absorbs and combines with oxygen from the air, and is converted into a somewhat elastic leathery substance, commonly known as *linoxyn*. A few other oils have this power in a less degree, but only one equals linseed oil; this is known as *tong oil* or *Chinese wood oil*, and appears to excel linseed oil in this respect. It is, however, higher in price than linseed, and darker in color, so that it is not likely to be used.

DRIERS. Driers act by taking up oxygen from the air and giving it up to the oil. These driers are compounds of lead and manganese, in solution in the oil; these metals have the power of forming two sets of oxygenated compounds, the peroxidized ones having twice as much oxygen as the others. When in linseed oil they give up half their oxygen to the oil, then, being exposed to the air, they absorb a fresh equivalent of oxygen, which again the oil takes from them; in this way they act as carriers of oxygen from the air to the oil, acting, of course, only when the oil is spread out in a film and exposed to the air. Since the oil is thus converted into a solid dry substance, these agents are called driers.

SOLVENTS. Most oil paints contain some turpentine or other volatile solvent. It is generally agreed that turpentine is the best of these; it is slow to evaporate, and any residue which does not evaporate readily oxidizes into a durable resinous substance, highly elastic, while benzine, which is often used as a substitute, is more rapidly volatile. The turpentine mixture retains its complete fluidity some little time after brushing out into a film, and so the brush-marks flow out and disappear, and the whole surface becomes smooth and uniform; but benzine evaporates immediately, and the paint becomes comparatively stiff and shows brush-marks and all imperfections of surface. This is, of course, more marked still in varnishes. Benzine has also a tendency, in some cases, to cause a separation. Kerosene is also used as a substitute for turpentine, but

no good paint can be made with kerosene as an ingredient. Artificial turpentines are usually made of high boiling-point benzine or low boiling-point kerosene, scented with eucalyptus and other essential oils. They are not to be used.

FIRE-PROOF PAINTS. The best fire-proof paints are made by grinding into each gallon of paint about a pound of boric acid. Some manufacturers use instead a very soft and easily fusible glass which is powdered and used in the same way. The idea is that when exposed to heat the boric acid or the glass will melt and form an air-proof glaze over the wood; the boric acid also, being slowly volatile, penetrates the surface with a gas which neither burns nor supports combustion. None of these paints are at all fire-proof when fresh, as the oil is so combustible as to overcome the restraining influence of the flux; but when the oil has become oxidized, it no longer burns readily, and, of course, the pigment is in almost all cases incombustible, and the protective action of such paint is then very considerable. The fire-proofing quality of such a paint diminishes with age and exposure, as the boric acid dissolves out and is washed away by the rain.

SHIPS' BOTTOM PAINTS. In general, the subject of painting the bottoms of iron ships may be divided into the preservation of the metal from corrosion and the prevention of fouling. The former is secured by applying any good anti-corrosive paint, and the problem, so far, is like the preservation of metallic structures in general. Some of the paint manufacturers attempt to do this by a special paint; others aim to make their anti-fouling compounds keep the water from the metal plates and serve both uses. The anti-fouling paints work by poisoning the organisms which attach themselves to the ship, and are chiefly of three kinds. One of these has for its active agent the oxides of copper; these were, in the first instance, ground and mixed with Stockholm tar. The copper was supposed to dissolve slowly and to kill the adhering organisms. Its use was suggested by the successful use of copper sheathing on wooden ships, but the generally accepted theory of the action of copper sheathing is that it acts, not by poisoning, but by a process of exfoliation or scaling off; that animals attach themselves to it, but that an outer layer of the copper peels off and leaves a fresh surface. (See **SHEATHING**.) Another sort of copper paint is a copper soap, made by precipitating a solution of common soap with a solution of some salt of copper, thus making an oleate or some similar salt of copper. This is a soapy or greasy substance, insoluble in water, and is applied hot, making a thick coating. This is not a good foundation for animals or plants to attach themselves to, and it is continually wearing away. The third, and at present the most numerous class of paints, are the varnish paints, already partly described, made from a spirit varnish. The pigment in these may be almost anything; commonly it is oxide of iron, sometimes with some white lead or white zinc; sometimes the coloring matter is Paris green, or some green pigment suggesting copper. The poisonous matter may be some arsenical compound, but in some of the most successful ones it is a mercury compound. The arsenical compounds are very cheap and are undoubtedly poisonous, but the mercury compounds are more

intensely poisonous; that is, they poison with a less amount, but they are very expensive, costing for the most part about a dollar per pound of contained mercury. It may be doubted whether there is much choice among the mercury compounds, as the sea water will convert any of them into corrosive sublimate. The essential thing seems to be to get a varnish which will last as long as possible, regard being had to the absolute necessity of having one which will dry almost immediately, then to put in enough mercury or other poison to last as long as the varnish does, in quantity sufficient to kill everything with which it comes in contact.

MANUFACTURE. Paint being a composite substance consisting of a pigment, a vehicle, a drier, and often a solvent, it is evident that paint manufacture includes first the manufacture of the separate constituents, and second the mingling of these constituents. In large paint works all the ingredients as well as the mixed paint are made in one plant, but in many paint works one or more of the ingredients are purchased, the mixing only being done at the works. Generally described, the process of paint manufacture is to grind the pigment, vehicle, and drier together in special grinding mills, the liquid coming from the mill being the finished paint, which has then only to be sealed in cans or kegs to be ready for sale. The method of manufacturing the various pigments defined in the preceding paragraph differs in each case. Different vehicles, driers, and thinners are also made in different ways.

BIBLIOGRAPHY. Consult: Church, *Chemistry of Paints and Painting* (London, 1892); Terry, *Pigments, Paint, and Painting* (ib., 1893); Hurst, *Painters' Colours, Oils, and Varnishes: A Practical Manual* (ib., 1896); Standage, *The Artists' Manual of Pigments* (ib., 1898).

See MINERAL COLORS; OIL; TURPENTINE.

PAIRING. In parliamentary practice, an arrangement by which two members of a legislature who intend to cast opposite votes on a question agree that both will absent themselves for a limited time, thus leaving the relative strength of their parties unchanged. It has long been a recognized custom in the House of Commons. The first known instance in the United States Congress occurred in 1840. It was severely rebuked by John Quincy Adams, who prepared a resolution declaring that it involved the violation of the Constitution, of an express rule of the House, and of the duties of both parties. The resolution was never voted upon, and the practice, recommended by its obvious convenience, has since become common.

PAISIELLO, pā'ē-zyēl'ō, or **PÆSIELLO**, GIOVANNI (1741-1816). An Italian musician, son of a veterinary surgeon at Taranto. He received his musical education in the conservatory of Saint Onofrio at Naples. Of his earlier operas produced at Naples the most celebrated was *Dal finto al vero*, composed in 1777. Some of his best works, particularly *Il barbiere di Siviglia*, were written during an eight years' residence at Saint Petersburg. At Vienna he composed twelve symphonies for large orchestra, and the opera buffa *Il Re Teodoro*. Between 1785 and 1799 he produced a number of operas for the Neapolitan Theatre, and was appointed by Ferdinand IV. his *maestro*

di capella. In consequence of having accepted under the Revolutionary Government the office of national director of music, he was suspended from his functions for two years after the restoration of royalty, but was eventually restored to them. In 1802 he went to Paris to direct the music of the consular chapel; but the indifferent reception shortly after given to his opera *Proserpine* led him to return to Naples, where he died. His compositions are characterized by sweetness and gracefulness of melody, and a simplicity of structure remarkable for the period and country in which he lived. Besides no fewer than ninety operas, Paisiello composed masses, requiems, cantatas, an oratorio, instrumental quartets, harpsichord sonatas, and concertos.

PAISLEY, pāz'li. A manufacturing town, municipal and Parliamentary burgh of Renfrewshire, Scotland, on the White Cart, three miles above its junction with the Clyde, and seven miles west-southwest of Glasgow (Map: Scotland, D 4). The town comprises the old portion on the west bank of the river, with long regular streets of warehouses and factories, and the new portion to the east built on level ground. It has fine municipal and ecclesiastical buildings, and the restored remains of the abbey founded in 1164 are the best specimens of their kind in Scotland. The town has several parks and recreation grounds, including Dunn Square, the Fountain Gardens, the Brodie Park, and Saint James Park, with a race-course on which since 1608 horse-races, originated by act of the burgh bailies, have been held annually on Saint James's day. The town owns much real estate, and gas, water, and electric lighting works, controls the charities, manages the hospitals, and maintains public libraries and museums, baths, slaughter houses, cemetery, and artisans' dwellings. Paisley may be considered the seat of the thread manufacture for the home and American markets. Tartan cloths, handkerchiefs, carpets, etc., soap, starch, and corn flour are largely manufactured; and dyeing establishments on an extensive scale, power-loom factories, print-works, machine shops, bleach-fields, ship-building yards, etc., are in operation in the town and vicinity. The manufacture, now almost extinct, of the famous shawls originated at the beginning of the nineteenth century. Commonly recognized as the Roman Vanduara, the town is mentioned in 1157 as *Passaleth*, a possession of Walter Fitzalan, who six years later founded the priory. Population, in 1891, 66,400; in 1901, 79,350. Consult: Lees, *Abbey of Paisley* (Paisley, 1878); Brown, *History of Paisley* (2 vols., Paisley, 1886).

PAIXHANS, pak'sāns', HENRI JOSEPH (1783-1854). A French artillery officer, author, and inventor. He was born in France, and graduated from the Ecole Polytechnique, and assigned to the artillery, in which service he became a general officer. The gun called by his name was adopted in France about 1824, and shortly afterwards in England. Paixhans was also distinguished for his other improvements in heavy ordnance, gun-carriages, projectiles, and methods of working guns. He strongly recommended the use of cylindrical projectiles as going more directly and striking more powerfully than round balls, and as being less exposed to air resistance. The

original Paixhans gun was 9 feet 4 inches long, with a bore of $8\frac{3}{4}$ inches, and a weight of about 7400 pounds; the charge consisted of between $10\frac{1}{2}$ and 18 pounds of powder. It would bear hollow shot of 60 pounds, or solid shot of 86 to 88 pounds. He was the author of several works on naval gunnery. See GUNS, NAVAL; ARTILLERY; ORDNANCE.

PAJARITO. A fish. See HALFBEAK.

PAJOU, pá'zhōw', AUGUSTIN (1730-1809). A French sculptor. He was born in Paris, was a pupil of Lemoine, and obtained the Prix de Rome for sculpture in 1748. On his return after twelve years of study at Rome, he was elected a member of the Academy on the merit of his work, "Pluto Holding Cerberus in Chains" (Louvre), and in 1767 he became professor. Louis XVI. employed him to adorn with sculptures the façade of the Palais Royal, and to execute statues of Pascal, Turenne, Bossuet, Buffon, and Descartes. He executed also the sculptures of the Salle de l'Opéra at Versailles, the ornaments of the Palais Bourbon, and of the Cathedral of Orleans. The Louvre contains a number of his works, among which are the aristocratic bust of Madame de Pompadour, and the charming ideal statue of "Psyche." His art is characterized by exquisite grace, and resembles that of his contemporary, the painter Boucher. He received a handsome fortune from his works, but lost it by the Revolution. Consult his biography by Lebreton (Paris, 1810).

PAK'ENHAM, Sir EDWARD MICHAEL (1778-1815). An English soldier. He was born in County Westmeath, Ireland; entered the army at an early age, and by rapid promotion came to be major-general in 1812. He served under Wellington in the Peninsula, particularly distinguishing himself at Salamanca, where he commanded the division which broke the enemy's centre and brought success to Wellington. In 1814 he was selected to direct the expedition against New Orleans, and was killed in the unsuccessful attack of January 8, 1815. See NEW ORLEANS, BATTLE OF.

PAKHOI, pāk-hoi'. A treaty port of Southern China, in the Province of Kwang-tung, situated on the Gulf of Tongking, 280 miles southwest of Canton (Map: China, C 7). The Chinese town is built at the foot of a bluff on the top of which lies the European section. The city serves as the port of Lien-chow. In 1901 its volume of trade amounted to \$2,875,000, the chief exports being hides, anise-oil, indigo, and fish, and the imports cotton and woolen goods, petroleum, and opium. Population, about 20,000. Pakhoi was opened to foreign trade in 1876.

PAK-KWA, pāk'kwā' (Chin., eight diagrams). Eight figures or symbols said to have been elaborated by the mythical Chinese Emperor Fuh-hi (q.v.). Each consists of a group of three parallel horizontal lines, some of them whole, and some broken in two, the broken lines symbolizing the *yin*, female or negative principle in the cosmogonic theory held by the Chinese, and the unbroken lines the *yang*, male or positive principle. By doubling these groups and ringing the changes on the different possible combinations, a new series of 64 hexagrams was produced, and these form the basis of the oldest

of the Chinese classics, the Yi-King or "Book of Changes."

PAKS, pōksh. A market-town of Hungary, in the County of Tolna, situated in a marshy region on the Danube, 60 miles south by west of Budapest (Map: Hungary, F 3). The town has a trade in wine and poultry. Population, in 1890, 11,800; in 1900, 12,034, mostly Magyars.

PALACE. Originally a building for the residence of the sovereign, the term being derived from the buildings on the Palatine Hill at Rome, where the successive emperors built their residences and halls of state. In English, the word has strictly no other sense than this; but there are many recent adaptations from foreign languages which are in use among travelers, students of art, and the like. Thus, the Italian *palazzo*, which means a stately private dwelling; and, in some cities, one having a carriage driveway (*porte-cochère*) admitting to a court, is translated carelessly by 'palace.' Also, as 'palazzo' is extended to cover municipal buildings, such as those at Siena, Perugia, Gubbio, and the like, some writers translate Palazzo Comunale, Palazzo Municipale, Palazzo Vecchi, by a compound term, of which 'palace' forms a part. More rarely, the French word *Palais*, as in Palais de Justice, Palais de Commerce, is rendered into English as 'palace.' The use of the word for a very costly dwelling-house is a mere exaggerated expression not received into the language, as having a separate signification.

PALACIO VALDÉS, pá-lí'thé-ō vál-dās', ARMANDO (1853—). A Spanish novelist, born at Entrealgo, in Asturias. He passed much of his youth at Avilés, on the coast. After a preliminary training at Oviedo, he went to Madrid to devote himself to the study of jurisprudence and political economy. He became a prominent member of the Ateneo, and was made editor of the periodical *La revista europea* when but twenty-two years old. After directing it for three years, he withdrew to give himself up to the composition of novels. The first of them, *El señorito Octavio* (1881), illustrates his fondness for simplicity of plot, and marks him from the start as one who excels in the psychological analysis of the inner man as in the description of the aspects of outer nature. His second novel, *Marta y María* (1883), is by many deemed to be his masterpiece. It deals with the contrast between a life of active, human love and one of virginal and mystic contemplation. In his later novels Valdés inclines toward naturalism. The more recent works—all of great interest and most of them, like the *Marta y María*, now translated into English—are: *El idilio de un enfermo*; *José*, a charming seaside idyll; *Aguas fuertes*, a collection of tales; *Riverita*, and its sequel, *Maximina*, the latter containing many autobiographical elements; *El cuarto poder*; *La hermana San Sulpicio*; *La espuma*; *La fe*; *El maestrante*; *El origen del pensamiento*; *Los majos de Cádiz*; *La alegría del Capitán Ribot*. The author's ideas with regard to the art of fiction are expressed in essays prefixed to the editions of the *Hermana San Sulpicio* and the *Majos de Cádiz*. Other works of a critical nature are: *Los oradores del Ateneo*; *Los novelistas españoles*; *Nuevo viaje al Parnaso*; and, produced in collaboration with Alas, *La literatura en 1881*. Consult: Blanco-García, *La literatura española en el siglo XIX.*, Parte

segunda (Madrid, 1891); Howells, in *Harper's Magazine* (New York, April, 1886, and November, 1886); Baxter, "A Great Modern Spaniard," in *The Atlantic Monthly* (Boston, April, 1900); Davidson, in the introduction to his edition of the *José* (Boston, 1900).

PALACKY, pā-lāts'kē, FRANTISEK (1798-1876). A Bohemian historian and political leader. He was born at Hodoslavitz in Moravia, and studied at Pressburg and Vienna. He became archivist at Prague in 1823, and national historiographer in 1839. In 1848 he was a prominent member of the Slavic Congress at Prague, and shortly after acted as representative in the Austrian Diet at Kremsier. A leader of the Czech national party in the provincial Diet of Bohemia, he became a prominent figure in the political life of the Empire, allying himself (although a Protestant) with the Ultramontanes in his opposition to the *Ausgleich* with Hungary. He took part in the Panslavic Congress at Moscow in 1867. Palacky's reputation as historian rests on his *Geschichte von Böhmen* (1836-67), begun in German and continued in Czech, a work based on vast original research into original sources. Other writings are: *Die ältesten Denkmäler der böhmischen Sprache* (1840); *Geschichte des Hussitenthums* (1868); *Geschichte des Hussitenkriegs* (1872-74).

PALADILHE, pā'lā'dēl', EMILE (1844-). A French composer, born near Montpellier. He studied at the Paris Conservatory under Benoist, Marmontel, and Halévy, and in 1860 won the Grand Prix de Rome with the cantata *Le czar Ivan IV*. During his stay in Rome he wrote an opera buffa and considerable instrumental music, but upon his return to Paris he became more widely known for his songs, which include: "Mandolinata," "Premières pensées," and *Méodies écossaises*. His first opera, *Le passant*, was produced in 1872, and was followed by *L'amour africain* (1875); *Suzanne* (1878); *Diana* (1885); and *Les Saintes Maries de la mer*, a lyric drama (1892). His most successful opera, *Patrie*, produced in 1886, has been given in Germany and Italy. His compositions also include considerable sacred music.

PALADIN (OF. *paladin*, from It. *paladino*, from ML. *palatinus*, warrior, one connected with the palace, from Lat. *palatium*, palace). A term originally derived from the Counts Palatine, or of the palace (see PALATINE), who were the highest dignitaries in the Byzantine Court, and hence used generally for a lord or chieftain, and by the Italian romantic poets for a knight-errant.

PALÆARCTIC REGION. See PALEARCTIC REGION.

PALÆASTER (Neo-Lat., from Gk. *παλαίος*, *palaios*, ancient + *ἀστὴρ*, *astēr*, star, starfish). An extinct genus of starfishes, found in rocks of Ordovician to Carboniferous age in North America and Europe. See STARFISH.

PALÆMON, QUINTUS REMMIUS. A Roman grammarian of the first century. He was born at Vicentia, the son of a female slave. Unlike the earlier scholars, who had made the older literature the centre of their linguistic studies, Palæmon devoted himself chiefly to Vergil, and is to be remembered for having first introduced the latter's works as a text-book into the Roman schools. His grammar, *Ars*, is said to have been much consulted by later grammarians, but is

now lost. The grammar that bears his name is wrongly ascribed to him. He is mentioned by Suetonius (*De Illustribus Grammaticis*, 23), and by Juvenal (vi., 451; vii., 215-219), who says that Palæmon was the master of Quintilian. Consult: Nettleship, in the *English Journal of Philology* (xv., 192); and Marschall, *De Remmi Palæmonis Libris Grammaticis* (Leipzig, 1887).

PALÆOBOTANY, etc. See PALEOBOTANY, etc.

PA'LÆOCREU'SIA (Neo-Lat. nom. pl., from Gk. *παλαιός*, *palaios*, ancient, + Neo-Lat. *Creusia*, from Gk. *κρέουσα*, *Kreousa*, a character of Greek mythology). A Lower Devonian barnacle that lived as a commensal in cavities of the coral Favosites. See BARNACLE.

PA'LÆOHATTE'RIA (Neo-Lat. nom. pl., from Gk. *παλαιός*, *palaios*, ancient + Neo-Lat. *Hatteria*, of uncertain origin). A fossil lizard-like reptile of the order Rhynchocephalia, found in the Permian formations of Europe. See RHYNCHOCEPHALIA.

PA'LÆOL'OGUS (Lat., from Gk. *Παλαιόλογος*, *Palaiologos*). The name of an illustrious Byzantine family, which first appears in history in the eleventh century, and attained the Imperial dignity in the person of Michael VIII. (q.v.), who became Emperor of Nicea in 1259, and mounted the throne of Constantinople in 1261. His successor on the throne was his son Andronicus II., in whose reign, which extended from 1282 to 1328, the Turks commenced a series of assaults on the Byzantine dominions. He associated his son, Michael IX., with himself, but was dethroned by his grandson, Andronicus III., who reigned from 1328 to 1341. The latter was an able warrior and ruler, who repeatedly defeated the Bulgarians, the Tatars of the Golden Horde, and the Servians, but was unsuccessful against the Catalans in Greece, while the Turks during his reign ravaged the coasts of Thrace as far as the Balkans. He was greatly esteemed by his subjects, and well merited the title of 'father of his country.' Andronicus III. was succeeded by his son, John V., who ruled, with some interruptions, from 1341 to 1391. During his minority his mother, Anna, and John Cantacuzenus were regents. The latter in self-protection had himself proclaimed co-Emperor as John VI. in 1341. (See CANTACUZENUS.) During John V.'s reign the Turks made great progress, and the Emperor was compelled in 1370 to agree to pay them an annual tribute. In 1376 John was overthrown by his son, Andronicus IV., but regained the crown in 1379. In 1390 the son of Andronicus IV., John VII., dethroned him and ruled for a few months, but John V. ultimately regained the crown, and retained it until his death, February 16, 1391. John VII. sought Turkish aid, and compelled the son and successor of John V., Manuel II. (q.v.), to make him co-Emperor in 1398, but in 1402 he was sent to the island of Lemnos, and in 1407 given some land in Thessaly and Macedonia, which the Turks soon conquered. He died about 1408. The successor of Manuel II. was his son, John VIII., who ruled from 1425 to 1448. On being pressed by the Turks he held out to the Popes the old bait of the union of the Greek and Western churches under his sway, and even presented himself at the Council of Florence, where, in July, 1439, the union of the churches was brought about.

But on his return to Constantinople the opposition of the Greek ecclesiastics to the union, supported by the people, rendered the agreement of Florence a dead letter. The Pope, however, stirred up Ladislas of Hungary and Poland to attack the Turks, but they could not be driven back. John was succeeded by his brother Constantine XI., who ruled from 1448 to 1453, and with him the Byzantine Empire ended. (See CONSTANTINE XI.) A branch of the Palæologi ruled Montferrat, in Italy, from 1306, but became extinct in the sixteenth century. The Palæologi were connected by marriage with the ruling families of Hungary and Servia, and the niece of the last Byzantine Emperor married Ivan III., Czar of Russia—a fact which the Czars of Russia were wont to bring forward as an argument in favor of their claims to European Turkey.

PALEONIS'CUS (Neo-Lat., from Gk. *παλαιός*, *palaios*, ancient + *ὄνισκος*, *oniskos*, fish of the cod kind, diminutive of *ὄνος*, *onos*, ass). A genus of fossil actinopterygian fishes found in the Permian rocks of Europe. The body was long and slender, covered with regular ganoid scales, and was provided with small triangular dorsal, pectoral, pelvic, and anal fins. It is especially common in the shales of England and in the copper-bearing shales of Thuringia, in Germany.

PALEOSPONDYLUS (Neo-Lat., from Gk. *παλαιός*, *palaios*, ancient + *σπόνδυλος*, *spondylos*, *σφόνδυλος*, *sphondylos*, vertebra). A very interesting fish-like fossil found in the flagstones of the Old Red Sandstone at Achanarras, near Thurso, Scotland. The entire fossil is scarcely two inches long, and it consists of an anterior broader cephalic portion and a long posterior slender vertebral column, terminated by a delicate feather-like fin. The structure of the head resembles that of the recent lamprey, and on this account *Paleospondylus* is supposed to be an ancestral lamprey, in which all the cartilages were calcified. Consult: Dean, "The Devonian Lamprey, *Paleospondylus gunni* Traquir, with Notes on the Systematic Arrangement of the Fish-like Vertebrata," in *New York Academy of Sciences, Memoirs*, vol. ii., part i. (New York, 1899). See CYCLOSTOMI.

PALEOTHE'RIMUM (Neo-Lat., from Gk. *παλαιός*, *palaios*, ancient + *θηρίον*, *thérion*, diminutive of *θήρ*, *thér*, wild beast). An extinct perissodactylate hoofed mammal of the size of a rhinoceros found in abundance in some Eocene deposits of Europe. It was described and named by Cuvier in 1804 from specimens exhumed at the gypsum quarries at Montmartre, near Paris. By some authors it has been looked upon as a three-toed ancestor of the horse, but it is more properly considered to represent a lateral offshoot from the main line of evolution of the horse. See HORSE, FOSSIL.

PALEPHATUS (Lat., from Gk. *Παλαίφατος*, *Palaiphatos*). A Greek mythographer, of an uncertain period, who is said to have written in several books an historical and allegorical explanation of Greek myths. Of this work there is extant only a short abstract, *On Incredible Tales* (*Περὶ ἀπίστων*), which was formerly a favorite school book. In it *Palephatus* gives a brief account of about fifty of the most celebrated Greek legends, and explains them according to the method of Euhemerus. The treatise has been

edited by Westermann, in his *Μυθολογία* (Brunswick, 1843). Consult Wipprecht, *Questiones Palæphateæ* (1892).

PALAPOX Y MELZI, *pä'lä-fōn' è mäl'thé*, JOSÉ DE, Duke of Saragossa (1780-1847). A Spanish patriot and soldier. He entered the army in 1792, and was lieutenant in 1808. Upon the invasion of the French he carried on a fierce guerrilla warfare against them; was made Captain-General of Aragon; unsuccessfully attempted to hold the line of the Ebro, and distinguished himself by his heroic defense of Saragossa, July 27-August 14, 1808, and December 20, 1808-February 21, 1809. He was taken a prisoner to France and kept at Vincennes until the restoration of Ferdinand VII. in 1814, when he was made Captain-General of Aragon. He commanded the National Guard from 1820 to 1823, and afterwards lived in disgrace till 1836, when he became Duke of Saragossa and grandee of the first class.

PALAIHNIHAN, *pä-lī'nē-ān* (Klamath *p'lai'ni*, mountaineers). A small linguistic family of North American Indians, living in north-eastern California, in the basin of the Pit River, whence they are called also Pit River Indians. Seven tribal divisions have been recognized among them. In their social life and morals, no less than in their vigor, the *Palaiahnihan* tribes are among the lowest aboriginal peoples.

PALAIS BOURBON, *pä'lä' būr'bōn'*. See CHAMBRE DES DÉPUTÉS.

PALAIS DE JUSTICE, *pä'lä' de zhüs'tēs'*. A group of buildings on the Ile de la Cité in Paris, occupying the site of the old royal palace, and devoted to the law courts. Of the ancient palace, which was presented to the Parlement by Charles VII. in 1431, the only portions spared by the fires of 1618 and 1776 are the Tour de l'Horloge, containing the oldest public clock in France, dating from 1370, the famous Sainte-Chapelle (q.v.), the Conciergerie (q.v.), the so-called Kitchens of Saint Louis, and three towers. During the war of the Commune in 1871 a large part of the structure was destroyed, but has been restored. A number of the courts open into the Salle des Pas-Perdus, one of the largest halls in existence, 240 feet long, 90 feet wide, and 33 feet high. The hall was formerly the great hall of the royal palace, and consists of two galleries separated by arcades. It contains several monuments and statues. The chief entrance of the Palais de Justice is formed by the handsome Court of Honor, adorned with allegorical statues.

PALAIS ROYAL, *pä'lä' rwä'yäl'* (Fr., royal palace). The name now borne by a heterogeneous mass of buildings on the eastern side of the Rue Richelieu in Paris, composed of a palace, theatres, public gardens, bazaars, shops, cafés, and restaurants. The old palace was built between 1619 and 1636 on the site of the Hôtel Rambouillet by Cardinal Richelieu, who at his death bequeathed it to Louis XIII. It subsequently became the residence of the Orleans branch of the Bourbons, and during the minority of Louis XV. acquired a scandalous notoriety as the scene of the wild orgies in which the Regent, Orleans, and his dissolute companions were wont to indulge. In the time of his great-grandson, Philippe Egalité, it became the focus of revolutionary intrigue. This prince, partly to repair

his impoverished fortune and partly to prove the sincerity of his professed sympathy with the people of Paris, converted part of the gardens of the Palais Royal into a place of public resort, and the pavilions of the great court into bazaars, which were divided into shops and stalls. On the downfall of Egalité the building was taken possession of by the Republican Government. On the restoration of the Bourbons it was occupied by Louis Philippe till his elevation to the throne of France in 1830, when it was incorporated in the general domains of the State. The palace was sacked by the mob during the Revolution of 1848, when many of its works of art were destroyed. It was thoroughly repaired and magnificently furnished in 1855, and given by Napoleon III. to his uncle, Jerome Bonaparte, whose son, Prince Napoleon, resided there until 1871. The Communists set fire to the palace in 1871, and all the apartments occupied by the Prince were destroyed, but the flames were checked before they spread to the galleries and shops, and the injured portions were restored in the autumn of 1873. The garden, with its avenues and parterres, fountains, and grass plots, still constitutes one of the liveliest and most frequented spots in the whole city; and its cafés still maintain, in great measure, their former reputation. The north side of the grand court is occupied by the Théâtre du Palais Royal, devoted to high comedy and farce.

PALAMEDES (Lat., from Gk. Παλαμήδης). In Greek mythology, a hero, son of Nauplius and Clymene. In Homer he is not mentioned, but in the later literature on the Trojan War he plays a prominent part, being especially noted for his quick understanding and resource. His wit detected the simulated madness of Odysseus, by placing the infant Telemachus in front of his father's plow. To him also was ascribed the invention of letters, numbers, weights and measures, money, dice, and draughts. This last, we are told, was to divert the army in a time of scarcity. His death was attributed to the jealousy of Odysseus and Diomedes, or the revenge of Odysseus, but the stories as to the plot and its execution varied widely. The name Palamidi, which is now borne by the rocky height above the modern Nauplia, is commonly believed to point to a cult of the hero in the neighborhood. Consult Jahn, *Palamedes* (Hamburg, 1836).

PALAMEDESZ, pā'lā-mā'dēs, ANTONIS (c.1601-73), surnamed STEVAERTS. A Dutch painter, born probably at Delft, or, according to Houbraken, in London, where his father, a gem-setter and painter, was in the service of James I. He entered the guild of Delft in 1621, and was its president in 1673. He painted the figures in Van Delen's architectural pictures, and probably through him met Dirk Hals, whose influence is noticeable in his works. His subjects are portraits or military scenes, treated with vivacity and glowing color. Among his authentic works are: "Portrait of a Young Man," in the Berlin Museum; "Spanish Soldiers and Girls in a Peasant's Cottage" (1632); "A Soldier Bargaining for a Hare," and a "Soldier Making Love," all in the Museum at Hanover; and a guard-room scene, in the Liechtenstein Gallery in Vienna. With Van Delen, he painted "The Meeting of the States-General" (1651), in The Hague Museum. His brother, PALAMEDES (1607-

38), was his pupil, and painted much the same subjects in the same manner, but with less skill. There is a spirited "Charge of Cavalry" in the Berlin Museum signed with his name.

PAL'AMON' AND ARCITE, ār'sit. Two Theban princes, imprisoned by Theseus, who both loved Emilia, sister to Hippolyta. Their story is told by Chaucer, in the "Knight's Tale," which was taken from Boccaccio's "Teseide." A French poem, "Palamon and Arcite," by Anna de Greville, appeared in 1487. The same story is used in Fletcher's tragedy *Two Noble Kinsmen*, printed in 1634, but probably written in 1616 and said to have been revised by Shakespeare. The tale is also used in Edwardes's play *Palamon and Arcite*, now lost, produced for Queen Elizabeth at Oxford, 1566. Another lost play of this title is mentioned in Henslowe's *Diary* as played in 1594. Dryden introduced a version of the story in his "Fables" in 1700.

PALANPUR, or **PAHLANPUR**, pā'lān-pūr'. A native State of Gujarat, India, feudatory to Bombay (Map: India, B 4). Area, 3177 square miles. Population, in 1891, 274,864; in 1901, 222,627, the decrease being due to the effect of the plague and famine of 1899-1900. The capital, Palanpur, is a station of the Rajputana-Malwa line, and had a population of 17,799 in 1901.

PALAPRAT, pā'lā'prā', JEAN, Sieur de Bigot (1650-1721). A French dramatist, born at Toulouse. He became secretary to the Grand Prior of Vendôme (Loire-et-Cher). With David Augustin de Brueys he wrote a number of plays once esteemed for their wit. He himself was the sole author of a few, including *Quiproquo* and *Hercule et Omphale*. All were collected in five volumes in 1735-55.

PALATE (OF. *palat*, from Lat. *palatum*, *palatus*, palate, roof of the mouth). The palate forms the roof of the mouth, and consists of two portions, the hard palate in front and the soft palate behind. The framework of the *hard palate* is formed by the palatal process of the superior maxillary bone, and by the horizontal process of the palate bone, and is bounded in front and at the sides by the alveolar arches and gums, and posteriorly it is continuous with the soft palate. It is covered by a dense structure formed by the periosteum and mucous membrane of the mouth, which are closely adherent. Along the middle line is a linear ridge or raphe, on either side of which the mucous membrane is thick, pale, and corrugated, while behind it is thin, of a darker tint, and smooth. This membrane is covered with scaly epithelium, and is furnished with numerous follicles (the palatal glands). The *soft palate* is a movable fold of mucous membrane inclosing muscular fibres, and suspended from the posterior border of the hard palate so as to form an incomplete septum between the mouth and the pharynx; its sides being blended with the pharynx, while its lower border is free. When occupying its usual position (that is to say, when the muscular fibres contained in it are relaxed), its anterior surface is concave; and when its muscles are called into action, as in swallowing a morsel of food, it is raised and made tense, and the food is thus prevented from passing into the posterior nares, and is at the same time directed obliquely backward and downward into the pharynx. Hanging from

the middle of the soft palate's lower border is a small conical pendulous process, the *uvula*; and passing outward from the uvula on each side are two curved folds of mucous membrane containing muscular fibres, and called the *arches* or *pillars of the soft palate*. The *anterior pillar* is continued downward to the side of the base of the tongue, and is formed by the projection of the palato-glossus muscle. The *posterior pillar* is larger than the anterior, and runs downward and backward to the side of the pharynx. The anterior and posterior pillars are closely united above, but are separated below by an angular interval, in which the *tonsil* of either side is lodged. The tonsils (*amygdalæ*) are glandular organs of a rounded form, which vary considerably in size in different individuals. They are composed of an assemblage of mucous follicles intermingled with diffuse adenoid tissue and covered by a mucous membrane. The follicles secrete a thick, grayish matter, and open on the surface of the gland by numerous (12 to 15) orifices.

The space left between the arches of the palate on the two sides is called the *isthmus of the fauces*. It is bounded above by the free margin of the palate, below by the tongue, and on each side by the pillars of the soft palate and tonsils.

As the upper lip may be fissured through imperfect development (in which case it presents the condition known as the hare-lip), so also may there be more or less decided fissure of the palate. In the slightest form of this affection the uvula merely is fissured, while in extreme cases the cleft extends through both the soft and hard palate as far forward as the lips, and is then often combined with hare-lip. When the fissure is considerable, it materially interferes with the acts of sucking and swallowing, and the infant runs a great risk of being starved; and if the child grows up, its articulation is painfully indistinct. When the fissure is confined to the soft palate, repeated cauterization of the angle of the fissure has sometimes been found sufficient to effect a cure by means of the contraction that follows each burn. As a general rule, however, the child is allowed to reach the age of five or six years without intervention, when the operation of *staphylorrhaphy* (suture of the soft parts) is performed. If the fissure involves the hard palate as well as the soft palate, that structure is also repaired at the same time, the operation being known as *urano-plasty*. Acute inflammation of the tonsils is treated of in the article TONSILLITIS.

Chronic enlargement of the tonsils is very frequent in children and the adolescent, and is not infrequently met with in adults. Its usual symptoms in children are muffled speech, obstruction in breathing, and a disposition to acute attacks of tonsillitis. Deafness occasionally is present both in children and adults from pressure of the enlarged tonsils upon the openings of the Eustachian tubes. The condition of chronic tonsillitis is to be met by general measures designed to improve the tone and nutrition of the individual, such as an open-air life and the use of such tonics as iron and cod-liver oil. When the symptoms of enlarged tonsils are especially noticeable and the general health is suffering, the organs should be removed by surgical measures.

The *uvula* is subject to relaxation or elonga-

tion. When this occurs the appendage is found to be more or less œdematous and protruding downward toward the larynx, where, by its irritation, it often gives rise to a constant tickling cough. The condition is usually relieved by astringent applications and gargles. Where these fail to relieve the condition, the excess must be cut away by the surgeon.

PALATINATE (F. *palatinat*, from ML. *palatinus*, palatine, from Lat. *palatinus*, relating to a palace, or to the Palatine Hill, from *palatium*, palace, Palatine Hill). A feudal district whose ruler exercised nearly all the prerogatives of sovereignty. Under the Frankish Merovingian kings, a *comes palatinus*, or count of the palace, was a high judicial officer residing at Court. After the time of Charlemagne, the office became localized and territorial, and the *comes palatinus* ruled in almost complete independence over his own district, often near the frontier. As early as the eleventh century the Count Palatine (Pfalzgraf) of the Rhine appears among the hereditary princes of the German Empire. In the thirteenth century the term palatinate or county palatine was introduced into England from the Continent to designate a jurisdiction whose beginnings can in some instances be traced back to Anglo-Saxon times. There were three principal counties palatine in England—Chester, Durham, and Lancaster—whose origin and development were no doubt influenced by their proximity to the frontier. The counts or earls palatine ruled over entire counties, so that all the landowners held feudally of them; they received the whole profits of the courts and exercised all the regalia or royal rights, nominated the sheriffs, held their own councils, and acted as independent princes, except in the owing of homage and fealty to the King. The Duchy of Lancaster was a creation of the year 1351, but has since 1399 been united with the Crown in such manner that the King ruled within its borders not as King, but as Duke Palatine of Lancaster. Its legal jurisdiction has since 1873 been transferred to the High Court of Justice, but its revenues are still independent of Parliamentary control. Chester was united with the Crown in 1301, and has since, together with the Principality of Wales, been vested in the eldest son of the sovereign. Durham ceased to be a separate jurisdiction under the Bishop of Durham in 1836. Other counties palatine were formerly Kent, Shropshire, Pembrokeshire, the Isle of Ely, and Hexhamshire, though the varying extent of their immunities makes it difficult in some cases to determine whether they were true palatinates. In very early times there were similar jurisdictions in Scotland, the most important of which was that of Strathearn. The Province of Maryland, in America, was granted to the Baltimores, on the model of the Palatinate of Durham. Consult: Stubbs, *Constitutional History of England*, vol. i. (6th ed., Oxford, 1897); Lapsley, *The County Palatine of Durham* (New York, 1900).

PALATINATE, THE (Ger. *Pfalz*, palace). The name of two little countries in the old German Empire, the Upper Palatinate and the Lower or Rhenish Palatinate, which were politically connected till 1620. The Upper Palatinate is at present included within the Bavarian district of the Upper Palatinate (Oberpfalz) and Regensburg. The capital was Amberg. The Lower Palatinate (Unterpfalz) was composed of an ir-

regular and disjointed territory on both sides of the Rhine, included roughly within the space marked off by the cities of Mainz, Worms, Heilbronn, Landau, and Zweibrücken. It included the Electoral Palatinate (with Heidelberg, and for a time Mannheim, as its capital), the Principality of Simmern, the Duchy of Zweibrücken (Deux Ponts), the principalities of Veldenz and Lautern, etc. Within its borders were embraced also the episcopal sees of Worms and Speyer, the free cities of Worms and Speyer, the county of Leiningen, etc. The Counts Palatine of the Rhine (see PALATINATE), whose original seat was Aix-la-Chapelle, appear in the eleventh century as holding a leading position among the hereditary German princes. In 1214 the Rhenish Palatinate was acquired by the House of Wittelsbach in the person of Louis I., Duke of Bavaria, and thereafter for four hundred years its history is the usual story of partition and reunion, varied with occasional increase of territory through purchase. Early in the fourteenth century a part of Bavaria between the Danube and the Fichtelgebirge was made over by the Emperor Louis the Bavarian to his kinsmen ruling in the Rhenish Palatinate; this was the origin of the Upper Palatinate. In 1356 the Golden Bull of the Emperor Charles IV. designated the Count Palatine of the Rhine as one of the seven Imperial Electors. Rupert I. of the Palatinate founded the University of Heidelberg in 1386. Rupert III. occupied the Imperial throne of Germany from 1400 to 1410. The Reformation made rapid progress in the Palatinate, and, influenced by the teachings of Melancthon, the Elector Frederick II. (1544-56) embraced the reformed faith. Under Frederick III. (1559-76), who inaugurated the Simmern line in the Electoral Palatinate, Calvinism was made the established religion, and the Heidelberg Catechism was drawn up (1563). Frederick III. also aided the French Huguenots and extended his protection to Protestant refugees from France. Frederick IV. (1583-1610) became head of the Evangelical Union formed in 1608 by the Protestant States for the protection of their interests. His son, Frederick V. (1610-32), the son of James I. of England, was elected King in 1619 by the Bohemian Protestants, whose revolt against the House of Hapsburg had inaugurated the struggle which was to be the Thirty Years' War. Frederick was defeated at the battle of the White Hill in 1620 and was deprived of his lands. The electoral dignity was conferred on Maximilian I., Duke of Bavaria, in 1623, and in 1628 this prince was formally invested with the Upper Palatinate. By the Treaty of Westphalia the son of Frederick V. was restored in the Lower Palatinate, and an eighth seat in the Electoral College was created for him, the Upper Palatinate remaining in the possession of Bavaria. During the wars of Louis XIV. the Palatinate, one of the richest and most fertile lands in Germany, was mercilessly devastated by the French armies in 1674 and in 1689. In 1685 the Simmern line died out and was succeeded by the collateral line of Neuburg, whose members were of the Catholic faith. This led to the emigration, in 1709-10, of a large number of Protestant inhabitants (estimated at 13,000) to England. Thence a large body crossed over to Ireland, while others came to North Carolina, Pennsylvania, and Virginia. In 1710 between 3000 and 4000 'Palatines,' as they were called,

settled in Columbia and Ulster counties, N. Y., whence many removed to Montgomery and Herkimer counties and to Pennsylvania. In 1742 the line of Neuburg in the Electoral Palatinate was succeeded by that of Sulzbach. In 1777 Bavaria was united with the Palatinate. By the Treaty of Lunéville (1801), the portion of the Palatinate lying on the left side of the Rhine was ceded to France, while the territories on the right bank were partitioned among Baden, Hesse-Darmstadt, Leiningen, and Nassau. The part beyond the Rhine was given up by France in 1814-15 and was divided among Bavaria, Hesse-Darmstadt, and Prussia. The Rhenish Palatinate (Bavaria) was the scene of a revolutionary uprising in 1849, which was suppressed by Prussian arms. The Bavarian Government districts of the Palatinate (Rhenish Palatinate) and Upper Palatinate (Upper Palatinate and Regensburg) have an area respectively of 2289 and 3729 square miles. The population of the former in 1900 was 831,533 and of the latter 553,857. The surface of the Palatinate (which is bounded on the east by the Rhine) is diversified with smiling plains, swelling hills, and wooded mountains. The western portion is traversed by the low range of the Hardt. The region yields bountiful crops of cereals, potatoes, tobacco, hemp, flax, etc., and is noted for its wine. The capital is Speyer. The Upper Palatinate is traversed by the offshoots of the Fichtelgebirge, the Bohemian Forest, and the Bavarian Forest, and is bordered on the west by the Franconian Jura. The Danube flows along the southern border. The capital is Regensburg. Consult: Häusser, *Geschichte der rheinischen Pfalz* (Heidelberg, 1845); Nebenius, *Geschichte der Pfalz* (Heidelberg, 1874).

PALATINE. A name frequently applied in the later days of the Roman Empire to persons in the imperial service whose duties connected them with the court. Under Constantine the Great the Palatini were the troops stationed at the capital in contradistinction to those charged with the defence of the border. In the Byzantine Empire the term was applied to the officials connected with the administration of the finances and the imperial domains. It was bestowed as an epithet of honor on persons in the entourage of the early German kings, and under the Carolingian rulers the Count Palatine was the highest judicial officer of the realm. Though, in the course of time, a number of counts palatine were created and charged with the execution of the imperial will in various parts of the Empire, the title ultimately became restricted to the ruler of Rhenish Franconia whose territory came to be known specifically as the Palatinate (q.v.). In England, after the Conquest, the see of Durham, the earldom of Chester, and the duchy of Lancaster were ruled by counts palatine who were possessed of regal powers within their jurisdiction. They had courts of their own which were exempt from the authority of the king, exercised the right of coining money, and stood at the head of the feudal system of land tenure in their counties.

PALATINE ANTHOLOGY. A collection of Greek poems made by Constantine Cephalas in the tenth century, lost, and rediscovered in 1606 by Salmasius in the Heidelberg Library. It was not, however, published until 1776, when

it appeared in Brunck's *Analecta*. Consult Thackeray, *Anthologia Græca* (London, 1877).

PALATINE HILL (Lat. *Mons Palatinus*). The central hill of the famous seven hills of Rome, and the seat of the earliest Roman settlements. In point of historic interest it ranks next to the Capitol and the Forum. Its summit is about 140 feet above the Tiber level. The form of the hill is irregularly quadrangular. Its northwestern slope, toward the Capitoline Hill and the Tiber, was called *Germalus* or *Cemalus*. The origin of the name is uncertain, although several derivations are given connecting it with legendary stories. Romulus is said to have founded the city upon this hill, and on Germalus grew the sacred fig-tree (near the Lupercal) under which he and his brother, Remus, were found sucking the she-wolf. Upon the Palatine were the temple of Jupiter Stator, the temple of Cybele, the sacred square inclosure called *Roma quadrata*, and other sacred places and edifices, and, during the Republic, many of the finest private houses in Rome. Under the Empire it became especially the site of the Imperial residence. Augustus and Tiberius resided here, and at last Nero included it entirely within the precincts of his *aurea domus*, which Vespasian subsequently restricted to the hill. From the time of Alexander Severus it ceased to be the residence of the emperors, except occasionally. Recent excavations have brought to light numerous remains of the structures with which the Palatine Hill was once covered. A considerable portion of the hill remains yet to be excavated.

PALATKA. A city and the county-seat of Putnam County, Fla., 60 miles south of Jacksonville; on the Saint John's River, and on the Georgia Southern and Florida, the Jacksonville, Tampa and Key West, the Florida East Coast, and other railroads (Map: Florida, G 2). It enjoys considerable popularity as a winter resort, and is the commercial centre of a productive fruit-growing and market-gardening section, its trade interests being of considerable importance. Population, in 1890, 3039; in 1900, 3301.

PALAUAN, pā-lā'wān, or **PALOWAN**. A general designation of the Tagbanua tribes from whom the island of Palawan took its name. See **PHILIPPINE ISLANDS**.

PALAU (pā-lou') **ISLANDS**. A group of islands in the Pacific Ocean. See **PELEW ISLANDS**.

PALAWAN, pā-lā'wān, or **PARAGUA**, pā-rā'gwā. One of the Philippine Islands, the extreme southwestern of the larger islands of the archipelago (Map: Philippine Islands, C 10). With its numerous dependent islands it forms a continuous chain extending from Mindoro southwestward to the northern extremity of Borneo. The chain runs parallel with the Sulu Archipelago and separates the Sulu Sea on the southeast from the China Sea on the northwest. The island of Palawan itself is of very elongated shape, being 278 miles long from northeast to southwest, with an average width of 20 to 25 miles, narrowed into an isthmus $4\frac{1}{2}$ miles wide a little north of the centre. It ranks sixth in size among the Philippine Islands. Its area is 4368 square miles, with its 98 politically dependent islands 4726, and with the 135 islands forming the group or territorial division 5037 square miles. The island itself is accordingly

a little smaller and the group a little larger than the State of Connecticut. The principal dependent islands are the Calamianes (q.v.), lying between Palawan and Mindoro, Dumarán (128 square miles), off the extreme eastern point of Palawan, and Balábac (168 square miles), between Palawan and Borneo. To Balábac belong a number of small outlying islands scattered over the Sulu Sea.

The coasts of Palawan are indented with numerous small bays and sounds, some of which form excellent harbors, especially that of Malampaya (q.v.). The surface consists of an elevated tableland falling rapidly toward the coasts on either side, and the latter are in some places bold and rugged with limestone cliffs. From the plateau an irregular series of summits and ridges, running generally obliquely across the island, rise to an average height of 2500 feet. The highest point is Mount Mantalingajan, in the southern part, with an altitude of 6843 feet. Owing to shape and contour of the island, the streams are all very short. The climate is regulated by the winds to which the island is exposed, the dry northeast trade winds during summer, and the moist southwest monsoons in winter. These moderate the temperature, but malarial fevers are common along the coasts. The flora of the island is rich and varied, with many peculiar species, notably among the pitcher plants, the ferns, and the orchids. The mountains are covered to their summits with immense forests of valuable cabinet, building, and dye woods, including ebony, sandalwood, logwood, and many species unknown to the rest of the archipelago. There are many trees, producing resins, such as dammar, gum mastic, and copal. Among the animals the birds, monkeys, and reptiles are especially abundant, the pythons reaching an enormous size.

Owing to the sparseness of the population, economic activities are in a very primitive state. Agricultural products are raised only for home consumption, and there are no industries beyond the primitive weaving and other manufactures carried on by each family for home use. There are no regular roads, the mountain trails and the rivers being the only means of access to the interior. The island is, however, favorably located for future development, lying along the route from India to China and Manila. Many sailing vessels on that route pass along the eastern coast of the island to avoid the violent monsoons in the China Sea. The inhabitants have never been enumerated, but their number is estimated at 50,000. Aboriginal Negritos inhabit the mountains of the interior; along the coast of the northern half of the island are Malays and mixtures of Malays and Negritos, known as Tagbanúas and Tandulanos. The coasts of the southern half are occupied by Mohammedan Moros. By the Provincial Government Act of June 23, 1902, the northern half of the island, lying north of parallel of latitude 10° , together with the Calamianes and other adjacent islands, was constituted as the Province of Paragua, with the seat of government at Cuyo, on the island of that name in the Sulu Sea. The portion of Palawan lying south of parallel 10° , known as Moro Palawan, was left without civil government, while the island of Balábac, with its dependent islands in the Sulu Sea, forms a distinct political division, the local government of which was es-

established by the treaty with the Sultan of Sulu of August 20, 1899. The chief towns of the mainland are Taytay (q.v.), in Paragua Province, and Puerto Princesa (q.v.), in Moro Palawan.

Palawan was a part of the Sultanate of Borneo until the beginning of the eighteenth century, when the Spanish began to found military stations on the island to protect their northern possessions from the Moro pirates. Two attempts by the Spanish authorities to colonize the island, first by importing free immigrants from Luzon, and second by founding convict settlements, were unsuccessful. Palawan was occupied by United States troops during one of the early campaigns in the southern islands. On the establishment of civil government in Paragua there were no military stations in that province. Consult *Marche, Luzon et Palawan* (Paris, 1887).

PALAZZOLO ACREIDE, pá-lít'só-ló á-krá'-á-dá. A town in the Province of Syracuse, Sicily, 22 miles west of Syracuse (Map: Italy, J 10). Near by are the ruins of the ancient Acræ, founded by a colony from Syracuse in B.C. 664. Curious remains are still to be seen, including a small but almost perfect theatre, an aqueduct, a temple, and various tombs and vases. Population (commune), in 1881, 11,154; in 1901, 14,840.

PALAZZO VECCHIO, vək'kyó (It., old palace). A commanding structure rising from the Piazza della Signoria in Florence, and dating from 1298. It was originally the seat of the Signoria, the republican Government, and later became the residence of Cosmo I. It now serves as the town hall. The most impressive portion of the building, and one of the most conspicuous objects in Florence, is the massive square tower, rising to a height of 308 feet. The court, dating from 1454, contains the statue of a boy with a fish, which serves as a fountain. It has elaborately decorated columns. The Great Hall was constructed for the Council in 1495. It contains a colossal statue of Savonarola, who in 1498 was burned at the stake at the corner of the palace, on the site now occupied by the great fountain.

PALE. See ENGLISH PALE.

PALE (OF., Fr. *pal*, from Lat. *palus*, stake, pale, from *pangere*, Skt. *paś*, to fix, to fasten). In heraldry (q.v.), one of the figures known as ordinaries.

PALEA (Lat., chaff). A chaff-like bract in certain plants, especially grasses, in which the term is applied to the glume in most intimate relation to the flower. It is also sometimes applied to the 'chaff' which in the heads of many *Compositæ* subtends the flowers. See GRAMINEÆ.

PALEARCTIC REGION (from Gk. *παλαιός*, *palaios*, ancient + *αρκτικός*, *arktikos*, northern). A primary division in zoögeography embracing the northern part of the Old World, or Paleogæa. It includes all of Europe, the whole Mediterranean basin, as far south as the Atlas Mountains, lower Egypt, Northern Arabia, Syria, and Asia Minor, the whole of Asia north of the Himalayas, and Japan. It is divisible, according to the scheme of Selater and Wallace, into four sub-regions, which, however, are not very clearly defined: (1) Europe north of the line of mountains running from the Pyrenees to the Caucasus; (2) the Mediterranean basin, and eastward through Turkey and Persia to the

Indies; (3) Northern and Northeastern Asia; (4) Manchuria, Northern China, and Japan. It is contended by many students of the subject that this area is not entitled to rank as a grand 'region' distinct from North America (Nearctic Region, q.v.); but that the two should be joined as one called the Holarctic Region or Arctogæa, and the weight of modern opinion tends toward this view. Some would include Africa in this grand division. Consult maps and authorities cited under DISTRIBUTION OF ANIMALS.

PALEARIO, pä'lá-ü'rè-ò, AONIO, or ANTONIO (c.1500-70). An Italian humanist and reformer, born at Veroli, near Rome. He is also called Della Paglia and Degli Pagliaricci. He was educated in Rome, and remained there until 1529, except for the interval of the siege in 1527. Afterwards he went to Perosa, Siena, where he principally lived, and Padua, where he wrote *De Immortalitate Animarum* (1536), his most important work—a long didactic poem in Latin hexameters. In 1542 he wrote *Della picnezza, sufficienza e soddisfazione della passione di Cristo*. The Inquisition pronounced it heretical, but Palario defended himself against the charge with much eloquence, and successfully. The tract was followed by *Actio in Pontifices Romanos et Eorum Asseclas*, which was not printed until after his death (1606). He was professor at Lucca from 1546 to 1555, and then taught at the University of Milan. The election of Pius V. was the signal for a fresh attack from his enemies. He was formally accused of heresy in 1567, and after a year's imprisonment at Rome, was burned at the stake, in July, 1570. Palario especially protested against the Roman Catholic doctrine of Purgatory. His other works include three volumes of *Epistolæ*. An edition of his works was published at Amsterdam in 1696, and at Genoa in 1728. The tract *Benefizia di Cristo*, attributed to him, more probably is by Benedetto of Mantua.

PALEMBANG, pä'lēm-bāng'. A residency of the Dutch East Indies, embracing the region of the Musi River in the southeastern part of the island of Sumatra (Map: East Indies, B 5). It is bordered on the north by the Jambi territory, on the east by the Java Sea, on the south by the Lampongs District, and on the west by the Barisan range. Area, 53,497 square miles. Population, in 1897, 692,317. Palembang is a low and exceedingly fertile region, subject to overflows by the rivers. It has deposits of petroleum. The inhabitants are nearly all Malays and Mohammedans. In the dense forests live the Orang-Kubu, a curious race exhibiting the lowest grade of civilization. Capital, Palembang.

PALEMBANG. A capital of a residency in Sumatra, on the Musi River, about 45 miles from its mouth (Map: East Indies, B 5). It extends four or five miles along the river banks, and lies in a swampy district, which is subject to overflows. The houses are of bamboo, and many stand on rafts in the stream. The town has a fine mosque, dating from the middle of the eighteenth century, the palace and tombs of the Sultans, and a fort. There is a considerable commerce, coffee and pepper being the leading shipments. The chief industries are silk weaving, wood and ivory carving, and the manufacture of weapons and gold articles. Population, about 60,000, chiefly Malays and Chinese.

Palembang was conquered by the English in 1812, and by the Dutch in 1821.

PALENCIA, pà-làn'thè-à. The capital of the Province of Palencia in Old Castile, Northern Spain (Map: Spain, C 1). It is situated on the left bank of the Carrión, 24 miles north of Valladolid, and is an old town with narrow streets and few modern improvements. It has a beautiful episcopal palace and a notable Church of San Miguel with a massive square tower. The most prominent building, however, is the Gothic cathedral, which, though it is ill situated and has an uninteresting exterior, is beautifully ornamented within, and contains a rich collection of old Flemish tapestries. The town has a hospital, a bull ring seating 8000 spectators, a provincial institute, a seminary, a normal school, and a municipal academy of arts. The chief manufactures are shawls and blankets, agricultural machinery, fire-works, chocolate, and bricks. Population, in 1887, 15,028; in 1900, 15,610. The ancient *Pallantia* was the capital of the Vaccæi. It was taken by the Romans after an obstinate resistance, and remained an important city through the Middle Ages, being in the twelfth century the seat of the Castilian kings and Cortes.

PALENCIA, DIEGO FERNANDEZ. See FERNANDEZ DE PALENCIA.

PALENQUE, pà-làn'ká. An ancient city of vast extent lying near the village of San Domingo del Palenque, in the State of Chiapas, Southern Mexico, and bordering on Guatemala. It is located on the steep slopes of the Tumbala foothills amid the most beautiful tropical surroundings. Almost impenetrable vegetation covers the country, so that up to the present only six existing ancient structures have been described, though it is believed many more exist in the forest. By a series of walled terraces level areas on the slopes have been prepared for the buildings. These were set on steep pyramids, the sides of which were faced with stone or covered with steps. Twelve of these pyramids remain in the Palenque group, the greatest height being about 80 feet. The largest building is called the Palace; the others are named Temple of the Inscriptions, of the Sun, of the Cross, of the Cerro, and of the Beau Relief. The plan of the temple is simple, showing an oblong, rectangular area, divided into two vaulted chambers, the front wall pierced with from one to five door-openings, the middle wall pierced with as many doorways as there are compartments in the back chamber. The two vaulted chambers are the unit of construction, the complicated plan of the palace being made up of a series of such units. The vaults are corbeled and have the form of the so-called Mayan arch, a variety of the triangular. In the rear chamber were set on the back wall finely carved slabs of sacred character, which the building was intended to inclose as a sanctuary. The exteriors of the buildings present several remarkable architectural features; above the vertical walls the roof slopes away at the slant of the arch within, resembling a mansard; the top of the roof slopes gently to the ridge, which is crowned with a high, narrow, perforate comb in the form of an arch, the walls having openings crossed with slabs resembling a grille. The exterior of the buildings was surfaced with plaster and decorated with relief models tinted

with color. The mansard slope had complicated relief work in stucco representing masks and figures of gods. The latticework roof comb also bore stucco figures in high relief. The chief feature of the palace is a unique square tower 40 feet high, of which at present four stories and a blind story remain. The builders of Palenque decorated their edifices with sculpture and modeling exclusively in bas-relief, while those of Yucatan sculptured in the round. The most remarkable of the Palenque reliefs are the tablets from the sanctuaries adorned with figures and hieroglyphics. Two of them bear figures in the form of a square cross between standing figures which have attracted world-wide notice. They are in low relief and are worked out with a delicacy of form and refinement of finish superior to that of any other work of stone in this hemisphere. In stucco work also the Palenque artists were the greatest modelers in America. Colors were lavishly used and included black, white, blue, two reds, yellow, and green. While some dressed stone was used, the finish of the walls was almost invariably in plaster. Two important pieces of engineering are found at Palenque, one an arched bridge of masonry 30 feet wide and 40 feet long across the Otolum, and the other a subterranean arched waterway 500 to 600 feet long, 10 feet high, and 7 wide, massively built and inclosing the same stream. New artifacts have come to light at Palenque; some tombs in the pyramids have been excavated and terracotta figures showing the characteristic head profile and costume, beads of jadeite, spindle whorls, lance-heads, obsidian knives, etc., have been found. As to the age of the structures it does not seem possible to arrive at any determination. Comparative archaeology, however, shows that the builders were of the Mayan stock, which is responsible for the wonderful architectural remains of Chiapas and Yucatan.

Consult: Stephens, *Incidents of Travel in Central America, Chiapas, and Yucatan* (New York, 1848); Bancroft, *The Native Races of the Pacific States* (ib., 1874-76); Bandelier, *Report on an Archaeological Tour in Mexico 1881* (Cambridge, 1885); Maudslay, *Biologia Centrali-Americana, Archaeology* (London, 1897); Holmes, *Ancient Cities of Mexico* (Chicago, 1895); Charnay, *The Ancient Cities of the New World* (New York, 1887); Peñafiel, *Monumentos del arte mexicano antiguo* (Berlin, 1890); Morgan, *Houses and House Life of the American Aborigines* (Washington, 1881).

PALEOBOTANY. The branch of paleontology which deals with fossil plants. The terms vegetable paleontology, fossil botany, phyto-paleontology, and paleo-phytology are used synonymously, and within the scope of the subject is included the consideration of all dead vegetable matter which is, or which was at any time, buried in the earth; or which has left its traces there in the form of casts or impressions either in solid rock or in incoherent deposits; or which may have become preserved in whole or in part by incrustation, by petrification, or by carbonization.

HISTORY. Paleobotany, as a science, is practically a product of the nineteenth century, although a number of writers on natural history, Agricola, Albertus Magnus, Matthiolus, Gesner, and others, had long previously described petri-

fled wood in common with other fossils and minerals. Leaf impressions, however, do not appear to have been described previous to the publication of Johann Daniel Magor's *Lithologia Curiosa, sive de Animalibus et Plantis in Lapides Versis*, at Jena, in 1664, and after that not again until Eduard Lhwyd published at London, in 1699, his *Lythophylacii Britannici Iconographia*. Probably the next succeeding work of importance in which fossil plants are mentioned is Johann Jacob Scheuchzer's *Herbarium Diluvianum*, the first edition of which was published at Zurich in 1709. After this, until the end of the eighteenth century, many writers in natural history incidentally described or mentioned fossil plant remains, but generally with exceedingly crude conceptions in regard to their nature, origin, or antiquity.

In 1801 Ernst Friederich, Baron von Schlotheim, issued his *Abhandlung über die Kräuter-Abdrücke in Schieferthon und Sandstein der Steinkohlen-formation*, in *Hoff's Magazine*, at Leipzig, and in 1804, at Gotha, his *Beschreibung merkwürdiger Kräuter-Abdrücke und Pflanzen-Versteinerungen, Ein Beitrag zur Flora der Vorwelt*. With the advent of this latter work paleobotany, as a science, may be said to have had its birth, and from that time on it has made steady progress. During the years from 1820 to 1838, Kaspar Maria, Graf von Sternberg, issued in a series of fascicles at Regensburg, Leipzig, and Prague successively, his *Versuch einer geognostisch-botanischen Darstellung der Flora der Vorwelt*, and in 1828 Adolphe Theodore Brongniart published at Paris, his *Prodrome d'une histoire des végétaux fossiles*, etc. These two works are generally regarded as having placed the science upon a firm foundation, and its subsequent progress was rapid.

During the half century from 1830 to 1880 the science was developed under Goeppert, Unger, Ettingshausen, Saporta, and others, and the fossil floras of the Old World became comparatively well known. J. W. Dawson had been at work on the coal floras of British America as early as 1845; J. S. Newberry about 1850 on those of Ohio; and a few years later Leo Lesquereux began his researches, which ultimately embraced the Carboniferous floras of Pennsylvania, Illinois, Arkansas, and other States, and also the floras of the more recent formations of the Western

lections were contributed by Newberry, and subsequently both Lesquereux and Newberry undertook the study of the material collected by the United States Geological and Geographical Surveys. The results of their researches appeared from time to time in the reports issued by the surveys and in the transactions of learned societies. With the death of these two pioneers in the subject, in 1889 and 1892, respectively, the historical period of paleobotany in America may properly be said to have terminated. The subsequent labors of Ward, Knowlton, White, Hollick, Penhallow, and others belong to the period of present active work.

GENERAL FACTS AND PRINCIPLES. The extinct flora of the earth, as evidenced by its fossil remains, was gradually evolved from simple forms low in the scale of life into forms successively more and more complex and higher in the scale. Each subkingdom, class, order, or other subdivision of the vegetable kingdom had its own particular time of origin, and all experienced subsequent phases of evolution during which some reached a maximum and then either declined and became extinct or else continued down to the present time, diminished in numbers, and often degenerated in size; while others maintained an upward development which has continued to the present day. It is thus possible to divide geologic time as a whole into a series of plant ages, and to designate each age by the name of the particular subdivision of the vegetable kingdom which was predominant during that age. Such a time division, based upon certain great types of vegetation, would be as follows: (1) Age of Cryptophytes—Eozoic and Paleozoic time. (a) Age of Thallophytes—Archæan, to and including the Upper Silurian period. (b) Age of Pteridophytes—Devonian and Carboniferous periods. (2) Age of Spermatophytes—Mesozoic and Cenozoic time. (a) Age of Gymnosperms—Triassic and Jurassic periods. (b) Age of Angiosperms—Cretaceous, Tertiary, and Modern periods.

Such a presentation of the facts is not, however, entirely satisfactory, for the reason that only the periods of maximum development of each designated type are indicated. A method which presents more accurately the several phases of development of each type and at the same time the development of the vegetable kingdom as

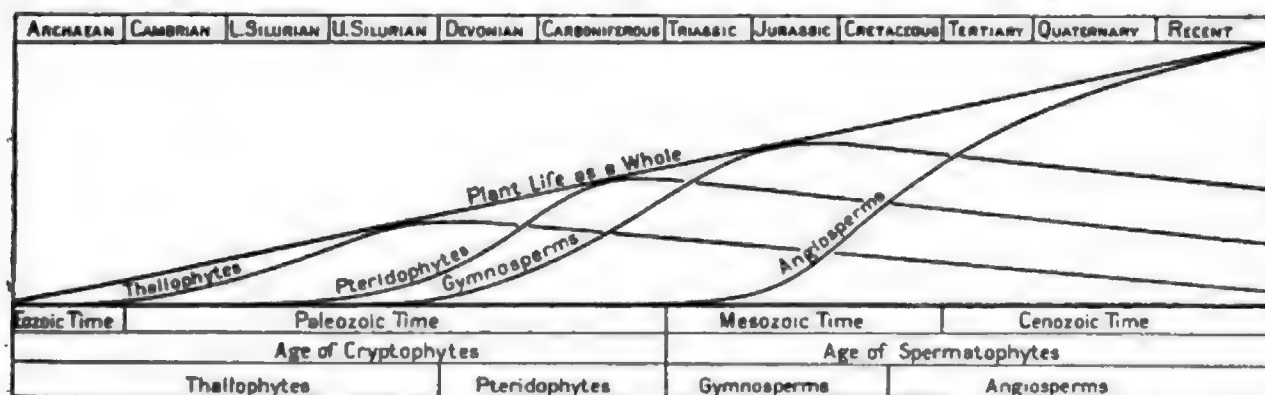


DIAGRAM SHOWING THE DEVELOPMENT OF PLANT LIFE.

States and Territories. About the year 1856 paleobotany began to receive a constantly increasing degree of attention as a result of collections of fossil plants made by Government exploring parties and by the Northwestern Boundary Commission. Reports upon these col-

a whole is by means of a diagram, in which the successively higher types are represented by a series of successively higher waves, each one having its origin later in geologic time than the preceding one, and subsequently overlapping and rising above it, the crests representing the periods

of maximum development and a line tangent to the crests the development of plant life as a whole.

The general botanical character, or expression, of any fossil flora is sufficient to determine the era to which it belongs; the identification of a few of its principal genera will determine the period, and the identification of certain typical genera or species may be relied upon for the determination of the exact or approximate age of the particular strata or beds in which they may occur. Recognition of the above facts has led to the acceptance of the broad principle, expressed by Ward, that "Great types of vegetation are characteristic of great epochs in geology, and it is impossible for the types of one epoch to occur in another." This principle is subject to modification, however, when fossil floras of widely separated localities and smaller geological subdivisions are compared. The order of sequence of types has been found to be the same everywhere, but evolution has at times been less rapid in one locality than in others, and hence the same types may occur, in different parts of the world, in strata which are not quite contemporaneous. To this identity of sequence, apart from contemporaneity, the term 'homotaxis' was applied by Huxley.

RELATION TO GEOLOGY. In connection with geology, a knowledge of fossil plants is as essential as a knowledge of fossil animals, whenever paleontological facts are of interest or value. Fossil plants may serve as corroborative evidence in the determination of the geologic age or the stratigraphic relations of strata; in some instances they may present the only available evidence, or, as has frequently happened, they may prove that conclusions deduced from other data are erroneous.

RELATION TO BOTANY. The facts relative to the phylogeny, or ancestral development, of the vegetable kingdom supplied by paleobotany have materially aided in placing modern vegetable taxonomy upon a firm and philosophical basis. Many of the now recognized early errors in taxonomy might have been avoided if the path indicated by phylogeny had been followed. Nearly every change which systematic botanists have made in the sequence or grouping of living plants, in their efforts to bring supposed allied forms together, has resulted in producing a taxonomic arrangement more closely approximating the phylogenetic sequence in the evolution of the fossil ancestors. The recognition of the fact that our living flora consists merely of the remnants of that which preceded it enables us to understand the meaning of many otherwise puzzling phenomena, such as that of monotypic genera, like *Ginkgo*, *Liriodendron*, *Sassafras*, etc., each of which is represented by a single species more or less widely separated biologically from its nearest living allies. Any apparent isolation of this kind in systematic botany was not capable of explanation by means of any known facts in connection with the existing flora.

Paleobotany has been of material assistance in solving many of the problems connected with the geographical distribution of living plants. The genus *Sequoia*, represented by the redwoods (*Sequoia sempervirens*) and the giant trees (*Sequoia gigantea*) of California, is restricted in its range to a narrow belt on the west coast of the United States, but its fossil remains

demonstrate that the genus had in the past a large number of species and a distribution which embraced practically the whole of North America, Europe, and Asia. Geological changes resulted in its extermination throughout the latter region and in all except the one limited area in the former. The genus *Nelumbo* is represented by two living species, one of which is restricted in distribution to Asia, the other to Eastern North America. When the fossil representatives of the genus were discovered they showed that the genus once extended over the whole of North America and Europe, and it is now recognized that changes in environment almost caused its extinction and left only one representative species in each continent. The problems of abnormal growths or of apparently useless organs in living plants have frequently been explained satisfactorily on the theory of atavism or reversion to ancestral characteristics when their fossil representatives have been examined.

Plants have always been regarded as excellent climatic indices. The fact that certain species or genera or families can exist only within certain extremes of temperature is well known, and hence if a relationship between a fossil flora and living plants of restricted climatic range can be established, it may be accepted as good evidence that the fossil flora was associated with a climate comparable with that of the region in which the similar living flora is now found. Fossil remains of cycads and palms found in the Cretaceous and Tertiary strata in the Arctic zones prove conclusively that tropical or subtropical conditions formerly prevailed there.

EVOLUTION OF THE PRINCIPAL TYPES OF VEGETATION. Theoretically plant life must have preceded animal life. It is assumed that the primordial vegetation was of an exceedingly low type, biologically, both on theoretical grounds and by reason of its known subsequent development from lower to higher forms. The earth and its waters are supposed to have been for a long period of time in a highly heated condition, and the first vegetation capable of existence under such conditions was probably represented by the lower thallophytes, some of which live in water at a temperature that is fatal to other forms of life. Exactly what the earliest vegetation was like cannot be determined, for the reason that its remains have been either entirely obliterated or else so altered that its original character cannot be recognized. The existence of plant life of some kind at a time when the earliest sediments were laid down is strongly indicated by the presence of carbon in the form of graphite in these rocks.

THALLOPHYTES. By reason of their cellular structure the thallophytes were poor subjects for preservation, while from their microscopic size they would be exceedingly difficult to detect even when preserved. Their comparative rarity as fossils is then to be expected, and such of their traces as are known are for the most part nothing more than casts or markings. The schizophytes, representing the agencies of disintegration and decay, were undoubtedly present at the very dawn of life, but their early existence is predicated upon theoretical grounds.

The fungi are also of comparatively little importance in fossil botany. They are represented by thallus and mycelium fragments, or by the effects produced presumably by these growths in

the tissues of higher plants, notably in those of the Carboniferous period, and there is every reason to believe that they were among the earliest floral elements of the earth. A complete enumeration of all the known fossils which have been classed as fungi has been made by Alloysius Meschinelli, in his *Fungorum Fossilium Omnium*, published at Venice in 1898, in which are listed and described about 400 species, included in about 70 genera. The lichens are almost unknown as fossils. Those found are apparently referable to living genera; they consist mostly of flakes on fragments of lignite or are inclosed in amber, and none is known from horizons below the Tertiary. The algæ are represented by the earliest known definite traces of vegetable organisms, even if all the problematic casts and tracings which have been referred to these plants are eliminated. Many of these latter to which generic names have been given may be considered as mere mechanical markings, such as are made by ripples, sun or frost cracks, etc., or by the tracks or burrows of marine animals. In the former class may be included the genera *Eophyton*, *Vexillum*, *Goniophycus*, etc., and in the latter, *Scolithus*, *Phytopsis*, *Bilobites*, etc. Nevertheless, if all these uncertain forms are disregarded, a large number of fossil species are known, which are apparently referable to the larger marine algæ, and are included in the general *Buthotrephis*, *Licorhynchus*, *Nematophycus*, *Lithothamnion*, *Chondrites* (qq.v.), etc., which occur in rocks of all ages from the Cambrian upward.

The diatoms are the most abundant as well as the most perfectly preserved of all the thallophytes, their siliceous tests generally retaining perfectly their original characters. They occur in abundance from the Cretaceous period upward, often forming extensive beds of 'tripoli' or diatomaceous earth, such as those of Bilin in Bohemia and Richmond in Virginia. (See DIATOM.) With very few exceptions, the genera of fossil diatoms are identical with those now living, and the same is true of a large number of species. The Characeæ are represented in the fossil state mostly by minute spheroidal bodies which are supposed to be the fruit cases or oögonia of species of *Chara*. They have been found in rocks of Devonian age in North America and are quite common in those of the Jurassic and Tertiary periods, where they are occasionally accompanied by fragments of stems.

THE BRYOPHYTES. Our knowledge concerning fossil bryophytes is practically confined to a small number of remains found in the Tertiary and more recent deposits, all of them either identical with or closely allied to living species. The Hepaticæ are represented by about twenty fossil species. Several in the genus *Marchantia* have been described from the Tertiary rocks of Europe, and one from the Eocene rocks of Montana. The mosses occur sparingly as fossils, and have been satisfactorily identified only in Tertiary deposits.

THE PTERIDOPHYTES. The rise and decline of this sub-kingdom of plants comprises one of the most remarkable chapters in the life history of the earth. Pteridophytes probably originated in the Lower Silurian period, although their earliest well-defined remains are from the Devonian. During the Carboniferous period they attained a position which, in respect of actual and relative

numbers and high degree of development as a type, has no parallel in the vegetable kingdom; but since that period the sub-kingdom as a whole has steadily declined numerically, and it has also undergone profound biologic degeneration. The ferns are probably the best known of the fossil pteridophytes. They were important elements in the Devonian flora, and reached a maximum of development in the Carboniferous period, at which time they apparently formed about 50 per cent. of the entire flora; they declined to about 30 per cent. in Mesozoic time, and in Cenozoic time to less than 6 per cent. All the Paleozoic genera (*Neuropteris*, *Pecopteris*, *Sphenopteris*, etc.) are extinct, and so probably are most of those of Mesozoic time, although a number of the latter are considered to be identical with living ones. Tertiary forms are generally regarded as generically and in many cases specifically, the same as existing forms.

Rhizocarps, inconspicuous both in size and in numbers at the present time, are but poorly represented as fossils, even if all doubtful forms are included. They probably made their first appearance during Devonian time. A number of undoubted species of *Salvinia* are known from Cretaceous and Tertiary deposits of North America and Europe. The *Equisetum* type had its beginning in the Devonian, and perhaps earlier. The remains consist of trunks or stems, leafy branches or fructifications, which are known under the generic names *Calamites*, *Calamodendron*, *Asterophyllites*, *Calamostachys*, etc. They attained their maximum of evolution during the Carboniferous period, at which time they formed probably 10 per cent. of the flora. These genera became extinct at the close of Paleozoic time and were succeeded by the Mesozoic genera *Schizoneuron*, *Phyllothea*, etc., and *Equisetum*, which latter has continued, through forms which steadily decreased in numbers and size, down to the present time.

Lycopods were represented very early in geologic time, probably in the Upper Silurian period or even earlier, but reached their highest development during the Carboniferous, contributing about 15 per cent. to the flora of that period. Their remains are represented mostly by trunks and limbs, under the generic names of *Lepidodendron*, *Lepidophloios*, *Knorria*, etc.; by the fruiting spikes, under *Lepidostrobus*; by foliar organs, under *Lepidophyllum*, etc. These genera became extinct at the same time with the other pteridophyte genera of Paleozoic time, and were succeeded by degenerate descendants which are either identical with or closely related to the living genera *Lycopodium* and *Selaginella*.

PLANTS OF DOUBTFUL RELATIONSHIP. In this connection it is necessary to mention several important types of vegetation whose exact botanical affinities are not definitely known. It is probable that some of these may represent synthetic types which combine characters belonging to both the pteridophytes and the gymnosperms, and they may, therefore, be properly considered between the discussion of these two groups. The Cycadofilices are plants which, in the present state of our knowledge, may belong either with the cycads or with the ferns, such as those included in the genera *Hoeggerathia*, *Thinnfeldtia*, etc. The important Paleozoic genus *Sigillaria*, with its rhizomes known as *stigmæria*, has been thought possibly to represent a type intermediate between

the lycopods and the gymnosperms, while the genus *Sphenophyllum* is one which has never been satisfactorily classified botanically.

THE SPERMATOPHYTES. The earliest definite remains of plants of this sub-kingdom thus far recorded in America belong to the Devonian period, but in Europe they probably date as far back as the Upper Silurian. They developed slowly until Mesozoic time, when, as gymnosperms, they became the dominant type of vegetation, and from then onward, as angiosperms, they continued their upward development to the present time.

The gymnosperms were the earliest representatives, of which the extinct genera *Cordaitea*, *Ginkgophyllum*, etc., may be considered as original types. As a class they were of relatively little importance numerically until the close of the Carboniferous period, when both cycads and conifers began to develop rapidly, and in early Mesozoic time these plants formed together more than 60 per cent. of the entire flora. This was the period of maximum development of the cycads in particular, after which they declined, and are now a rare and unimportant element in the living flora. The conifers apparently originated before the cycads; their development was more uniform and they continued to be important factors in the vegetation of both Mesozoic and Cenozoic time, as they are yet in the living flora. Genera such as *Baiera*, *Araucarites*, etc., closely allied to our *Ginkgo* and Norfolk Island pine, were in existence in the Jurassic and early Cretaceous periods, and these were followed by undoubted living genera, such as *Sequoia*, to which the giant trees of California belong; *Pinus*, which includes our common pines, etc. As a whole, the conifers have continued to decline in relative importance ever since the early part of the Cretaceous period.

The angiosperms may have had their origin in the Carboniferous period, but the few supposed Paleozoic forms described are very doubtful. Toward the close of the Jurassic period this class of plants was abundantly represented, and in the Cretaceous it rapidly developed into the dominant type, which position it has maintained ever since. In regard to the monocotyledons we know but little. The time of their first appearance is not definitely established, and it was not until the palms made their appearance in the Upper Cretaceous that they assumed any prominence. Grasses and sedges probably preceded the palms, but their remains have mostly been found in rocks of Tertiary age, during which period the class, as a whole, may have contributed about 10 per cent. of the entire flora.

It is probably in connection with the dicotyledons that the greatest interest centres. Their origin is traced to certain archaic forms in the Jurassic and Lower Cretaceous deposits of North America and Europe, to which Saporta has given the name of proangiosperms. Some of these from the Potomac formation of Virginia suggest, superficially, a blending of the monocotyledons and dicotyledons, as seen in the genera *Acicmophyllum* and *Proterophyllum*. Others, like *Protorhipis*, *Braseniopsis*, etc., have certain characters suggestive of relationship to those few dicotyledons which, in common with the monocotyledons, possess an endogenous structure, and of which *Nymphaea*, *Nelumbo*, etc., are examples. Apparently the dicotyledons attained their high

degree of development, both biologically and numerically, more rapidly than did any one of the types of vegetation which preceded them. In the Middle Cretaceous they had become the dominant type, and they have continued so to the present time. Among the earliest identifiable genera are many whose relationship with living genera is more or less clearly defined, as indicated in the names *Populophyllum*, *Quercophyllum*, *Saliciphyllum*, etc., while these were followed by others like *Sassafras*, *Platanus*, *Liriodendron*, *Magnolia*, etc., which it has been found impossible to separate generically from those now in existence. Living species have been recognized as far back as the Eocene and the Tertiary, and in the Quaternary period it is probable that all were identical.

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PALEOGRAPHY (from Gk. *παλαιός*, *palaios*, ancient + *-γραφία*, *graphia*, writing, from *γράφειν*, *graphein*, to write). In its widest signification the science which treats of the writing of the ancients and that of the Middle Ages. It includes within its scope the study of all marks or characters which may be designated as writing, whether on materials regarded as indestructible or as destructible. The term is commonly used, however, in a more restricted sense, and denotes the science which treats of writing on destructible material. Hence we may define Greek and Latin paleography as that branch of the general science of paleography which is concerned with the writing of those languages, found on such material as wax, papyrus, parchment, and paper, and dating from the earliest times. Historically, the

science of Latin paleography owes its origin to the demands of diplomatics, or the study and criticism of ancient legal documents. Gradually paleography assumed an importance of its own, and finally became a distinct science when the importance of diplomatics diminished after the French Revolution. The interest aroused by Latin documents led to the study of Greek paleography, through the investigation of the writings of the Greek Church Fathers. The field of Greek paleography is limited in comparison with Latin paleography, as the Greek letters were used for only one language, but the Latin alphabet served for the whole of Western Europe.

LETTERS AND THEIR FORMS. Letters may be classed in a general way as majuscules and minuscules. The former are either capitals or uncials. Capitals are either square, such as are found in the most carefully made inscriptions, or rustic, which are drawn with greater freedom with cross strokes oblique and short. Uncials are modified capitals arising from the favoring of curves and avoiding of angles inasmuch as they are the production of the pen on papyrus. Minuscules are the result of the rapid and inartistic writing of majuscules, which have been changed in form and size. The forms of letters were also influenced by the material upon which they were written. Those made on soft substances show curved lines, while letters on stone or metal are angular.

MATERIALS. The materials used by mankind for purposes of writing have varied much. Leaves and bark were employed in a primitive state of society. Linen was used by the Egyptians and by the Romans for their religious books. Clay was inscribed or stamped by the people of Babylonia, Assyria, Egypt, and by the Greeks and Romans. Bronze was used by the Romans for legal documents, such as the *diplomata*, giving privileges of citizenship and legal marriage to the soldiers, and lead served also for documents and dedicatory inscriptions. Stone inscriptions belong to the science of epigraphy. Wax tablets were used by the Greeks and Romans for writing purposes, a use which continued through the Middle Ages and down to modern times, as in the fish markets at Rouen. These were made of wood or ivory in a rectangular form and had a smooth surface slightly sunk and bordered by a rim. The surface was covered with black wax in which the writing was drawn by means of a stylus, a sharp-pointed instrument of bone, ivory, or metal. These tablets might be used singly, or two or three could be bound together. Many wax tablets have been found, as in the mines of Dacia, which date from A.D. 131 to 167, and at Pompeii dating from A.D. 15 to 62. Papyrus (q.v.) was very commonly used as a writing material in Egypt, Greece, and Italy. Papyrus rolls found at Herculaneum, which was destroyed A.D. 79, preserve the earliest Latin writing on this material. Next in date are the deeds of Ravenna, running from the fifth to the tenth century A.D. Of the fifth century are the fragments which contain rescripts written in a Roman cursive and addressed to Egyptian officials. The use of papyrus continued through the Middle Ages to some extent for literary works and regularly for Papal documents down to the eleventh century. Parchment (q.v.) was first employed by the Greeks and Romans simply as a cover for

the rolls of papyrus, and its use for books dates from the latter part of the first century A.D. The term used in modern times for any kind of skin book is vellum, which properly designates calfskin. Vellum was employed until the fourteenth century, when paper made from rags generally took its place. Paper made from cotton had been used for Greek manuscripts in the thirteenth century. As suggested above, papyrus assumed the roll form, or *volumen* proper. Parchment, on the other hand, was made up into book form in imitation of the wax tablets.

GREEK PALEOGRAPHY. The science of paleography as applied to the study of Greek writing on papyrus is of modern date. Greek papyri were discovered at Herculaneum in 1752, and in 1778 forty or fifty rolls were found in Egypt, which with one exception were afterwards destroyed. In 1820 a large number belonging to the second century B.C. were found at the Serapeum in Memphis. During the next thirty years there were discovered at intervals important literary papyri, as in 1821 the Bankes *Iliad* (the last book), in 1847 orations of Hyperides, and in 1849-50 the Harris Homer (parts of *Iliad* xviii., and in book form, books ii.-iv). Far more important discoveries were to follow. In 1877 many fragmentary papyri of a more literary character belonging to the Byzantine period were unearthed at Arsinoë in the Fayum district. In 1892, at Socnopæi Nesus, in the same district, another group was found containing documents ranging from the beginning of the first century A.D. to the middle of the third. In 1889-90 Flinders Petrie found that the cartonnages of mummy coffins at Gurob were made of papyri, written in the third century B.C., which proved to be fragments of documents and of literary works, among them part of the lost *Antiope* of Euripides. Fortunately, some papyri were also deposited with the dead, and were thus preserved in fairly good condition. Among these were the *Constitution of Athens* of Aristotle, the Mimes of Herondas, the oration of Hyperides against Athenogenes, and portions of the odes of Bacchylides. In 1896-97 Grenfell and Hunt, acting for the Egyptian Exploration Fund, discovered at Behnesa, the ancient Oxyrhynchus, thousands of papyri, fragments of literary works, and complete rolls of non-literary character. Among these were the famous *Logia* or sayings of Christ, parts of the Gospel of Matthew, and pieces from classical writers. They range in date from the first to the seventh century A.D. Previous to these discoveries it was customary to classify Greek papyri according to the style of writing as the literary or book hand or, again, the cursive. Although these differ in their general style, there is no set form for each. Writing on vellum may be classed as uncial and minuscule, and this distinction can be sharply drawn in the Middle Ages, when the literary hands were settled. This is not true, however, of the papyrus period, for it is impossible to distinguish uncials and minuscules, both of which may be written cursorily. The uncial of the mediæval period is a lineal descendant of the literary style in the papyri, but the mediæval minuscule is a new letter, based on the cursive, but molded into an exact form and becoming finally the regular hand of the literary style. Three periods in the history of Greek writing on papyrus may be recognized. These correspond to political changes:

The Ptolemaic, B.C. 323-30, marked by freedom and breadth of style; the Roman, from Augustus to Diocletian, marked by roundness and curved, flowing strokes; and the Byzantine, from A.D. 360 to the Arab conquest of Egypt in 640, marked by a large, handsome style.

It is possible that the earliest extant example of writing on vellum is an Egyptian fragment of two leaves containing part of Demosthenes's speech, *De Falsa Legatione*, in a hand like that of the Herondas papyrus, written perhaps in the early part of the second century A.D. This is a rare example, and we do not find a rapid increase in the use of vellum until the fourth century, when literary works on papyrus are almost entirely lacking and its place was taken by vellum. The oldest vellum manuscripts, excepting the fragment of Demosthenes, are the great uncial codices of the Bible, the Codex Vaticanus and the Codex Sinaiticus. Manuscripts written in Greek minuscules are numerous. They are classified as the *vetustissimi*, from the ninth to the middle of the tenth century; the *vetusti*, from the middle of the tenth to the middle of the thirteenth century; the *recentiores*, from the middle of the thirteenth to the middle of the fifteenth century; and the *novelli*, all of later date. These show a varying style of minuscule, the earliest being the most simple and exact.

LATIN PALEOGRAPHY. In studying the history of Latin paleography, we begin with majuscule writing as found in the earliest Latin manuscripts extant, such as the Vergil of the fourth century. Uncials described above may be recognized in Latin paleography by the letters E and O, and also by rounded forms of D and H. As a literary hand the uncial writing runs from the fifth to the eighth century. The cursive hand generally used influenced the more limited literary majuscule hand, so that a style designated the half-uncial finally became the book hand. The earliest examples of the cursive style are the wall inscriptions and wax tablets of Pompeii, written before A.D. 79. The style of writing differed very slightly in the first three centuries of the Christian Era. From the cursive hand came the so-called national hands, which assumed an individuality according to the locality in which they held sway. The Lombardic is the writing of Southern Italy as practiced in the monasteries of Monte Cassino and La Cava, and lasted from the ninth to the thirteenth century. The Visigothic was employed for books and documents in Spain from the eighth to the twelfth century. The Merovingian appears as a book hand on manuscripts of the seventh and eighth centuries. It never reached the calligraphic form, which marked the highest development of the other national hands, for it was supplanted by the round minuscules of the Carolingian reform. The Irish and Anglo-Saxon writing must be mentioned apart from the national hands, for it was not derived from the cursive style, but from the half-uncial which was brought to Ireland by the missionaries in the sixth century. One important peculiarity of the Irish hand is the tendency to calligraphic forms and ornamentation of the manuscripts, as in the famous Book of Kells of the latter part of the seventh century. The Irish hand found its way into the northern part of Britain, so that the English hand may thus be traced to the Roman half-uncial.

The reform of writing which marked the reign

of Charlemagne was initiated by a decree of 789 for the revision of Church books. It had its origin in the monasteries of France, particularly at Tours, where, in the Abbey of Saint Martin, under the direction of Alcuin of York, much attention was given to writing. A new hand was the result, which is known as the round Caroline minuscules. These are small uncials of the true Latin form modified by cursive influences, and they became the literary hand of the Frankish Empire. In the tenth century these minuscules began to spread, and in the eleventh century they began to assume their individual form in various nations of Europe. This was the starting point of the history of modern hands, which are traced to the Roman alphabet. In the twelfth century the so-called Gothic writing appeared, which is simply the Caroline minuscule with angles replacing the curves. The writing of the fourteenth century shows a gradual decline and the letters become less distinct and are less carefully made. Nevertheless, a renaissance in Italy in the fourteenth century gave a very regular and beautiful style—the humanistic hands of the fifteenth century, which had great influence on the type forms. These minuscule letters were the ancestors of the lower-case letters of the Roman alphabet, and the Gothic form of the same gave the German lower-case letters.

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PALEONTOLOGY (from Gk. *παλαιός*, *palaios*, ancient + *ὄντα*, *onta*, pl. of *ὄν*, *on*, being + *-λογία*, *-logia*, from *λέγειν*, *legein*, to speak). The science which deals with the ancient life that has inhabited the earth during the past periods of geological time. It is based upon the study of fossils, and has close affiliations with geology, physiography, and biology. It embraces, under a broad conception of its scope, not alone the description and classification of fossils, but also all questions relating to the nature, morphology, and physiology, bionomy and ecology, geologic and geographic distribution, and to the ontogeny, evolution, and phylogeny of all forms of plant and animal life that have lived upon the earth and that are now found, in more or less well-preserved condition of fossilization, imbedded in the rocks that form the earth's crust. Paleontology is the history of the organic life of the earth from its inception in remote geologic time to its culmination in the vegetable and animal life of the present era. This science was founded on an independent basis by Lamarck, Cuvier, Schlotheim, Sowerby, Parkinson, D'Orbigny, and Goldfuss about the beginning of the nineteenth century, and most of the early paleontological literature dealt with mere descriptions and classifications of fossils. After the publication of Darwin's *Origin of Species* in 1859, and the subsequent elaboration of the doctrine of evolution, it became evident that proof of this doctrine must be furnished largely by the paleontologists, and the study of fossil organisms received a new impetus along those lines of research which bear upon the broader philosophical questions of the origin, evolution, and phylogeny of the various species and races of fossil animals and plants. Quite coördinate with this development of the biological phase of paleontology has been the elaboration of that phase of the science which is more closely allied to geology: namely the more refined methods in the use of fossils as markers of geologic horizons, the investigation of the succession, migration, and evolution of fossil faunas and floras, and the determination of the physiographic changes and other causes of such phenomena.

Two lines of paleontological research may then be recognized. Certain investigators confine their attention almost entirely to the elucidation of the morphology, embryology, ontogeny or development, and phylogeny or genealogy, and to the description and classification of organic remains, noting the names only of the geological formations whence the species have been derived. Such studies fall within the scope of paleobotany and paleozoölogy, which are essentially branches of biology. The other phases of the science of paleontology, and perhaps the more comprehensive of the two, may be designated as paleontologic ge-

ology, stratigraphic paleontology, geological biology, and deals with the relations existing between the fossils and the rocks in which they are found. It is practically that part of historical geology which is based upon the study of fossils. Under this head are embraced the following lines of investigation, and also others not mentioned that are of more special interest: (1) The use of index fossils as markers of geological formations and horizons; (2) the assemblage, within individual formations, of species and genera of fossil plants and animals to constitute paleofloras and paleofaunas; and the study of the succession, migration, and evolution of these ancient floras and faunas, and their relations to the grander divisions of geologic time; (3) the development of facies, and the influence of the facies on the conditions of existence of the life of ancient times; (4) the study of paleogeography, comprising the determination of the physiographic and climatic conditions existent during the successive periods of the earth's history. All these latter lines of investigation, however closely related in their final results to the physical side of geology, nevertheless depend for their successful pursuit upon intimate knowledge of the purely biological aspects of paleontology, for they are based primarily upon keen discrimination between allied species and upon recognition of the phylogenetic relationships of the species involved.

FOSSILS. The nature of fossils and the modes of fossilization are described in the article **Fossil**. Not all animals and plants of past time have been preserved to us as fossils. A large number of them were of such organization that they were hardly likely to leave traces of their existence in the rocks. It is also known that many formations which originally contained fossils have suffered so great metamorphism that their organic contents have been wholly or partially destroyed. Other formations have been upheaved above the level of the ocean to form part of the land and have been subjected to erosion, with the result that their materials have been carried down to lower levels or into the sea, there to build up deposits of later age. Yet, in spite of the many gaps which will probably never be filled, the history of organisms is being rapidly compiled with an increasing degree of continuity in the series of life epochs, the lines of descent of many races of animals and plants have been established, and the sequence of those events in geological history that bear upon the conditions of existence of extinct faunas has been worked out for several portions of the earth's surface, and with a surprising degree of detail.

Through observation of the true order of superposition, the rocks of the earth's crust have been arranged by geologists into a series of systems, stages, and formations, the lowermost being the oldest and the uppermost the youngest, and the relative succession of the individual members of this series has been determined to be the same in all parts of the world. The fossils of the different members of the series have been studied and described, and it has been ascertained that the assemblage of fossils found in one formation always differs more or less from the assemblage of fossils found in the overlying and underlying beds, and furthermore that the difference is accentuated as the distance between the formations is increased. For table of geological formations, see **GEOLOGY**.

FAUNAS. The fossils contained in a rock formation are in general indicative of the animal and vegetable life that lived during the period of time in which that rock was deposited. Successive faunas and floras of variable expression have succeeded each other on the earth and have left their remains in the rocks that were forming during the periods of their existence. The large divisions of time are distinguished by the predominant types of life, as the Paleozoic era by invertebrates, the Mesozoic era by reptiles, etc., and the smaller periods of time, represented by the stages and substages, are characterized by particular genera and species. Thus the Helderbergian series is identifiable by the brachiopod genus *Gypidula*, and a division of that series, the Coeymans limestone, is recognizable by the presence of *Gypidula galeata*, a well-marked species that serves for the identification of that horizon in many parts of America. Such a characteristic genus or species, which can be relied upon for the recognition of geological horizons or zones, is called an index fossil, and its use is the result primarily of careful observation in the field. This empirical usage of index fossils is that adopted by geologists who have not been trained in the methods of paleontological research. There is a second and more important usage of index fossils based upon a knowledge of the phylogeny of races of animals and plants. By recognition of the phyletic position of a fossil the expert paleontologist can determine within close limits the relative age of the rock from which the fossil was obtained.

INDIGENE AND EXOTIC FAUNAS. In a single basin it is sometimes found that a series of similar faunas, evidently evolved each from its predecessor in this basin, is eventually succeeded at a higher horizon by a new fauna totally different from those below. The lower faunas are the indigene faunas, developed or evolved in this province through a long period of time and consisting of members nicely adapted to their environment and to each other. The new fauna, generally associated with a change of sedimentation, is called an alien or exotic fauna, and it has invaded this region in consequence of physiographic or climatic changes. It may find itself in congenial surroundings, and its species will then multiply and evolve, and if left undisturbed it will in turn become the indigene fauna of the region. But if its new environment happens to become uncongenial it may suffer partial extinction of its members or suppression of development of its individuals, and it will remain in the region for a short time only, to be succeeded by another alien fauna or by a returning party of the original indigene fauna. The migrations of faunas are largely due to changes in the 'facies' consequent upon physiographic and climatic changes.

FACIES DEVELOPMENT AND BIONOMY. Facies is the combination of physical and biological characteristics exhibited by a geological formation at a particular point. These are determined at the present time by climate, depth, tides, nature of medium, distance from shore, etc. (see GEOGRAPHICAL DISTRIBUTION: ECOLOGY: FAUNA; FLORA), and just as different types of facies are being developed in the ocean and on the land at the present time, so they have been developed during all past periods of geological history. It follows then that the deposits formed during any

one period may be represented in different regions by littoral, sublittoral, abyssal, corallie, estuarine, lacustrine, or terrestrial facies, and each of these facies will have its own distinctive fauna. Study of the life habits of modern organisms enables us to restore the habits of extinct forms of life, and we are able to portray with a considerable degree of correctness the conditions under which the ancient faunas lived, and consequently also to picture the physiography of past times. The large majority of fossiliferous rocks are of marine origin, and hence a study of modern marine organisms is essential to a proper understanding of the bionomic conditions of the past. Freshwater and terrestrial deposits are also claiming more attention than they formerly received; they with their peculiar faunas and floras occur chiefly in the Mesozoic and Cenozoic formations.

BIONOMY. Marine organisms are broadly divided into pelagic or those that inhabit the open sea, and littoral, those that live in the vicinity of the coasts. According to their modes of life they are divided into plankton, nekton, benthos.

PLANKTON includes the majority of pelagic organisms that are more or less passively drifted about by the waves and currents of the ocean. Many organisms are planktonic only during their larval stages and when adult become attached and adopt a benthonic life (meroplankton). Such are sponges, medusæ, annelids, Echinodermata, brachiopods, Bryozoa, most mollusks, and Crustacea. Others are planktonic throughout their lives, as Foraminifera, Radiolaria, Siphonophora, Ctenophora, Chaetognatha, Pteropoda, Heteropoda, and some Crustacea. Planktonic organisms are generally widely distributed and their fossil remains occur principally in the sublittoral and abyssal facies, though they may be found in the littoral facies.

NEKTON includes the organisms that are active swimmers independent of storms, currents, and tides. Here are included fishes, most malacostracan crustacea, the dibranchiate cephalopods, and also the marine reptiles, including the extinct ichthyosaurs, plesiosaurs, Pythonomorphs, and the Cetacea.

BENTHOS includes all forms that live at the bottom, and of which there are recognized two sub-groups: the sessile and the vagile benthos. The benthos includes by far the larger proportion of marine organisms that are found in a fossil state. Among them are the marine algæ, some foraminifera, sponges, hydroids, corals, echinoderms, worms, brachiopods, bryozoa, gastropods, lamellibranchs, cirripedes, tunicates, and many cephalopods, such as the orthoceratites and belemnites. Radial symmetry is most highly developed in the sessile benthos (corals and echinoderms).

LITTORAL FACIES includes deposits formed on the beach and in the shallow sea in the vicinity of the coast. They consist mostly of terrigenous materials ranging in size from fine mud, through sand to coarse conglomerate, and some kinds of organic deposits. The coarse beds contain few fossils, but those of finer grain abound in them. Fossils of the littoral facies comprise remains of the organisms that inhabited the shallow water and the region between tides; also those of the beach, and others that have drifted in to shore from the open sea. The majority of the fauna is made up of benthonic forms and all the animals and many of the plants have strong cal-

careous skeletons. Certain types of mollusks are characteristic of the littoral zone; oysters, mussels, the heavy clams, limpets, chitons, *Littorina*-like shells, the boring lamellibranchs, and here belong also the coarse marine algæ, crabs, and anomurans. The littoral facies is the most important of all, for most of the fossiliferous rocks have been formed in the shallow water near the shore and on the continental shelf, and also because preëminently, in its peculiar development of coralline facies, it contains the largest fauna.

SUBLITTORAL FACIES includes those deposits formed in the deeper water at a distance from the coast. It merges on the one side into the littoral and on the other into the abyssal facies. It contains the remains of pelagic (plankton and nekton) organisms which after death have sunk to the bottom, and also of those benthonic organisms of the deeper waters. Here are included fish, ammonoids, pteropods, graptolites, many foraminifera, radiolaria, and many echinoderms, mollusks, and brachiopods of more delicate build than those found in the littoral facies. Many of the pelagic organisms enjoyed very wide distribution, as the graptolites, and hence afford excellent index fossils for correlative purposes. Examples of sublittoral facies are the graptolite shales of the Ordovician, goniatite, and ammonite limestones and shales of the Upper Paleozoic and Mesozoic, and many pteropod limestones, like the *Styliolina* limestone of the Devonian.

ABYSSAL FACIES. Here are included the deposits of the deep sea, consisting of very fine grain sediments of various types. (See Ooze.) The existence of abyssal sediments among the rocks of the earth's crust has been strongly denied by some writers. It is, however, difficult to assign certain geological formations to any other category. Such are the chalk deposits of the Cretaceous, the Upper Paleozoic radiolarian cherts of New South Wales, and those of Jurassic age in the Alps, and the *Aptychus* shales of the Alps, all of which are very similar to the abyssal deposits of the present day.

CORALLINE FACIES. This is really a phase of the littoral facies, but as its characteristics are so distinct, and as its development depends upon the absence of many of those features associated with the normal littoral facies, it deserves special consideration. The conditions under which corals form reefs at the present time are, a warm temperature, shallow water not more than 125 feet deep, and pure sea-water entirely free from mud and from inflowing fresh water. The other organisms living about the coral reef require the same conditions. These conditions existed also during the formation of the Paleozoic and Mesozoic and Tertiary coral reefs, for the rocks of these fossil reefs are free from traces of mud and clay.

ESTUARINE FACIES embraces the deposits and faunas of lagoons and estuaries. The sediments are usually irregularly bedded muddy sands and clays. Here is found a commingling of brackish water types with marine organisms, fresh-water and terrestrial types. A fine example of such an estuarine facies is afforded by the Lower Carboniferous nodule-bearing shales of Mazon Creek, near Morris, Ill., described by Meek and Worthen, Scudder, and others. The nodules have furnished a very large congeries of plants and animals. There are represented here ferns, am-

phibia, fish, insects, spiders, scorpions, myriapods, eurypterids, crustaceans, aquatic worms, lamellibranchs of marine and fresh-water types, gastropods of fresh-water, marine, and terrestrial types. No strictly marine types, like crinoids and brachiopods, occur here, those present being species which could live in brackish water. Other examples of estuarine facies are found in the Carboniferous, Mesozoic, and Tertiary formations of Europe. In all probability many of the coal-measure swamps were of estuarine nature, for sections through the beds show alternations of marine and fresh or brackish water faunas.

FRESH-WATER FACIES appears first in the Carboniferous in the form of swamp deposits, now turned into coal. In these deposits are abundant fossil plants of various types, and remains of fresh-water mollusks, insects, etc., and also of amphibians and fish. In the Mesozoic, and in more pronounced degree in the Tertiary, lacustrine deposits are largely developed. They may be recognized by their contained fresh-water shells; *Paludina*, *Goniobasis*, *Planorbis*, *Limnæa*, *Unio*, and *Anodonta*. They have afforded also the far more important and more interesting vertebrate remains, such as the dinosaurs, birds, and mammals. *Terrestrial facies*, represented by deposits of flood plain, desert, and prairie, do not as a rule afford many fossil remains. The loess, a recent accumulation of dust and river mud, contains land and fresh-water shells; and the White River Miocene clays of Colorado, containing finely preserved vertebrates, are thought to have been accumulated largely as dust upon a Tertiary prairie.

COMPOSITE FACIES. The fossil elements of a fauna may be distinguished as autochthonous, or those which naturally belong in the deposits where found and which have been buried where they lived or where they fell to the bottom; and heterochthonous, or those which owe their entombment to the agencies of currents or other means of transportation, and have been buried far from their natural habitats. The autochthonous fossils are the more reliable for zonal correlation, while the heterochthonous fossils indicate the nature of preëxistent faunas and the proximity of neighboring faunas of different facies.

ANCIENT CLIMATE AND PALEO GEOGRAPHY. Climatic zones are thought to have existed as early as Cambrian time and to have continued through the Silurian and Devonian periods. The European and North American faunas of these periods can be separated into northern and southern types which are quite distinct, the various genera having representative species in each zone. The courses of oceanic currents have been indicated for the early and late Ordovician by Matthew and Ruedemann. Other evidence regarding the climate of the Paleozoic is derived from study of the distribution of the fossil coral reefs of the Silurian, and of the plants of the Carboniferous. The Silurian coral reefs are found in high latitudes and indicate rather warm temperatures for those regions, and the structure of the Carboniferous tree trunks points to a remarkable uniformity of the seasons during that period. Neumayr has tried to demonstrate that the Jurassic and Cretaceous faunas show the influence of well-marked climatic zones which extended in belts around the globe independent of the continental barriers, but his results have not been confirmed

by subsequent investigations. During the Tertiary, however, climatic zones certainly existed, as is indicated by the fossil floras and faunas, but a lowering of the temperature began during Eocene time in North America and during Miocene time in Europe, and culminated in the ice age of the Pleistocene. Various interesting attempts have been made by Neumayr, Suess, Chamberlain, and others to correlate the evolution of animals and plants with the changes of climate in past times.

It will be seen from what has been said regarding facies development that the study of the distribution and migration of fossil faunas leads to conclusions regarding the physical geography, paleogeography, of ancient times; these conclusions must of course be tested in the light of the evidence derived from the study of the tectonic features. Much has been accomplished in this field of research by Heer, Neumayr, Suess, De Lapparent, Canu, Smith, Chamberlin, Weller, Ortmann, Schuchert, Ulrich, and Clarke.

THE SPECIES AND GENUS IN PALEONTOLOGY. The early conceptions of species held by the botanists and zoölogists of the non-transformist school were held also by paleontologists. Each fossil species was considered to represent a distinct entity separate from its allies and specially created. At that time transitional forms between species were grouped as varieties under one or the other specific head, or were even in many cases thrown away and destroyed, as they interfered with the hard and fast delimitations sought after in the early classifications. Subsequently, as the evolution doctrine became better understood, these transitional individuals were recognized as affording examples of the variability of species, and they are now considered to be of equal importance with the norm of the species itself, as affording evidence upon the origin of new varieties. A fossil species differs from a living species in one important respect. The living species of the present day is distinguished by certain particular characters which differentiate it from its allies, certain physiological tests determine its individuality, and it has a more or less limited area of geographical distribution. The species of the paleontologist is a far different conception. In addition to its geographical distribution, it has geologic range; for it lived during the period of deposition of perhaps several successive formations, and it is represented in these formations by a series of fossil forms of more or less unmistakable continuity until it disappears at some higher horizon. The physiological tests are impossible, and hence the paleontologist must rely upon likeness of form and upon continuity of occurrence, and he groups under a single specific denomination those individuals which resemble each other in essential characters and which differ only in secondary characters. Some species were evidently very short-lived, others enjoyed long lives and underwent little if any change of form, while still others varied considerably during their periods of existence, and in their later stages present such wide departure from the original form that, were the intermediate transitory phases absent, they would be considered to constitute distinct species or perhaps even distinct genera. Examples of such series of variable species are furnished by the *Planorbis* of the Upper Miocene at Steinheim, Württemberg, described by Hyatt and Hilgendorff; the

Paludina of the Lower Pliocene of Slavonia, described by Neumayr; the *Ammonites* of the *Opelia subradiatus* type of the Jurassic limestones, studied by Waagen.

The existence of such series of transitional forms, the members of which occur in successive horizons and all of which have apparently been derived from an original common ancestor, forces recognition of the fact that the term species in paleontology is a very arbitrary one, and that the limitation of a species is determined not by any strictly definable form, but rather by the absence of transitional forms that would serve to link it through scarcely distinguishable grades of variation to its nearest ally. Two species found in formations of different ages, and now considered distinct, may through future discovery of intermediate transitional stages prove to be but the earliest and latest stages of a single race. The same principles are true with respect of genera, families, etc. (see HORSE, FOSSIL), our conceptions of which change as intermediate forms are discovered, and as the gaps in the classification are filled up. The inevitable conclusion drawn is that species and genera and even the larger groups are mere stages in the life history of organisms, that they have no real existence in nature, and that they are arbitrary concepts of the stages of evolution attained by a race of organisms at a particular moment or during a more extended period of its history.

PERSISTENT AND ABERRANT TYPES. Persistent or conservative types are common among fossils, and they include those types that have escaped all changes of environment, and also those members of an original stock that have not responded to the influences of changed environments, and which have perpetuated the characters of their more primitive ancestral type through several geological formations or epochs. Examples are found among the Foraminifera, *Globigerina* and *Orbulina* (Cambrian to recent); *Nautilus* among cephalopods (Ordovician to recent); *Lingula*, *Crania*, and *Rhynchonella* among brachiopods; and *Cidaris* among echinoderms.

Aberrant types, or forms in which organs have been developed to an extent not found in the other normal members of the group, are common among fossils. *Eucalyptocrinus* among crinoids, the *Rudistæ*, *Pholadidæ*, and *Teredinidæ* among pelecypods, *Ampyx* among trilobites, *Triceratops* and *Naosaurus* among reptiles, and the *titanothere*s among mammals, serve as examples. The most aberrant forms are usually found at the ends of short lines of descent, and they seem to mark approaching extinction of these side lines. They seem to indicate extreme adaptation of the organism to special modes of life and appear to have lost their powers of adaptation in other directions.

GENERALIZED AND SYNTHETIC TYPES. In the early history of a subkingdom there is often found to be a group of fossil organisms which combine in more or less marked degree the characters that distinguish a number of distinct classes or orders of later date. Such a generalized type or synthetic group is considered to resemble closely if not actually to represent the ancestral type of the entire subkingdom. An excellent example is afforded by the *Cystoidea* of Cambrian and Ordovician origin, which combine the characters of the *Crinoidea*, *Blastoidea*, *Asteroidea*, and *Echinoidea* of later origin. (See

articles on these groups.) At a date after the Cystoidea and Blastoidea had become extinct, and after the Echinoidea had passed through a considerable amount of evolution, there appeared in the Triassic the isolated genus *Tiarechinus*, which resembles both the Blastoidea and the Echinoidea, and which thus constitutes a synthetic type between these two classes. The *Phyllocarida* form a generalized group connecting the Entomostraca and Malacostraca; the Merostomata, containing the Eurypteridæ and Limulidæ, connect the Crustacea and Arachnida (especially the scorpions); the suborder Condylarthra of Lower Eocene time contains the ancestors of all the later suborders of the Ungulata, and also presents characters resembling those of the Carnivora; and the Gnetales are synthetic between the angiosperms and gymnosperms. Nearly all races of fossil animals that can be traced back through ancestral forms are found to have their origin in such groups of generalized types.

PALEONTOLOGY AND EVOLUTION. The causes of variability among species, the meaning and processes of evolution and natural selection, and the relations between evolution and classification are considered in other articles under those particular titles. The bearing of paleontologic research upon these subjects and some of the results attained deserve brief notice here, and for further information regarding these lines of research the reader is referred to the papers cited in the bibliography at the end of this article. The following lines of research have been distinguished: Auxology or Bathmology, the study of growth of organisms; Genesiology, the study of heredity; Cytology relates to the origin of acquired characteristics; and Bioplastology deals with the correlation of the ontogeny and phylogeny, or the stages of development with those of evolution.

EMBRYOGENY OF FOSSIL ORGANISMS. Embryonic shells of mollusks, brachiopods, and crustacea are sometimes found as minute objects in highly fossiliferous shales and limestone. Some adult shells retain at their apices the form of the embryonic shell, and others, like the ammonites, have the young shell which hatched from the egg inclosed within the centre of their coiled disks. By examining large numbers of brachiopod shells of all sizes, Beecher and Clarke, and later Schuchert, were able to arrange the individuals of certain species in series according to size, and to show that they all were derived from an embryonic stage, called the protegulum, of very simple form, resembling the Cambrian genus *Paterina*. They have shown that members of all the families of brachiopods began their existence as paterina-like shells, and that the distinctive adult shapes have been attained through modifications in the mode of growth of the shell during the stages subsequent to the protegulum stage. Beecher has shown that members of the principal families of trilobites began their existence as embryonic forms, called the 'protaspis,' which is comparable with the protonauplius stage of the more primitive living crustacea. Among the corals, several fossil genera, as *Favosites*, *Syringopora*, etc. (sive Beecher and Girty), pass through an embryonic stage that resembles another fossil coral *Aulopora*. The nautiloid and ammonoid cephalopods present the most favorable conditions for the preservation of the embryonic stages of growth, because

their shells hold within their centres all the successive stages through which they have passed in their ontogenetic development. By breaking open such a shell the developmental stages can be studied from the earliest 'protoconch' hatched from the egg and found at the centre of the coil, to the senile or old age stage represented by the last chamber in which the animal lived. See CEPHALOPODA.

AGASSIZ'S LAW OF RECAPITULATION, subsequently termed by Haeckel the law of palingenesis, according to which the stages of development or ontogeny of the individual can be correlated with the stages of evolution or phylogeny of the race to which the particular individual belongs, has received abundant confirmative evidence from paleontology, and the literature on this and allied branches of research is quite formidable, especially in its technicality of expression. The following scheme of terms adapted from Hyatt has been devised to distinguish the corresponding stages:

ONTOGENY OR DEVELOPMENT		Phylogeny or evolution of race stages
<i>Colloquial</i>	<i>Technical</i>	
Fœtal.....	Embryonic	Phylembryonic
Baby.....	Neoplontic	Phyloneplonic } ..Epæme
Adolescent.....	Neanic	Phyloneanic
Adult.....	Ephebic	Phylephebic..... Acme
Senile.....	Gerontic	Phylogerontic..... Paræme

Fine illustrations of such correlations between ontogenetic and phylogenetic stages have been furnished by Hyatt's study of the *Arietidæ*, a group of ammonites; by Beecher's demonstration of the phylogeny of the *Terebratulidæ*, a family of brachiopods; and by Beecher's studies on the larval forms of trilobites. This palingenetic law is of much value to the stratigraphic paleontologist, for it enables him to correlate geological formations of which the faunas consist of wholly unknown species. It also enables him to prophesy the existence in earlier formations of unknown genera which when found will prove to be counterparts of larval or adolescent stages of species already under observation.

ACCELERATION AND RETARDATION. In some cases the correspondence between the two classes of stages mentioned above is incomplete, through action of 'tachygenesis' or 'acceleration of development,' which has been defined by Hyatt as follows: "All modifications and variations in progressive series tend to appear first in the adolescent or adult stages of growth, and then to be inherited in successive descendants at earlier and earlier stages according to the law of acceleration, until they either become embryonic, or are crowded out of the organization, and replaced in the development by characteristics of later origin." Examples are seen in the spiny larvae of the trilobites *Acidaspis* and *Arges*, which differ greatly from the smooth protaspis stages of other trilobites. Retardation of development is the reverse of acceleration and is due to the later stages dropping out of the ontogeny; in other words, animals in which this operates grow old quickly. Examples are afforded by some Cretaceous ammonites which have sutures of goniatic and ceratitic type. These ammonites are derived from Jurassic ancestors having complex sutures, but they never attained their normal development; they stopped growing in their youth. Similar cases have been noted among the brachiopods,

and the larval condition of many parasites may be explained in this manner. Retardation of acceleration results often in regressive evolution. These laws of acceleration and retardation explain disturbing factors in the application of embryogenic methods to elucidation of the past histories of the races of modern animals, and enable us to understand why the ontogeny of a living animal cannot always be depended upon to furnish a synopsis of the sequence of events that have occurred in the geological history of its phylum.

CYTOLOGY (εργία, something acquired). The question of the inheritance of acquired characters, one of the cardinal principles of evolution, has been denied by some zoologists, and affirmed by most paleontologists. Hyatt, after tracing the genetic relations of varieties and species of fossil cephalopods through geologic time, came to the conclusion "that there is no class of characteristics which may be described as non-inheritable," and he has proved beyond any doubt the inheritance of one particular characteristic, namely the so-called 'impressed zone,' of the nautiloids, due to the adoption by the animal of a crawling mode of life, with its consequent influence upon the form of the shell. This impressed zone appeared first in the adult stages of early Paleozoic nautiloids, and through inheritance and acceleration it became fixed in successively earlier stages of growth in the succeeding nautiloids of the later Paleozoic.

GERONS AND PHYLOGERONS. When an organism has passed the acme of its development and begins to get old it sometimes acquires at that late date peculiar characteristics that seem to indicate loss of energy. The shells of mollusks and brachiopods thicken and the ornamentation decreases in prominence, etc. Among fossil cephalopods the last whorl often shows a tendency to uncoil. By acceleration these gerontic characters appear earlier in the ontogeny of succeeding species, and finally the normal closely coiled shell is found only in the very youngest stages of the phylogerontic members of the race.

ADAPTATION AND SPECIALIZATION. The manner in which many types of modern organisms have become adapted to their particular modes of existence is often well illustrated by their fossil ancestors, in which may be observed a gradual change in organization from earlier less specialized and less adapted types. One of the best known cases of gradual adaptation is that of the horse, whose one-toed hoof has become adapted from an original omnivorous type to a final generalized type. (See HORSE, FOSSIL.) Some cases of adaptation to particular modes of existence reached a higher degree of perfection during past times than any known at the present day. There was a winged reptile, *Ornithostoma* or *Pteranodon* of the Cretaceous, in comparison with which the best of modern birds are mere tyros. This creature, with a body weighing not more than thirty pounds, had wings that spread twenty feet from tip to tip, and a skeleton so delicate that the bones are almost paperlike in structure. The cause of extinction of such a creature, which would seem to have been almost beyond the influences which are known to have caused the extinction of other races of animals, is as yet a mystery.

EXTINCTION OF ORGANISMS. One of the most impressive phenomena brought to the attention of

the student of paleontology is the extinction or disappearance of species, families, and even whole orders, as well as faunas of fossil animals and plants. In some cases the rate of disappearance is gradual, the group diminishing in importance before final extinction occurs; in other cases extinction is sudden, as if due to some catastrophe. Extinctions of the latter type are usually associated with important changes in the sediments or with unconformities, and occur at levels which have been used to mark the limits of geological systems or formations. In many cases such extinction is only apparent, and is due to migration



DISTRIBUTION OF IMPORTANT GROUPS OF FOSSIL ANIMALS.

of the fauna into some distant or unknown region. In some cases the extinction is very real, entire groups of animals having been, as it were, suddenly annihilated. Some types of organisms after having enjoyed a more or less extended period of life have slowly died out and have become extinct, apparently uninfluenced by any physiographic catastrophe, after having passed through a maximum period of evolution and a subsequent phylogerontic decline. They have grown old and died apparently through lack of growth force.

Without doubt the most far-reaching causes of extinction of marine animals during past times have been those changes in the relative levels of land and sea by which the water has been largely drawn off from the epicontinental shallow seas and from the continental shelf or littoral zone during intervals of isostatic readjustment. As a consequence of such readjustments, which also mark the openings of new geological periods, the faunas inhabiting the shallow seas have been driven into deeper water and have suffered annihilation, with the exception of scattered parties which found shelter in some harbors of refuge and thus served to furnish the nuclei for new faunas which evolved under future more favorable conditions.

DISTRIBUTION OF ORGANISMS IN THE PAST. Detailed information regarding the range of the various fossil animals throughout the geological formations is given in the articles on the separate groups and genera, and the range of fossil plants is described in the article **PALEOBOTANY**. It is necessary here to give only a general view of the distribution of those groups of animals which are of most importance to the student of stratigraphic paleontology. The vertical divisions of the table represent geological periods, and the thickness of the black lines indicates the relative expansion of the groups. The selection of the group names is based entirely upon their importance as fossils and has nothing to do with their rank as members of a zoological classification.

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Consult articles: **GEOLOGY**; **GEOGRAPHIC DISTRIBUTION OF ANIMALS**; **ECOLOGY**; **EVOLUTION**; **NEOLAMARCKISM**; **OCEANOGRAPHY**; **ROCK**; **PETROLOGY**; **BIOLOGY**; **BOTANY**; **ZOOLOGY**; **CLASSIFICATION OF ANIMALS**; **HEREDITY**; **PALEOBOTANY**; etc.

PALEOTROPICAL or ETHIOPIAN REGION (from Gk. *παλαιός*, *palaíos*, ancient + Eng. *tropical*). A grand division in zoogeography composed of Africa south of the Sahara and Madagascar. The second name is the better, because only a part of the tropical regions of the Old World are included. Four subregions were delimited by Sclater and Wallace: (1) All Africa north of the Tropic of Capricorn (including Southern Arabia), except the Congo basin; (2) West Africa, or the equatorial Congo forest region; (3) South Africa; (4) Madagascar and the neighboring islands. This is one of the best defined of the zoological regions, and has been

excepted by those who would unite all the rest of the Southern Hemisphere. (See NOTOGÆA.) Of its subdivisions, the most clearly defined is the Malagasy Subregion (q.v.). For the faunal characteristics of this region, see AFRICA, paragraph *Fauna*; also, DISTRIBUTION OF ANIMALS.

PA'LEOZOIC (from Gk. *παλαιός*, *palaíos*, ancient + *ζώνη*, *zoe*, life). The name given to the lowest of the three great divisions of the fossiliferous rocks, because they contain the most ancient forms of life. They were formerly known as the primary rocks. The systems included under this title are the Cambrian, Ordovician, Silurian, Devonian, and Carboniferous. Phillips, for the sake of uniformity, introduced Mesozoic as equivalent to Secondary, and Neozoic to Tertiary rocks. See GEOLOGY; PALEONTOLOGY; SILURIAN SYSTEM; DEVONIAN SYSTEM; CAMBRIAN SYSTEM; CARBONIFEROUS SYSTEM.

PALERMO, pà-lér'mò. The capital of the Province of Palermo and of Sicily, being the judicial, ecclesiastical, and military seat for the island. It is situated on the northwest coast, on the west side of the Bay of Palermo, 120 miles west of Messina (Map: Italy, II 9). The entrance to the bay affords a beautiful view. The city, which has received the appellation of 'la felice,' or 'the happy,' stretches magnificently along the shores. It is surrounded by the beautiful plain of the Conca d'Oro, and is nobly backed by mountains reaching a height of nearly 3500 feet, the shapely Monte Pellegrino rising on the north and Cape Zaffarano stretching away to the east. The mean annual temperature is 63.6° F. In summer a refreshing wind blows up daily from the east, across the water.

Many of the streets are unpaved and are disagreeable from dust at certain seasons of the year; the avenues are regular, and Palermo is, on the whole, well built and clean. There are four quarters which are formed by the Corso Vittorio Emanuele and the Via Macqueda. At their intersection is the small but lively square called Quattro Canti, the geographical centre of the city. It has eight sides, and is faced by façades decorated with statues of the holy virgins of Palermo, kings of Spain, and the seasons of the year. There are in the city many relics—towers, etc.—of Norman times. All the houses are provided with balconies. The Corso, the main street, leads from the sea to the cathedral and royal palace in the southwest corner of the city—the official centre. Here the vast and picturesque cathedral faces the Piazza del Duomo (which is surrounded by sixteen huge holy statues) and stands adjacent to the important Piazza Vittoria. A statue of Santa Rosalia rises in front. The church was begun in 1169, and is a composite structure with many spoiled features. Its façade, however, is very attractive, and its tombs of the Sicilian kings, including that of Frederick II., are imposing. In the Chapel of Santa Rosalia lies the saint in a silver sarcophagus (1631), which is exhibited to the people thrice annually. Another interesting church is the San Giovanni degli Eremiti, with five domes and charming cloisters, a Norman structure belonging to the early part of the twelfth century. The superb San Salvatore is a creation of Amato, and the Carmine Maggiore is also fine. The spacious La Martorana dates from 1143. In it are the headquarters of the important Conservazione dei

Monumenti di Sicilia. In the Oratorio del Santissimo Rosario is a notable altar-piece by Van Dyck.

The Palazzo Reale, or royal palace, stands on the site of a castle built in Saracenic times. The spot is associated with the lives of Manfred and Robert Guiscard. There is here, perhaps, the finest attraction in the city—the Arabic-Norman Palatina Chapel. It owes its origin to Roger II. (1132). As a palace chapel it is unsurpassed. It is beautifully ornamented with mosaics, the glass mosaics on the interior walls being especially noteworthy. Around the Piazza Vittoria stand, in addition to the royal palace, the Palazzo Sclafani, now serving as barracks; the archiepiscopal palace, dating from the fifteenth century, and possessing several graceful architectural features; and the Palazzo Municipio, containing a beautiful Greek statue of Antinous.

Among the fine new buildings in Palermo is the Government Finance Bureau. The modern Casino is found in the Palazzo Geraci. The beautiful Garibaldi garden lies near the small harbor of La Cala, from which, along the sea, extends the magnificent and fashionable esplanade Foro Italico as far as the Villa Giulia, or the Flora. This public park, beautified with the rarest trees, is scarcely rivaled in Italy. It has monuments to the poet Meli and to Frederick II., and a meritorious modern marble group of the Greek heroes, the Canaris, chiseled by Civiletti. Adjacent is the splendid Botanic Garden. Not far away, on the south side of the city, is the Garibaldi gate where the patriot entered in 1860. In the northwestern part of the city extends the modern Via della Libertà, the popular drive in winter. It passes through the English Garden, opposite the gate of which is a fine equestrian statue of Garibaldi, dating from 1892. In this direction lies the newest quarter of Palermo. It is occupied chiefly by foreigners. There are in the city a monument to Philip V. (1856), a statue of Charles V., the historic statue of the Genius of Palermo, and a statue of Victor Emmanuel I. In the Piazza Croce del Vespro stands a memorial (marble column and cross) erected in 1737 to the French buried here after the Sicilian Vespers.

The National Museum is in the suppressed monastery Dei Filippini, and is interesting. Among its more valuable contents is an exceptionally fine altar-piece with wings, of the early Flemish period, attributed by some to Cornelissen, by others to Mabuse. Here, also, are the famous metopes of Selinus, representing almost the highest stage of Greek art.

Palermo is the seat of a university. (See PALERMO, UNIVERSITY OF.) The communal library, rich in material on Sicilian history, has about 220,000 volumes and 3300 manuscripts. The national library has about 160,000 volumes. It together with the lyceum is established in the former New College of the Jesuits. There are in the city a Greek seminary, a conservatory of music, a royal observatory, two teachers' seminaries, the Società per la Storia Patria, a seamen's school, an agricultural institute, a Circolo Filologico, a fine modern opera house, and the new theatre called Politeama.

The manufacturing interests are small. There is now a capacious shipbuilding yard. The commerce is growing, wine, oranges, lemons, sulphur, sumach, grain, and oils being conspicuous

exports. Leading imports are coffee, sugar, coal, cotton and woolen goods, silks, and porcelain. The old harbor is the little La Cala, suitable only for small vessels. It is protected on the east by a long narrow mole reaching out toward another mole extending from the north. The new haven lies at the foot of Monte Pellegrino. The city is connected by rail with various parts of the island. Palermo is the sixth Italian port in importance and the third in Sicily, the number of ships entering and clearing in 1900 having been 6750, with a total tonnage of 3,330,000. The city is provided with electric tramways and a good water supply. At the head of the city government is a syndic. Palermo's great festival is that of Saint Rosalia, from July 11th to 15th. Regattas, races, and fireworks are its important features.

The environs, embellished with elaborate villas, are of great beauty and interest. A short distance to the southwest ancient catacombs were discovered in 1785, but were destitute of contents. Monte Pellegrino offers a very attractive ascent and a remarkable view. On its side is found the famous grotto (now converted into a church) of Saint Rosalia. The royal château at the foot of the mountain is a splendid seat, with Chinese architectural features. The population of Palermo in 1901 was 309,694. It is the fifth Italian city in size.

The town (anciently Panormus or Panhormus) was of Phœnician origin. It was Carthaginian for a long time, until taken by the Romans in B.C. 254. Augustus established a colony here. The Byzantines took it from the Goths in A.D. 535. It was a wealthy and powerful Moslem centre after 830, and became the capital of the Normans in Sicily in 1072. In 1194 it passed to the Hohenstaufen. The Court of Frederick II. here was one of the most brilliant in Europe. In 1282 occurred the massacre of the French in Palermo, known as the Sicilian Vespers (q.v.). During the residence of the Spanish viceroys the city was a regal place, and much of its distinguishing architecture and many of its features date from this epoch. It was the scene of revolutionary revolts in 1820, 1848-49, and 1860, and suffered much in consequence. Garibaldi entered the city in 1860. A national exposition was held here in 1890. Consult: Schüring, *Historische Topographie von Panormus* (Lübeck, 1870); Freeman, *Historical Essays*, 3d series (London, 1879); id., *History of Sicily* (ib., 1891); Arcoleo, *Palermo und die Kultur in Sicilien*, trans. by Nolte (Dresden, 1900).

PALERMO, UNIVERSITY OF. An institution founded by Ferdinand IV. in 1779. A higher institution of learning existed in Palermo as early as 1394. In 1805 the university was closed and was not reopened until 1850. Since then, encouraged by the Government, it has maintained a steady growth. It consists of the faculties of law, medicine, surgery, mathematics and natural science, letters and philosophy, and the schools of pharmacy and engineering. Its attendance is about 1400.

PALES, pāl'ēz. In early Roman mythology, a divinity much worshiped by herdsmen. In the Roman poets, who only knew the divinity from the festival, Pales is a goddess, but Varro states that originally the divinity was masculine. The festival, the *Palilia*, or more commonly the

Parilia, was celebrated on April 21st, which was in later times declared to be the day of the founding of Rome. It was a purification of the flocks and herds. The stables were swept, sprinkled, purified with sulphur, and adorned with wreaths. Fires of hay and straw were kindled, over which the worshipers sprang three times, and doubtless drove the herds. Prayers for the increase of the flocks were made, and also offerings of milk and cakes, but no bloody sacrifices.

PALESTINE, pāl'ēs-tin (Lat. *Palæstina*, from Gk. Παλαιστίνη, *Palaistīnē*, from Heb. *Pēlišti*, Philistine, from *pālāsh*, to wander about). A name originally applied to the coast land occupied by the Philistines, but later used in a wider sense to denote the land of Israel. The exact limits of Palestine, taking the term in its ordinary wider significance, are somewhat hard to fix. A line drawn from the deep gorge of the Leontes (the modern Litany or Kasimiyeh), as it turns abruptly to the west to reach the sea, eastward across the valley to Mount Hermon will give a satisfactory northern boundary; similarly, a line from Mount Hermon due south to the parallel of the southern end of the Dead Sea will indicate the eastern limit; the southern boundary may be marked by a line from the south end of the Dead Sea due west to the Mediterranean. The territory thus bounded extends about 150 miles north and south, the breadth ranging from about 35 miles at the extreme north to 110 in the south. The west-Jordan portion varies in breadth from 23 to 80 miles. In other words, Palestine lies between latitudes 31° and 33° 20' N., and extends from the sea to about longitude 35° 45' E. of Greenwich. The west-Jordan portion comprises something over 6000 square miles, that east of the Jordan somewhat more than 3000 square miles.

PHYSICAL FEATURES. The physical features of Palestine are very marked. The most peculiar and important of these is the remarkable depression through which flows the Jordan (q.v.). This depression is due to a geological disturbance at the end of the Pleiocene period, when the whole plateau east of the Mediterranean then under water was rent in two from north to south as far as the Red Sea. In Palestine the strata just west of the fault broke and fell with a strong dip toward the deep valley thus formed. Throughout nearly the whole course of the Jordan, and to a short distance south of the Dead Sea, this valley is lower than the level of the Mediterranean. The waters of Merom (Lake Huleh) are about seven feet above sea-level, the surface of the Sea of Galilee, about 10 miles farther south, is 682 feet below the sea, while the surface of the Dead Sea, 65 miles south of the Sea of Galilee, lies 1292 feet below sea-level, with the bottom 1300 feet lower still. The surface of Palestine may be divided, roughly speaking, into four parallel zones—the seacoast plain, the hills and mountains west of the Jordan, the valley of the Jordan, and the plateau region east of the great depression.

This whole region consists of a series of limestone formations over Nubian sandstone. The upper strata are soft and porous, except where worn away by erosion, so that in many places water can be obtained only from very deep wells. Where the harder strata are nearer the surface, springs abound. In the Jordan Valley

and in many parts of the east-Jordan land hot springs exist. These show that the ancient volcanic activity, evidenced not only by many earthquakes recorded in history, but especially by the great lava plateau (with many extinct volcanoes) which stretches from the Sea of Galilee to the Hauran (q.v.), is not yet entirely quiescent.

The hilly range west of the Jordan, in striking contrast to the eastern plateau, is broken and irregular in character. It may be divided into several distinct regions. Beginning at the extreme south, we have the 'Negeb' or 'south' region (literally the dry or parched land), a desert tableland, 1500-2000 feet above sea level, intersected by wadies or ravines running east toward the Dead Sea or northwest toward the Mediterranean. The largest of these is the Wady es-Seba, which passes by ancient Beersheba and enters the Mediterranean as Wady Ghuzzeh a few miles south of ancient Gaza.

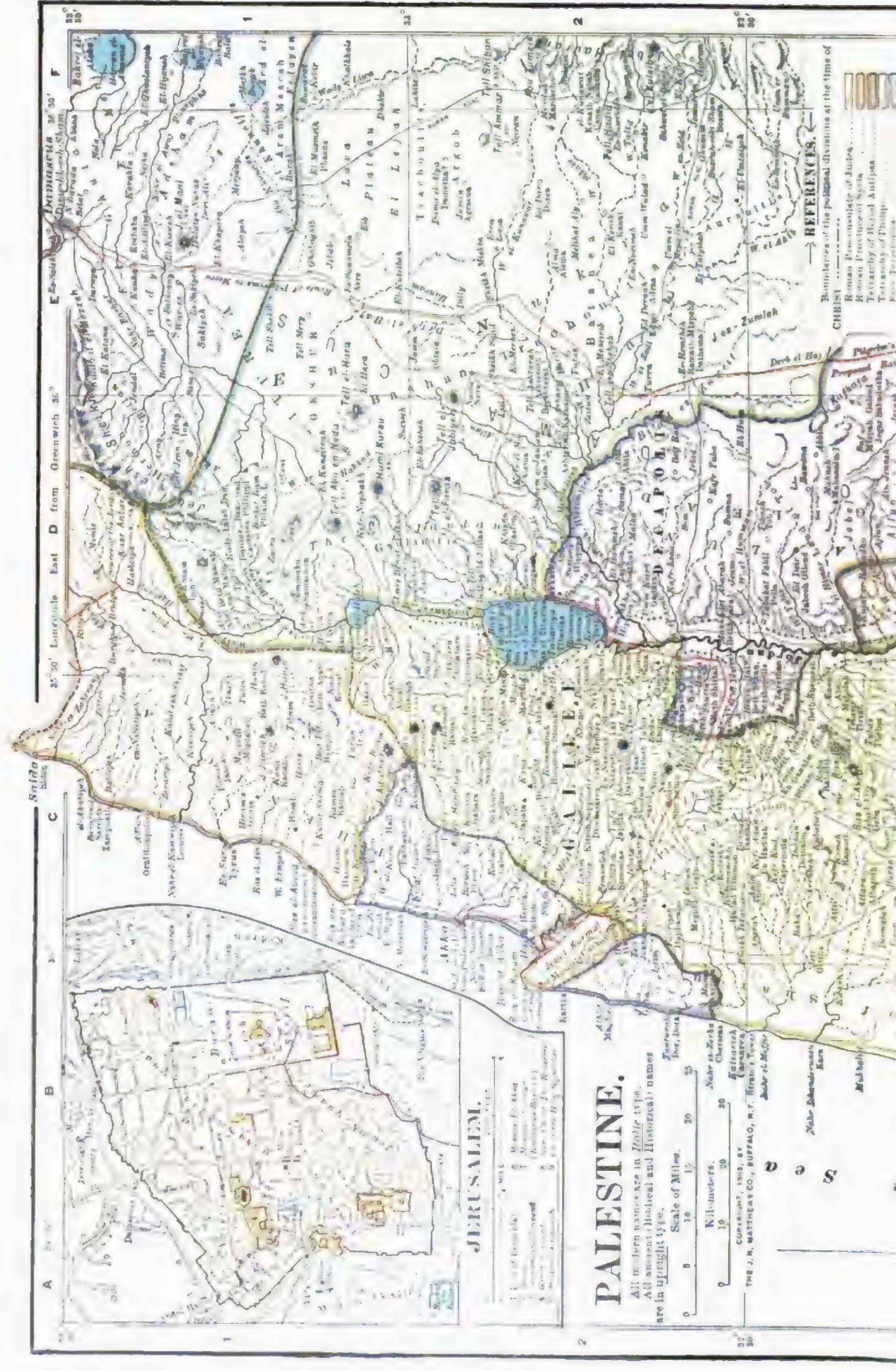
The northern part of the Negeb is higher (about 2500 feet above sea level) and more broken. The central ridge now becomes more pronounced, and the highland or mountain region of Judah begins. This extends as a fairly unbroken plateau some miles north of Jerusalem. The highest portion of the Judean range is near Hebron (3370 feet). Toward Jerusalem the level sinks in places to about 2400 feet, but becomes higher as it extends north. The crest of the Judean highland averages nearly 15 miles in breadth. From it the descent to the Dead Sea, 10 or 15 miles away, is rapid, breaking down finally in precipitous cliffs. The whole region bordering on the Dead Sea is wild, barren, and rocky, intersected by countless deep ravines leading toward the sea. It was known as *Jeshimon* (the desert waste), and its upper reaches nearer the central plateau formed the Wilderness of Judah with its various subdivisions, the Wilderness of Tekoa, of Jeruel, of Maon, etc. West of the Judean highland the country sinks gradually toward the coast plain. This region of hills and valleys was known as the *Shephelah*, i.e. the low land. In the more open valleys and on the hillsides both the Shephelah and the central plateau are capable of high cultivation. In other parts, especially the uplands, they are more suited for pasturage. From the coast plain several large valleys lead up into the interior highlands, of which those of Ajalon, of Sorek, and of Elah have become famous as scenes of great conflicts between invaders and defenders of the uplands.

The central highland continues north of Jerusalem for upward of forty miles, but with less uniformity. North of Bethel (10 miles north of Jerusalem) it begins to be broken. The general level sinks, though many peaks are over or nearly 3000 feet high. The descent to the Jordan Valley is in places very abrupt, though also traversed by a number of passable valleys. One of these, the Wady Farah, pierces far into the interior. Near Shechem, situated in a beautiful vale between Mount Gerizim (2849 feet) on the south and Mount Ebal (3077 feet) on the north, a network of valleys seems to converge. One of these, the Wady esh-Shair, opens out northwest into the plain in which the city of Samaria was situated and continues on to the coast. Another opens into the Wady Farah, and thus gives open connection with the Jordan Valley. Near She-

chem, then, the central highland may be said to break down into a system of valleys, plains, and isolated peaks. Between Bethel and Shechem, especially along its western border, the whole plateau is more open and undulating, more fertile and capable of cultivation, than that of Judah to the south. This region was known as Mount Ephraim, rather a succession of hills than one continuous mountain. The part of the coast plain west of Mount Ephraim is the famous 'Plain of Sharon.'

From the hills near Samaria northward the country takes on a new character. The low-lying plain of Dothan, 10 miles north of Samaria, connects the seacoast plain with the southern reaches of the great Plain of Esdraelon (q.v.), a triangular-shaped expanse, about 16 miles across, midway between the Jordan and the sea, with an average elevation of but about 250 feet. This remarkable district is separated from the seacoast plain to the west by a series of low hills running northwest from the plain of Dothan and culminating in the Carmel range (1500-1800 feet), which juts out into the Mediterranean in a promontory 556 feet high, at the foot of which there is a narrow strip of beach. The Plain of Esdraelon is shut in on the east by the Gilboa Mountains (1300-1650 feet) and the hills near the site of ancient Shunem and Nain. Between these two ranges of hills the deep valley of Jezreel, all of it below the sea level, leads down to the Jordan. The northeastern corner of the plain opens out into another rapidly descending valley across which Mount Tabor (1843 feet) rises in lonely grandeur.

North of Esdraelon, in Lower Galilee, the mountains begin to reappear. The whole region between the Sea of Galilee and the Mediterranean (i.e. the Galilee of the New Testament) is quite open. None of the peaks attains a height of 2000 feet, and they are for the most part isolated and interspersed with valleys and plains. There are two main systems of hills in this lower Galilee. One bounds the Plain of Esdraelon on the north, extending from the river Kishon just opposite Mount Carmel to the Sea of Galilee. The hills about Nazareth and Cana and Mount Tabor belong to this system. North of these hills, extending from the northwest coast of the Sea of Galilee to the coast plain, is a long, low plain broken into several portions by low hills, crossing it from north to south. The most famous part of this plain is the fertile Sahel el-Buttauf (Assochis), ten miles long and two to three miles wide. The eastern end of the plain as it descends to the Sea of Galilee forms the Land of Gennesaret. A second line of hills, north of the long plain, at the northern foot of which runs the bed of the Wady Shaib, completes the hill system of Lower Galilee. North of the Wady Shaib the elevation rapidly increases. As in Judah, we now find a high central plateau with an elevation of 2000-3000 feet, with occasional peaks still higher. The descent on the east, to the Jordan, is steep; that on the west, to the sea, more gradual. The plateau is narrower at the north than in its southern portion. Northern Galilee is limited by the Leontes, which, rising between the Lebanons, makes a sharp detour to the west and enters the sea just north of Tyre. East of the angle formed by the Leontes the mountains of Galilee extend north-



JERUSALEM.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

PALESTINE.

All modern names are in *italic type*.
All ancient (Hebrew and Historical) names are in *upright type*.

Scale of Miles.
0 5 10 15 20 25

Scale of Kilometers.
0 5 10 15 20 25

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ward to form a portion of the great Anti-Lebanon range.

Across the valley through which flow the upper courses of the Jordan lie the rapidly ascending slopes of Mount Hermon, whose summit is 9168 feet above the sea. Out from the depths of this vast mountain flow most of the springs which combine to form the Jordan. Where these streams converge the valley is 8 to 10 miles wide and but little above the level of the sea. It soon becomes marshy, and at last opens into Lake Huleh. After this the valley narrows and the stream descends rapidly to the Sea of Galilee. From this lake to the Dead Sea, 65 miles, the Jordan Valley varies in width from 3 to 14 miles. It is only about 4 miles wide where it leaves the Sea of Galilee, but broadens where it is joined by the Valley of Jezreel, 13 miles below. It again narrows, but after receiving the Jabbok continually widens until, at Jericho, it attains its maximum breadth. Where the Jordan enters the Dead Sea the valley bottom is swampy. On either side of the valley the ascent to the highlands is generally steep. The western side is much broken by many ravines and passes, but the eastern hills present a more uniform appearance, being broken only at long intervals by the larger streams. The valley is of inexhaustible fertility, and has an almost tropical climate. The Dead Sea marks the deepest part of this great depression. It has no outlet, and the constant evaporation, aided by the saline character of many of the springs in the neighborhood, makes its waters so heavily charged with salt that they are exceedingly bitter in taste and of high specific gravity. They are, nevertheless, very transparent. In some places the shores are heavily lined with salt deposit. The Dead Sea is also remarkable for the petroleum springs below its surface from which come the lumps of bitumen often found floating on its waters. Hence its ancient name, *Asphaltis*. The sea is deepest (c.1300 feet) at its northern end. The southern half is quite shallow. Lying at a level of 1300 feet below the sea, and surrounded by hills rising 3000 to 4000 feet above its surface, the Dead Sea is one of the hottest regions on the earth.

Across the deep, hot valley lies Eastern Palestine, much more uniform in character than the territory west of the Jordan. It divides naturally into three main sections. From Mount Hermon to the Yarmuk (Hieromax), a large perennial stream traversing the eastern plateau and emptying into the Jordan, the limestone is overlaid by a thick volcanic formation. Extinct volcanoes abound and the lava soil renders the region extraordinarily fertile. Only the western portion, the Jaulan (ancient Gaulanitis), belongs within the limits of Palestine. The eastern portion represents the ancient Bashan. The general elevation is highest near Hermon, gradually sinking toward the Yarmuk. The drainage is all west (to the Jordan) or south (to the Yarmuk). Only near the Sea of Galilee and the Yarmuk is the plateau much broken by ravines.

South of the Yarmuk to the Jabbok and from the Jabbok to the Arnon, a total distance of nearly 100 miles, lie ancient Gilead and the Plains of Moab, identical with the *Peræa* of New Testament times. The lava soil characteristic of the region north of the Yarmuk is not found here. Basalt gives place to limestone, and the

soil, though fairly well watered, is of inferior fertility. It is consequently less fitted for agriculture, but has ever been famous for its pasturage. It is a high rolling plateau broken only by the larger wadies running to the Jordan. North Gilead (modern Ajlun, north of the Jabbok) is not so high as South Gilead and the Plains of Moab (the modern el-Belka), but more heavily wooded and better supplied with water. The most southern portion, south of the Arnon, and the home of ancient Moab, is even more barren and dry, yet still suitable for pasturage.

Palestine is somewhat deficient in its water supply. During the winter there are heavy rains, but the numberless wadies, with few exceptions, are dry in the summer or dry season. Where the hard limestone is near the surface, at the foot of high hills, perennial springs are numerous. This is mainly true of Northern and Central Palestine, while in Judah and on the plateau of Southern Gilead and Moab springs are rare. The Jordan is the only considerable stream. Its sources are perennial springs mostly flowing from the slopes of Mount Hermon. Of these the most famous is that near Banias, the ancient Paneas, near the site of Dan, where the stream issues forth from a large cave. The Jordan is supplied farther down by several perennial affluents, of which the Yarmuk, the Wady el-Arab, and the Jabbok on the east, and the Nahr Jalud (in the Valley of Jezreel) and the Wady Farah on the west are the most important. On the western slope the Leontes at the extreme north, the Kishon (which drains the great Plain of Esdraelon), and the Zerka or Crocodile River are perennial.

In the whole country there are but two seasons in the year. The rainy, or 'winter' season, begins in October-November with the 'early rain.' This softens the parched and baked soil and enables the farmers to plow. The rain, with occasional snows on the mountains, falls more or less continuously until February. During February sowing takes place. Some weeks later (March-April) the so-called 'latter' rain is indispensable to the well-being of the now growing crops. By May the rains are over, and the long hot summer (May to October) begins. The average annual rainfall is 21 inches. The different elevation of the several zones of Palestine causes a great variety in the temperature and other conditions. When it is pleasantly cool on the uplands it is unendurably hot in the Jordan Valley a few miles away. The highlands are dry and salubrious, the lowlands moist and oppressive. The mean annual temperature of the uplands is 63°, with an average maximum of 100° and an average minimum of 34°. The prevailing winds are from the sea, northwest in summer, west or southwest in winter. The hot winds (sirocco) carrying clouds of dust from the deserts east and south often inflict damage and severe discomfort.

FLORA AND FAUNA. Considering the limited area and the fact that portions of the country are desert-lands, the flora of Palestine is remarkably rich. This is owing to the fact that Palestine is the meeting point of three large floral regions which differ considerably from each other, the Mediterranean, the Asiatic steppe-flora, and the tropical flora of Arabia and Egypt. The latter is confined to the valleys, in which the papyrus grows near the water; dates, ba-

nanas, figs, olives, almonds, as well as myrtles, acacias, azaleas, and many other Mediterranean and tropical plants, are also abundant. On the mountain slopes north of Judea there are some heavy forests. On the lower slopes they are deciduous, chiefly of oak and beech, with maples, poplars, plane trees, and mulberries. Higher up there are pine forests associated with spruce, cypress, juniper, and cedars, including some remaining specimens of the cedar of Lebanon. The fauna is also varied, including over 100 species of mammals and several hundred birds. The larger wild animals, however, such as the lion, bear, and leopard, have quite disappeared. The most characteristic surviving mammals are mountain goats and the hyrax (q.v.).

PRESENT ECONOMIC CONDITION. The economic development of the country is hindered by the lack of a settled agricultural population, the present inhabitants being chiefly Syrians and Arabs. The soil is fertile chiefly in the sense that it can be rendered highly productive by irrigation and careful cultivation, but it has largely lain barren and uncultivated for many centuries. The herding of sheep and goats was, and still is, one of the chief means of support of the inhabitants. Within the last fifty years, however, considerable areas of waste land have been brought under cultivation through the efforts of Western agricultural colonists. Attempts to found agricultural settlements were made by Germans and Americans as early as 1850, but the first successful colonies were those founded by Germans at Jaffa and Haifa in 1868, and later at Jerusalem. Since then a number of other colonies have been founded by Jewish immigrants impelled by the Zionist movement. (See ZIONISM.) Though they have not all been successful, the net result has been a distinct improvement in the economic conditions of the country. Modern agricultural methods have been introduced and serve as an example to the native farmers, and new industries have sprung up. Roads have been greatly improved, and wagons have begun to replace camels and mules. A railroad has been built from Jaffa to Jerusalem, and another is under construction between Haifa and Damascus.

POLITICAL GEOGRAPHY AND HISTORY. The early history of Palestine, to the sixteenth century B.C., is exceedingly obscure. From the records of the Egyptians we learn that it was a part of the land of the *Amu* (Southwestern Asia), earlier called by the same people *Lotan* or *Ruten*. The term *Kharu* was a designation for Southern Palestine, *Amor* or *Amur* for the northern district and the Lebanon region. The earliest Babylonian records appear to have included the country under the term *Martu*, or the west land, which later gave way to *Amur*, or the land of the Amorites. While Egyptian forces may have made occasional incursions into Palestine earlier than the sixteenth century B.C., the dominant power in Southwestern Asia at this early period was Babylonian. This supremacy gave way to the so-called Amoritic, i.e. the incoming of great numbers of Semites (q.v.) from the Arabian deserts. These either absorbed or exterminated the older population, and, being of the same general Semitic stock as the Babylonians, readily learned and adopted their culture, so that the civilization of Babylonia continued dominant. Egyptian inscriptions show that this people prospered in Palestine and engaged in commerce with Egypt.

Egyptian overlordship over Palestine was fully established by Thothmes III. (c. 1515-1485 B.C.), who defeated a great confederacy in which Northern Palestine was involved, near Megiddo, in the Plain of Esdraelon. His famous list of 119 subjugated towns includes names of many places in Palestine. He organized the conquered territory, established a number of fortresses, filled them with Egyptian garrisons, and appointed governors to look after his interests. The Tell el-Amarna letters (see AMARNA LETTERS) show that the common name of the land was Canaan (see CANAAN; CANAANITES), and that the language of the people was simply an earlier form or dialect of that known later as Hebrew, spoken not only by Israel, but by the Phœnicians, the Moabites, and the Edomites. They show further that under the weak rule of Amenophis IV. Palestine was rapidly passing away from Egyptian control. The Hittites (q.v.) from the north, and the 'Khabiri' (thought by some to be the Hebrews, and, at any rate, a part of the great Aramean movement to which the Israelites belonged) in the central and southern regions, were seeking to gain possession. The Egyptian governors were plotting one against the other, all meanwhile writing to Egypt for aid and loudly protesting their individual loyalty to their sovereign. This era of confusion was ended by the revival of Egyptian supremacy under the new (nineteenth) dynasty (c.1350 B.C.), whose kings, Seti I. and Rameses II., rolled back the Hittite advance and again reduced Palestine to complete submission to Egypt. The next Egyptian dynasty was weak and Palestine broke up into a number of petty kingdoms.

About this time (B.C. 1300-1100) two distinct peoples, of different origin and character, sought to make this country their home, viz. the Philistines (q.v.) and the Hebrews. The former became the dominant people of the whole seacoast plain. The latter, after varied experiences, began a series of conquests which resulted finally in giving them control of Palestine.

The Canaanites appear to have been so disorganized that they offered little united opposition. Only one concerted action on their part is recorded, the confederacy of five kings in the region west of Jerusalem (Josh. x.). The work of conquest was long and gradual. At first the Israelites held but little more than the hills. The seacoast plain and the Plain of Esdraelon, defended by heavy armed troops with chariots, they avoided. Israel did not exterminate the Canaanites, except where the resistance was most stubborn. In general they simply reduced them to subjection, and in many cases probably the two peoples lived side by side on terms of equality. The old language of Canaan was used by the Israelites, and with the adoption of the language went the adoption of many Canaanitish ideas and customs, also the knowledge of the Babylonian culture then prevalent in the country.

The tribes as finally settled in the conquered land were distributed as follows, according to the biblical narrative: East of the Jordan between the Arnon and the Jabbok the Reubenites and the Gadites had their homes. The Reubenites, who occupied the northern half of the original Moabite domain, appear to have soon lost their identity, either because they were gradually absorbed by the Gadites, who finally occupied this territory,

or because they gradually drifted eastward and became absorbed among the Ammonites and other tribes nearer the desert. The western highland from Jerusalem south to the 'Negeb' was the home of Judah. Southwest of Judah lay the territory of Simeon. Between Judah and the Plain of Esdraelon the country was occupied mainly by the House of Joseph, i.e. the tribes of Benjamin (northeast of Judah), Ephraim (the central portion), and Manasseh (the northern part). A small district between Judah and Ephraim on the northwest was allotted to the tribe of Dan, but this was so small that soon after the conquest a large section of this tribe (600 families) migrated to more roomy quarters in the extreme north near the sources of the Jordan. In the valley of Jezreel and the fertile Plain of Esdraelon lay the territory of the tribes of Issachar (the eastern portion) and Zebulun (the western part). Part of Southern and all of Northern Galilee was occupied by Naphtali (on the east) and Asher (on the west behind the Phœnician territory of Sidon and Tyre). After the conquest of the west-Jordan territory men of Manasseh (and possibly of Ephraim also) passed over the Jordan and conquered North Gilead, between the Jabbok and the Yarmuk, and probably part of Golan and Bashan, north of the Yarmuk. The coast north of Carmel remained in possession of the Phœnicians. South of Carmel the Philistines controlled it. Israel was never a seafaring people.

About B.C. 1050 the divided Hebrew tribes were united into a kingdom under Saul, of the tribe of Benjamin. His successor, David, completed the work of firmly establishing Israelite supremacy in Palestine. Under David and Solomon, for the first and only time in its history, Palestine was the home of a united people all under one central government. About B.C. 937 this unity was disturbed by the formation of two kingdoms, a northern (Israel) and a southern (Judah). One result of this division, coupled with the growing power of the Aramean kingdom of Damascus, was that Israelitic control of the east-Jordan territory became weakened, without, however, resulting in any essential changes in the population. The northern kingdom fell before the power of Assyria in B.C. 722. The annals of Sargon, the Assyrian King, state that he deported 27,290 people, and, according to Assyrian custom, transported thither a number of Arameans from Babylon. Seventy-five years later Asshurbanipal (B.C. 647) added another contingent, made up of various Eastern nationalities. These united with the remnant of the old Israelitic stock, and thus a mixed population, but still essentially Semitic, came to occupy the old Ephraim-Manasseh territory. Galilee seems to have gradually filled with a mongrel Phœnician-Syrian population, which was not seriously disturbed till near B.C. 100, save by the Iturean occupation. (See ITUREA.) The southern kingdom came to an end when Nebuchadnezzar of Babylon captured Jerusalem in B.C. 586. The best elements of Judah were carried to Babylon and the whole country left desolate. For the next half century Palestine seems to have been left largely to itself. The most important movement during this period was the influx of Nabatean Arabs, who pressed in from the deserts east and south-east, occupied much of the old Ammonite and Moabite territory, and, forcing the Edomites out

of their abode, pushed them northward into Southern Judah, which now became 'Idumean' territory. The colony of exiles who returned from Babylonia by permission of Cyrus in B.C. 536 occupied only the northern part of the old kingdom of Judah. For further details of the history of Palestine during this period, see JEWS.

After the reorganization of the Persian Empire by Darius I., Palestine was a part of the Province or Satrapy of Syria (i.e. of the regions west of the Euphrates). The details of its administration are somewhat uncertain. The satrapy was subdivided into a number of districts, of which Judah, Samaria, and Phœnicia certainly were administered by separate Governors. What the exact arrangement was of the coast region, Galilee, the East Jordan territory, and Idumea is obscure. Through the labors of Ezra and Nehemiah (qq.v.) the Judean community was thoroughly consolidated, Jerusalem fortified, and foreigners expelled. The Jews constantly encroached on Samaritan territory and gradually enlarged their border toward the northwest. The Samaritans also became more closely united through the founding of the Samaritan religion, based on the Pentateuch alone, by a priest who was expelled from Jerusalem by Nehemiah, and, at a date now not known, by the building of a temple on Mount Gerizim. (See SAMARITANS.) During the Persian period the language of the Jewish community assimilated itself to the Aramaic spoken throughout the region and the old Hebrew gradually ceased to be the tongue of the common people.

The chief result for Palestine of Alexander's conquest of the East was the introduction of a large Greek element. Samaria was destroyed and rebuilt as a 'Macedonian' city. It is possible that Pella and Dium, east of the Jordan, were built by Alexander's veterans. Other Greek cities followed, especially in the east-Jordan land (see DECAPOLIS), while many of the old sites became practically Greek cities. Alexander followed the Persian example and attached Palestine to Syria for administrative purposes. In the struggles of his successors it came into the hands of Ptolemy I. of Egypt, and until B.C. 197 was under Egyptian control. Then it passed to Antiochus III. (the Great) of Syria. In B.C. 168 the attempt of Antiochus IV. to destroy the Jewish religion led to the great War of Independence. (See MACCABEES; JEWS.) When the struggle was over, Judea, now under the Asmonean priest-princes, was in control of all Southern Palestine from the Jordan to the coast. The rest of the land was nominally under Syria, but was practically in a condition of anarchy. East of the Jordan the Nabatean Arabs were in possession of all but the territory of the Greek cities. Under the Asmoneans, Hyrcanus I., Aristobulus I., and Alexander Jannæus (B.C. 135-78), the Jews succeeded in subjugating, first Idumea and Samaria, then Galilee, and finally nearly all of the old east-Jordan territory. The Idumeans and Galileans were compelled to adopt Judaism, while the Samaritans saw their temple (c.127 B.C.) and capital (c.108 B.C.) destroyed. The Greek cities east of the Jordan also suffered greatly. The Jewish population of Galilee, so familiar to the readers of the New Testament, dates only from B.C. 105-104.

The quarrels of the rival factions opened the way for Roman intervention. Pompey arrived in

Syria and captured Jerusalem in B.C. 63. He deprived the Jews of the greater part of their territory except Judea proper and transferred the remainder to the government of the new Roman province of Syria, of which it remained a part from B.C. 63 to A.D. 67. During most of this time Judea and other districts were under the control of Herod the Great and his successors. (See HEROD.) The greater part of the country was included in the four districts, Judea, Samaria, Galilee, and Perea, east of the Jordan, south of the Jabbok. The territory north of the Jabbok was broken up into minor divisions, Gaulanitis, Auranitis, Trachonitis, Batanæa, etc., under petty tetrarchs or governors. At the breaking out of the Jewish War (A.D. 66-67) Palestine was made a separate province under charge of Vespasian. The great struggle against Rome was closed by the capture and ruin of Jerusalem in A.D. 70 and the destruction of the Jewish State. New cities now sprang up under Roman protection, and apart from Jerusalem the country was prosperous. In 132-135 occurred the rising of the Jews under Bar-Cochba. This rebellion was crushed out with fearful bloodshed and devastation, and the Emperor Hadrian in rebuilding Jerusalem changed its name to *Ælia Capitolina*, and absolutely forbade any Jew to dwell in it. Never since has Jerusalem been a Jewish city, or Palestine a Jewish land. Greeks, Romans, Arabians, and large elements of the fundamental Aramean (Syrian) stock with the remnant of the Jews made up its population then, and of these the Arabian and Syrian are dominant to-day.

Palestine remained an integral part of the Roman Empire, and afterwards of the Byzantine Empire until the invasion of the Persian King Khosru II. in 614. Up to the era of Constantine the condition was especially flourishing. Remains of buildings and cities in now absolutely deserted places are a wonderful testimony to the great prosperity. After Constantine and the division of the Empire Greek Christianity became dominant and Palestine became a Christian land. It was now the habit to speak of it as divided into *Palestina Prima* (Judea and Samaria), *Secunda* (Galilee), and *Tertia* or *Salutaris* (Idumea and Moab). Each of these districts was divided ecclesiastically into various bishoprics. See also the article Jews for Palestine during the Roman period.

The Persian control was transient, but that of Mohammedanism, beginning in 635, proved to be permanent. Since then, apart from the era of the Crusades, the history of Palestine contains little of general importance. Partly under the influence of Islam, but much more from other general causes, the culture of the Græco-Roman period passed away, the beautiful cities, temples, and churches fell into decay and ruin, and no new developments took their place. The era of degeneration had set in. The Latin Kingdom of Jerusalem (see JERUSALEM) founded by the Crusaders in 1099, and overthrown by Saladin in 1187, was only an episode of no permanent value, though the Crusaders left their imprint in churches, monasteries, etc., all over the land.

After the conquest by the Ottoman Turks in 1516 the condition of Palestine became only worse. In the nineteenth century, however, mainly as a result of the labors of the missionary societies, the beginning of new activity and

a better era began to manifest themselves. The large influx of Jews from Europe under the Zionist movement, and above all the opening of the country to railway enterprise, promise a better future.

Modern Palestine is broken up into a number of administrative districts. The Mutesarrif of the Sanjak (province) of Jerusalem governs the southern part west of Jordan. The remainder of Western Palestine with the Belka is a part of the Vilayet of Beirut. East of the Jordan, all north of the Jabbok belongs to the Sanjak of Hauran. The population of the Sanjak of Jerusalem is about 320,000; that of the remainder of the country is variously estimated, but exact figures cannot be obtained. The total is probably near 650,000. It has increased more rapidly in later years. Under a good government and with more thorough cultivation, several times this number could be easily supported.

BIBLIOGRAPHY. The literature on Palestine is enormous and will be found fully registered down to 1878 in Rohricht's *Bibliotheca Geographica Palestinæ* (Berlin, 1890). Outside of the Bible and Josephus the older works of importance are few. The *Onomasticon* of Eusebius (Latin trans. by Jerome) and the various accounts of pilgrimages from Jerome to the Crusaders are valuable as contemporary witnesses, but not reliable for identification of ancient sites or for ancient history. The great work of Reland, *Palestina* (Utrecht, 1714), and Ritter, *Erdkunde*, vols. xiv.-xvii. (Berlin, 1848-54), are still of great value, especially for the notices by early writers. The results of modern exploration are given in Robinson, *Biblical Researches* (Boston, 1841 and 1856); id., *Physical Geography* (Boston, 1865); the various works of Titus Tobler, from 1849 to 1868; Guérin, *Description de la Palestine* (7 vols., Paris, 1868-89); the *Quarterly Statements* of the Palestine Exploration Fund (London, 1869 et seq.); the seven quarto volumes of the *Survey of Palestine*, published by the Fund; and in the publications of the German *Palästina-Verein* (Leipzig, 1878 et seq.). To these, as of special value, may be added: *The Library of the Palestine Pilgrims' Text Society* (13 vols., Palestine Exploration Fund); Schumacher, *The Jaulan, Across the Jordan, and Ajlun* (London, 1888, 1889, and 1890); Hull, *The Survey of Western Palestine* (ib., 1886); Le Strange, *Palestine Under the Moslems* (ib., 1890); Tristram, *The Fauna and Flora of Palestine* (ib., 1884); and other works published by the Palestine Exploration Fund. Comprehensive general treatises on Palestine are the guide books of Baedeker and Murray; G. A. Smith, *The Historical Geography of the Holy Land* (London, 1897); and Buhl, *Geographie Palestina* (Leipzig, 1896) most excellent. For the most ancient period, consult Paton, *Early History of Syria and Palestine* (New York, 1901), where a full bibliography will be found. The standard histories of Israel and the archaeologies of Benzinger and Nowack (both 1894) are valuable for the Old Testament period. For the era from B.C. 175 to A.D. 135, Schürer, *History of the Jewish People in the Time of Jesus Christ* (Eng. trans., Edinburgh, 1886-90), is the most reliable work. An excellent map is that of Smith and Bartholomew (Edinburgh, 1902); the maps of Kiepert and of the Palestine Exploration Fund are also to be recommended.

PALESTINE. A city and the county-seat of Anderson County, Texas, 100 miles southeast of Dallas; on the International and Great Northern Railroad (Map: Texas, G 4). It has two libraries, Young Men's Christian Association, fine city hall, and opera house buildings, and the general offices and shops of the International and Great Northern Railroad. Old 'Fort Houston' is of interest. The products of the most extensive industries, in which there is a considerable trade, include cotton, cottonseed oil, beef, iron, fruit, and vegetables. There are in the vicinity large iron ore deposits, also a salt mine of importance. Settled in 1846, Palestine was incorporated under a general law in 1870. The government, under this statute, is vested in a mayor, biennially elected; in a council composed of the mayor and aldermen elected on a general ticket; and in administrative officials, the majority chosen by popular vote. Population, in 1890, 5838; in 1900, 8297.

PALESTINE EXPLORATION FUND, THE. A society founded in London, June 22, 1865, for the accurate and systematic investigation of the archaeology, topography, geology and physical geography, natural history, manners, and customs of the Holy Land for biblical illustration. Under its auspices the following expeditions, travels, and excavations have been made: December, 1865-May, 1866, under Captain Wilson, to fix spots for investigation and to collect information; May, 1867-April, 1870, under Lieutenant Warren, to settle questions connected with the Holy Sites; 1870, under Professor Palmer and C. F. Tyrwhitt Drake, to examine the desert of the Tih; 1872-77, under Captain Stewart Drake, Lieutenant Conder, and Lieutenant Kitchener, to survey Western Palestine; 1873-74, under Clermont-Ganneau, for archaeological research; 1881, under Lieutenant Conder, for the partial survey of Eastern Palestine; 1883-84, under Prof. E. Hull and Lieutenant Kitchener, for the geological survey of the Dead Sea region and the Wady Arabah; 1890-93, under Flinders Petrie and Frederick J. Bliss, for the excavation of the buried cities in the mound Tell el-Hesi; 1894-97, under Bliss and Dickie, for excavations at the south and the southwestern portion of Jerusalem; 1898-1900, under Bliss, for excavations at Tell es-Safi (Gath?), Tell Zakariyah, Tell Sandabanah, and Tell el-Judaïdah; 1902, under R. A. Stewart Macalister, for the excavation of Gezer. Since 1869 the society has issued a *Quarterly Statement*. The more important publications of the society are: *Survey of Western Palestine: Memoirs* (7 vols., 1881-84); *Survey of Eastern Palestine*, by Conder (1900); *Excavations at Jerusalem*, by Bliss and Dickie (1894-97); *The Fauna and Flora of Palestine*, by Tristram (1884); *The Geology of Palestine and Arabia Petraea*, by E. Hull (1886); *Archæological Researches*, by Clermont-Ganneau (1896, et seq.); the great map of Western Palestine; the raised map; the map of Modern Palestine (in 20 sheets). The society has also a Palestinian Museum at its office, 38 Conduit Street, London. Consult: *Thirty Years' Work in the Holy Land* (London, 1895), an official *résumé* of the work of the Fund prepared by Walter Besant; Conder, "Palestine," in *The World's Great Explorers and Explorations* (ib., 1899).

PALESTINE PILGRIMS' TEXT SOCIETY, THE. A society established in London, Eng-

land (about 1885), for the purpose of publishing translations of the early descriptions of Palestine and the holy places, written by pilgrims and travelers between the fourth and fifteenth centuries. These accounts were intended to explain many of the topographical references which abound in ancient and mediæval literature from the earliest times to the periods of the Crusades and later, and to illustrate the manners and customs prevalent in the East in bygone times. The narratives are written in Greek, Latin, Arabic, Hebrew, Old French, Russian and German, and include curious records of pilgrimages, which begin with the *Unknown Pilgrim of Bordenax*, and follow in unbroken line down to comparatively recent date, including such interesting historical monuments as Saint Jerome's *Pilgrimage of the Holy Paula* (A.D. 382), Mukadda's *Description of Syria* (785), *Jacques de Vitry* (1180), and Bohaeddin's *Life of Saladin* (1145-1232). After a period of eleven years' work, the Society carried out the programme originally outlined and the results of its labors are found in a library of twelve volumes, which in 1896 were handed over to the Palestine Exploration Fund to be by that society distributed to the members of the Palestine Pilgrims' Text Society.

PALESTRA (Gk. *παλαίστρα*, *palaistra*, from *πάλη*, *palē*, wrestling). Properly, a wrestling-school; hence one of the schools in which the Greek boys were trained in gymnastic exercises. They were usually private institutions, though in later times some were supported by the State. The name is also applied to that part of the Greek gymnasium which was set apart for wrestling, and sometimes even becomes a synonym for gymnasium.

PALESTRINA, *pā'les-trē'nā*. A town of Central Italy, the ancient Præneste (q.v.).

PALESTRINA, GIOVANNI PIERLUIGI DA (c.1524-94). A great Italian composer. He was born in a small town southeast of Rome called Palestrina. His real name and the condition of his parents in life are as uncertain as is the correct year of his birth. The date of his birth is variously stated from 1514 to 1524, with the weight of evidence strongly in favor of the latter date. His first experience in music is said to have been in the Church of Santa Maria Maggiore, whose choirmaster gave him his first lessons in music. He is supposed to have studied four years in Rome at the celebrated Gallo-Belgian school established by the Frenchman Goudimel (q.v.). This would seem to comprise all the instruction he ever received. At the age of twenty he was appointed to a canonry in the cathedral of his native town, his duties being to play the organ, sing, and teach the boys. The pay was very poor, and the duties seem to have been very distasteful. During his stay here he married a peasant girl named Lucrezia de Goris, who owned a small vineyard. The chief ecclesiastical functionary of the town was Giovanni del Monte, who afterwards became Pope, with the title of Julius III., and who, as sovereign pontiff, maintained his interest in the young composer of Palestrina. Jacob Arcadelt, the great Flemish musician, resigned his post in the Cappella Giulia, and, although he was legally ineligible for the post, by reason of his marriage, Palestrina was named for the appointment by his patron, Pope Julius III. This was the most

important period of his life, in that it was the period of his greatest development as a musician. On the accession of Pope Paul IV., in 1555, Palestrina was dismissed, with a pension of six gold *scudi* (about six dollars) a month. He was so well known, however, that he secured almost immediate employment at the Church of Saint John Lateran, where he stayed for six years, until his appointment as director of the Church of Santa Maria Maggiore, where he remained for many years. This was the most prolific period of his life, and many of his finest madrigals, including the *Donna bella e gentil*, date from this time. The crucial test of his life, however, was yet to come. Pope Pius IV., after the close of the famous Council of Tr nt, appointed, in 1564, a committee of cardinals to investigate and, if possible, reform the condition of Church music. (See SACRED MUSIC.) Palestrina was asked to support the argument of those who in the Council of Trent had fought against a too rigid application of the Pope's radical views, by submitting a mass which should be free from all the errors prevalent at this time and yet be polyphonic in character. In response he wrote the great *Missa Pap  Marcelli*, which was so successful that it won the day, and secured for its composer the appointment of composer to the Pontifical chapel. On the death of Animuccia he was appointed Master of Music at the Cappella Giulia, an office which he held up to the time of his death. His music is grave, beautiful, and unemotional in character, but reverential in the highest and purest sense of the term. As a composer he is one of the important landmarks in the entire history of music, and in the realm of sacred composition he remains supreme. He was a prolific composer, his compositions alone filling 33 volumes, a complete edition of which was published between 1862 and 1894 by Breitkopf & H rtel, Leipzig, Germany. Particularly exquisite are the following masses: *Eterna Christi Munera*; *Dies Sanctificatus*; *O Sacrum Convivium*; *Assumpta est Maria in C lum*; *Dilexi Quoniam*; *Ecce Ego Joannes*.

PALESTRO, p -l s'tr . A village in the Province of Pavia, Italy, on the Sesia, 34 miles west by south of Milan (Map: Italy, C 2). It is famous as the scene of a battle between the allied Sardinians and French and the Austrians in May, 1859, in which the latter were defeated with great loss. Population (commune), in 1901, 3498.

PALEY, p 'li, FREDERICK APTHORP (1816-88). An English classical scholar, born at Easingwold, near York. He was educated at Saint John's College, Cambridge, where he lived from 1838 to 1840, when he left the university on account of his conversion to the Roman Catholic faith. Subsequently (1860) he returned to Cambridge, and remained there until in 1874 he was elected professor of classical literature in the Roman Catholic College at Kensington. He was classical examiner to Cambridge, London University, and the Civil Service Commission. A tireless student, he prepared numerous thoroughgoing and discriminating editions of the classics, including *Æschylus*, *Euripides*, *Aristophanes*, *Propertius*, and *Pindar*. It was chiefly as a verbal critic that he won recognition, and his original compositions in Latin and Greek were far superior to his few English renderings.

Besides his literary studies, which attracted much attention in Germany, he published works on ecclesiastical architecture, including an excellent *Manual of Gothic Mouldings* (1845).

PALEY, WILLIAM (1743-1805). An English divine, born at Peterborough, entered Christ's College, Cambridge, as a sizar at sixteen, and for the next two years led a dissipated life, but thereafter became a severe student, and took his bachelor's degree in 1763 with the highest honors. After teaching in a school for three years he was elected a fellow and afterwards a tutor of Christ's, and ordained in 1767. In 1776, upon his marriage, he was obliged to give up his fellowship and became rector of Musgrave, and later vicar of Dalston in Cumberland. In 1780 he was collated to a prebendal stall in the cathedral church of Carlisle; in 1782 he became arch-deacon, and in 1785 chancellor of the diocese. The last of these years witnessed the publication of his *Principles of Moral and Political Philosophy*. In this work he propounds his ethical theory, which is a most remarkable mixture of utilitarianism and theology. Virtue was defined as "the doing good to mankind in obedience to the will of God, and for the sake of everlasting happiness." The will of God is discoverable "from Scripture and the light of nature combined." The light of nature is the tendency of actions to promote human happiness, the benevolence of the Deity being supposed. In 1790 appeared the *Hor  Paulin *, in which he aims to prove, by a great variety of 'undesigned coincidences,' the improbability, if not impossibility, of the hypothesis that the New Testament is a 'cunningly devised fable.' A *View of the Evidence of Christianity* was published in 1794. In his own day he was held to have achieved a splendid triumph over skeptics, and was handsomely rewarded. Several preferments came to him in rapid succession, until finally he obtained the rich rectory of Bishop-Wearmouth (worth £1200 per annum). After 1800 he became subject to a painful disease of the kidneys; but he continued to write, and in 1802 published perhaps the most widely popular of all his works, *Natural Theology, or Evidences of the Existence and Attributes of the Deity*, which, however, was to a large extent borrowed from a Dutch work. In natural theology he is well known on account of his shallow argument from design to the existence of God. Paley died May 25, 1805. A complete edition of his works was published in 1825 by one of his sons, the Rev. Edmund Paley. There are biographies by Meadley (London, 1809), and by Lynam (ib., 1825). Consult: Stephen, *English Thought in the Eighteenth Century* (London, 1876); Albee, *History of English Utilitarianism* (ib., 1902).

PALFREY, p l'fri, FRANCIS WINTHROP (1831-89). An American historian, born in Boston. He graduated at Harvard in 1851 and at the Law School two years afterwards. During the Civil War he rose to the rank of colonel and brevet brigadier-general, and in 1872 he was appointed register in bankruptcy. He published *A Memoir of William F. Bartlett* (1879); *Antietam and Fredericksburg*, in the "Campaigns of the Civil War" series (1882); and contributed to the first volume of *Military Papers of the Historical Society of Massachusetts*, and the *North American Review*.

PALFREY, JOHN GORHAM (1796-1881). An American theologian and historian. He was born in Boston, May 2, 1796, graduated at Harvard in 1815, and studied for the ministry. In 1818 he was called to the pulpit of the Brattle Street Church (Congregational-Unitarian), Boston, and in 1831 to the chair of sacred literature at the Harvard Divinity School, where he remained till 1839. He was editor of the *North American Review* (1835-43), and in 1839 and 1842 gave a course of lectures before the Lowell Institute, Boston, on *The Evidences of Christianity*, which appeared in book form the next year. He was a member of the House of Representatives of the Massachusetts Legislature, 1842-43, and Secretary of the Commonwealth, 1844-48. He entered Congress as a Whig in 1847. He had already opposed the extension of slavery in a series of articles called *The Progress of the Slave Power* (1846); and in December, 1847, he declined to vote for Robert C. Winthrop, the Whig candidate for Speaker. This step, with his well-known anti-slavery principles, cost him his seat at the election of 1848, after a close contest. He soon joined the Free-Soil Party, was one of the editors of the *Commonwealth*, the Massachusetts organ of that party, and their candidate for Governor. He died in Cambridge, April 26, 1881. Dr. Palfrey published *Lectures on the Jewish Scriptures and Antiquities* (1838-52); *Sermons* (1834); *Elements of Chaldee, Syriac, Samaritan, and Rabbinical Grammar* (1835); and *The Relation Between Judaism and Christianity* (1854). But his reputation now rests upon his *History of New England During the Stuart Dynasty* (1858-75), abridged; *A History of New England from the Discovery by Europeans to the Revolution of the Seventeenth Century* (1866); again under title *A Compendious History of New England, from the Discovery by Europeans to the First General Congress of the Anglo-American Colonies* (4 vols., 1873). The closing part of the fourth volume in this edition was incomplete, and a fifth volume was published, *History of New England from the Revolution of the Seventeenth Century to the Revolution of the Eighteenth Century*, ed. by F. W. Palfrey (1890).

PALGHAT, pāl-gīt'. A town and railway station in the District of Malabar, Madras, India, on the southern slope of the Nilgiri Hills, 26 miles southwest of Coimbatore (Map: India, C 6). It is at the foot of the Palghat Pass, which connects Travancore and Malabar by a military road and the Madras Railway. It has an extensive trade, and is noted for its educational institutions, including the Victoria Jubilee College, a law library, and a Swiss Protestant mission. Anciently of strategic value, Palghat was captured by the British in 1768, since when its military importance has declined, and its fortress, which still exists, has been abandoned. Population, in 1891, 39,481; in 1901, 44,177.

PALGRAVE, pāl'grāv, Sir FRANCIS (1788-1861). An English historian. He was born in London of Hebrew parentage, his father, Meyer Cohen, being a member of the stock exchange. He studied law and for a time was prominent in pedigree cases before the House of Lords. In 1823 he married, and on that occasion changed his faith and assumed the maiden name of his wife's mother, Palgrave. He became known as a literary antiquary by publishing some Anglo-

Norman chansons. Gradually, however, he turned to the study of English history, and in 1831 published a *History of England*. In 1832 appeared his best work, the *Rise and Progress of the English Commonwealth*, and in the same year Palgrave also received the honor of knighthood. In 1838 he was appointed deputy keeper of Her Majesty's records, and held this office until his death. To him was due the gathering of the valuable records and their removal from their various insecure repositories to the great Public Record Office. In 1851 Palgrave published the first volume of his *History of Normandy and England*, but most of the work appeared after his death, which took place on July 6, 1861. As deputy keeper of the records, he published twenty-two annual reports. He also edited for the Record Commission the following works: *The Parliamentary Writs* (1827); *Essay on the Original Authority of the King's Council* (1834); *Rotulæ Curie Regis* (1835). His historical works display a union of research, daring, and ingenuity. Nevertheless, they are not monumental, and they have been superseded by later works. The author lays great stress on the development of legal institutions, on which he was an authority; but his style is discursive, and the subject matter is badly arranged. Sir Francis Palgrave was the father of Francis Turner, William Gifford, Robert Henry Inglis, and Reginald Francis Douse Palgrave (qq.v.).

PALGRAVE, FRANCIS TURNER (1824-97). An English poet and critic. He was born at Great Yarmouth, was educated at Charterhouse and in Balliol and Exeter colleges, Oxford; served for five years as vice-principal of the training college for schoolmasters at Kneller Hall, and afterwards until 1884, when he retired, was successively examiner and assistant secretary in the education department. In 1885 he succeeded John C. Shairp in the Oxford professorship of poetry. He was the author of *Idylls and Songs* (1854); *Essays on Art* (1866); *Hymns* (1867); *Lyrical Poems* (1871); and *Landscape in Poetry* (1897); but is best known as the scholarly editor of such admirable collections as the *Golden Treasury of English Lyrics* (1861); *Sonnets and Songs of Shakespeare* (1877); *Selected Lyrical Poems of Herrick* (1877); *Selected Lyrical Poems of Keats* (1855); and the *Treasury of Sacred Song* (1889).

PALGRAVE, Sir REGINALD FRANCIS DOUSE (1829-). An English writer, born in London, June 28, 1829. He was educated at Charterhouse School and became a solicitor in 1851. Entering the committee office of the House of Commons as a clerk in 1853, he was appointed examiner of petitions for private bills to both Houses (1866), then second clerk assistant (1868-70), and clerk assistant (1870-86), and finally clerk of the House of Commons (1886-1900). He was knighted in 1892. His books include: *The House of Commons: Illustrations of Its History and Practice* (1877); *The Chairman's Handbook* (1890); *Oliver Cromwell* (1890). He also edited the first two books of Sir T. E. May's *Treatise on the Law of Parliament* (1893).

PALGRAVE, ROBERT HARRY INGLIS (1827-). An English economist. He was born at Westminster, was educated at the Charterhouse, and went into banking. From 1877 to 1883 he

edited *The Economist*. He wrote: *Local Taxation of Great Britain and Ireland* (1871); *Notes on Banking* (1873); *Bank Rate in England, France, and Germany* (1880); and contributions to the *Dictionary of Political Economy* (1900), of which he was editor.

PALGRAVE, WILLIAM GIFFORD (1826-88). An English traveler and diplomatist. He was born in Westminster, won the Charterhouse medal for classical verse, and obtained an open scholarship at Trinity College, Oxford. He served in the Indian army as a lieutenant in the Eighth Bombay native infantry. In 1853 he resigned his commission, entered the Jesuit Order, and after courses of study at Laval and Rome, voluntarily joined the Syrian mission. Here he acquired such knowledge of Arabic language and manners as to be able thereafter to pass as a native. This guaranteed his safety in a perilous expedition through Central Arabia (1862-63), undertaken under commission of Napoleon III., and described in the admirable *Narrative of a Year's Journey* (1865). Having withdrawn from the Jesuit Order, in 1865, he went on a special governmental mission to Abyssinia, held various consulates in 1866-79, and in 1884 received appointment as Minister Resident to Uruguay, where he died. Among his works are: *Essays on Eastern Questions* (1872); *Hermann Agha* (1872); and *Dutch Guiana* (1876).

PALI, *pālī* (Skt., line, series, sacred text). The language and literature of primitive Buddhism (q.v.), now represented in Ceylon, Burma, and Siam. Strictly speaking, Pali is the name of the literature only, which is so called because it is regarded as a series of sacred texts. The language itself was called *Palibhāṣā*, 'language of the series,' or *Māgadhībhāṣā*, 'language of Magadha' (q.v.). It appears, however, to have formed a linguistic belt along the northern slope of the Vindhya Mountains. It is not impossible that its centre was in the city of Ujjain (q.v.), where the first great patron of Buddhism, Aśoka (q.v.), had been governor before he ascended the throne. Thence the language was carried to Ceylon by the Buddhist missionaries. Pali may be divided into two groups, that of the inscriptions and that of the literature. Of these the inscriptional Pali is the older. Its earliest records in India are in the inscriptions of Aśoka, and date from the third quarter of the third century B.C., and the youngest are as late as the tenth century A.D. In Ceylon the oldest inscriptions cannot be dated before the first century B.C. The relation of Pali to the other languages of India is in some respects uncertain. It is clear, however, that it is not a corruption of classical Sanskrit, but is descended from a dialect closely akin to Vedic Sanskrit. (See SANSKRIT LANGUAGE.) There is much evidence for the view that Pali was the language of India between the Himalayas and the Vindhyas before the rise of classical Sanskrit. Sanskrit inscriptions are not common before the first century B.C., and it was not until the fourth century A.D. Pali inscriptions, except for a few, chiefly archaistic in character, were superseded by those in Sanskrit. Many proper names in Megasthenes (about 300 B.C.) and other classical authors, are evidently Pali, while others are as plainly Sanskrit. Epigraphical evidence further leads to the view that the classical Sanskrit originated in the region which

was bounded by the Ganges and the Jumna, and which stretched between these rivers from the Himalayas to Muttra. From this country classical Sanskrit spread, superseding Pali and the other Indo-Germanic folk-dialects of India. On the other hand, it must be borne in mind that classical Sanskrit was at an early date a language of high culture, and that it was fixed in its literary form by Panini (q.v.) as early as B.C. 300. Again, the resemblances between Pali and Prakrit (q.v.) are so close that Pali may be regarded merely as a Prakrit dialect (see *Prākṛit*), and the Prakrits long survived as literary and doubtless, also, as spoken languages, so that not only is Prakrit found in the Hindu drama, but we have a collection of Prakrit poems by Hala, probably about A.D. 1100. It would appear, therefore, that Pali and the later Prakrits existed contemporaneously with classical Sanskrit, which was the language of the higher classes and of literature, while Pali was vernacular and sectarian in use. Within Pali itself the existence of a number of dialects may be inferred from the epigraphical remains.

As contrasted both with Vedic and with classical Sanskrit, Pali, like Prakrit, shows a marked decadence both in phonology and in morphology. As a few of the most striking deviations from the Sanskrit phonology found in Pali, and frequently also in Prakrit, may be mentioned: The loss of *r*, as Sanskrit *vṛddha*, 'large,' Pali *vaddha*, *viddha*, *buddha*, *vuddha*. Prakrit *vaddha*, *viddha*, *vuddha*; the frequent change of dentals to cerebrals, as Sanskrit *dahati*, 'burns,' Pali *ḍahati*, Prakrit *ḍahai*; the occasional change of *d* to *l*, as Sanskrit *dōhāda*, 'longing of a pregnant woman,' Pali *dōhala*, Prakrit *dōhala*, *dōhāda*; the change of Sanskrit *ś*, *ṣ* to *s*, as Sanskrit *śobhati*, 'is beautiful,' Pali *sobbhati*, Prakrit *sōhai*, Sanskrit *vṛṣabha*, 'bull,' Pali *rasabha*, Prakrit *vasaha*; the avoidance of consonant-groups, usually by assimilation, but occasionally by the insertion of an epenthetic vowel, as Sanskrit *bhakta*, 'boiled rice,' Pali and Prakrit *bhatta*, Sanskrit *ślāghā*, 'praise,' Pali *silāghā*, Prakrit *salāghā*. Inflection in Pali closely resembles that of classical Sanskrit, except that the aorist, comparatively rare in classical Sanskrit, occurs not infrequently in Pali. Pali has no distinctive alphabet, but is written according to locality in Ceylonese, Burmese, or Cambodian script. The Devanagari (q.v.) writing is never employed.

Pali literature is almost entirely religious. The greatest work in it is the *Tipitaka* (q.v.). Of much importance are the *Visuddhi Magga*, or Way of Purity, by Buddhaghosa, a treatise on Buddhist doctrine dating from the fourth century A.D., and the *Milindapañha*, or Questions of Milinda (q.v.), which was probably composed about the beginning of the Christian Era. There are further a number of historical works, which have an increased interest from the fact that Sanskrit literature (q.v.) is almost without authentic histories. Among the most important works of this class in Pali are the *Mahāvamsa* (q.v.), or Great History, and the *Dīpavamsa* (q.v.), or History of the Island (of Ceylon). There is an abundant literature besides, including not only religious and historical writings, but also metrics, grammar, and lexicography.

Consult: Burnouf and Lassen, *Essai sur le Pali* (Paris, 1826); Minayef, *Grammaire Palie*, translated by Guyard (ib., 1874); Kuhn,

Beiträge zur Pali-Grammatik (Berlin, 1875); Frankfurter, *Handbook of Pali* (London, 1883); Müller, *Simplified Grammar of the Pali Language* (ib., 1884); Tilbe, *Pali Grammar* (Rangoon, 1899); Oung, *Grammar of the Pali Language* (Akyab, 1899-1903); Childers, *Pali-English Dictionary* (London, 1875); Torp, *Flexion des Pali in ihrem Verhältniss zum Sanskrit* (Christiania, 1881); Franke, *Geschichte und Kritik der einheimischen Pali-Grammatik und Lexikographie* (Strassburg, 1902); id., *Pāli und Sanskrit* (ib., 1902); Takakusu, *Pāli Chrestomathy* (Tokyo, 1900); Andersen, *Pāli Reader* (London, 1901).

PALIKAO, *pā'le'ka'ō*, CHARLES GUILLAUME MARIE COUSIN-MONTAUBAN, Count of (1796-1878). A French general and statesman, born in Paris. After serving with distinction in Spain, and for twenty years in Africa, he was created a general in 1855. In 1860 he was placed in command of the French and English forces sent to China, and with relatively insignificant forces captured the forts at Taku, and after gaining a decisive victory at Palikao he entered Peking at the beginning of October of the same year. The Chinese Government was forced to accept his terms, and the conditions of peace were rigidly enforced. On his return to France in 1861, Napoleon III. presented him with the grand cross of the Legion of Honor, and gave him the title of Count. After the first defeats of the French army in 1870 he succeeded Ollivier as Premier, was at the same time Minister of War, and was consequently associated with the misfortunes that followed the French army. He published a history and defense of his administration in 1871. He died January 8, 1878, in Paris.

PALILIA, or **PARILIA**. An ancient Roman feast in honor of Pales (q.v.), celebrated on April 21st, and of such importance that its date was deemed the anniversary of the founding of Rome.

PALIMPSEST (Lat. *palimpsestus*, from Gk. *παλινψηστος*, scraped again, from *πάλιν*, *palin*, again + *ψηστός*, *psēstos*, scraped, from *ψήν*, *psēn*, to rub smooth). The name given to parchment, papyrus, or other writing material, from which, after it had been written upon, the first writing was wholly or in part removed in order that the page might be made available a second time. The ink used on papyrus and sometimes on parchment was commonly of soot mixed with gum and thinned with water, or else the liquid of the cuttlefish. This could be washed out with a sponge, and the latter was part of the writing equipment. Where this ink has been used, there is usually no trace of the original writing if the manuscript has been used again. Later for parchment, ink made from gall-apples, sometimes with the addition of vitriol, or metallic substances, was used. This took hold of the vellum, and for removal required the use of pumice, or of a mixture of milk, cheese, and lime to soften the parchment. Sometimes the knife was used, of course to the complete destruction of the writing. The processes employed were not always very complete, nor were they carefully carried out, and as a result in a number of cases the earlier writing is still more or less legible. The fragile character of papyrus made it difficult, if not impossible, to wash out writing of long standing, though the sponge was

probably used while the ink was fresh. Since on papyri, as a rule, the writing was only on the recto, the back was frequently used to receive later writing. In the case of parchment, especially when bound in books, erasure was needed for a second use. The practice was common in classical times, and is frequently mentioned in the ancient writers, though in some cases it may be doubted whether the reference is not to wax tablets. In general, these old palimpsests were used as note-books or for rough drafts. The relative scarcity and cost of papyrus or vellum undoubtedly was responsible for this custom, and with the disuse of papyrus and increasing demand for parchment, the habit of using old books increased in the East and West. Though vellum began to supersede papyrus for important works in the fourth century of our era, it was not till the seventh century, when the Arab conquest shut off the supply, that it became practically the only material in use, and it is from that time that palimpsests begin to increase. In the East, in 691, a Greek synod forbade the destruction of manuscripts of the Bible or of the Fathers, unless they were already damaged, and in the West much use was made of old manuscripts from the seventh to the ninth century, when, in consequence of the disturbed state of the country, there was some scarcity of material, and the old volumes of neglected authors were used for more popular works. Some writers have ascribed this to the indifference and even to the hostility of the monks and clergy to classical literature, and have attributed to their reckless destruction of classic manuscripts, in order to provide material for their own service-books and legends, the deficiencies in the remains of ancient learning which scholars have now to deplore. That some part of the loss may have so arisen it is impossible to doubt, although it is equally certain that we owe to the mediæval monks and clergy the preservation of a large part of the surviving ancient literature. Moreover, it seems probable that in general damaged copies were drawn upon for palimpsests, and in some cases the writing was not erased till the sheets had been re sewn. It is said that no palimpsest shows that it originally contained a complete work under the later writing, though in some cases the amount preserved is very large. It should also be noted that in not a few cases the Bible or Church Fathers are found under classical or late texts, so that convenience, not hostility, seems in general to have determined the choice of material for erasure. While the practice continued even down to the sixteenth century, and in at least one case cleaned parchment was used for a printed book, most of the valuable Latin palimpsests are earlier than the tenth century, when it was possible to use the fine parchment of earlier times. In the East the practice was much more general, and the best palimpsests are of a later period. In fact, it is said that a relatively large proportion of existing Greek manuscripts are on reused vellum. While many of these are of Eastern manufacture, not a few show that the upper writing was done in Italy and the West. The natural result of these factors is that in general the palimpsests yield fragments, whose value lies largely in testimony to the early state of the text. In biblical criticism some very important results have been obtained from early palimpsests, and in classical

literature such palimpsests as the *Codex Ambrosianus* of Plautus have unique value. Most important of course are the rare cases where a lost work may be recovered from a palimpsest, as in the case of the *Republic* of Cicero, or the *Institutes* of Gaius.

It will easily be understood, therefore, that the chief, if not the sole, interest of palimpsest manuscripts lies in the ancient writing which they had contained, and that their value to literature mainly depends on the degree of legibility which the ancient writing still retains. Very commonly the original writing is much larger than the modern; the modern lines and letters do not cover those of the old manuscript, but follow the same order. In other specimens the new writing is transverse, and in some the old page is turned upside down. Sometimes, where the old page is divided into columns, the new writing is carried over them all in a single line; sometimes the old page is doubled, so as to form two pages in the new manuscript. Sometimes it is cut into two or even three pages. The most perplexing case of all for the decipherer is that in which the new letters are of the same size, and are written upon the same lines with those of the original manuscript. In the case of Latin palimpsests, it is generally true that lower minuscule writing, when legible at all, is scarcely worth the trouble of reading. The valuable manuscripts are in capitals or uncials. Some variety, also, is found in the language of the palimpsests. In those which were originally found in the Western libraries the new writing is almost invariably Latin, while the original is sometimes Greek, and sometimes Latin. In the palimpsests discovered in the East the original is commonly Greek, the new writing being sometimes Greek, sometimes Syriac, sometimes Armenian.

The possibility of turning palimpsest manuscripts to account as a means of extending our store of ancient literature was suggested as far back as the days of Montfaucon; but the idea was not turned to practical account till the latter part of the eighteenth century. The first palimpsest editor was a German scholar, Dr. Paul Bruns, who discovered that one of the Vatican manuscripts was a palimpsest, the effaced matter of which was a fragment of the ninety-first book of Livy's *Roman History*, and printed this fragment at Hamburg in 1773. In the field of discovery thus opened by Bruns, but little progress was made until the following century, when Barrett of Trinity College, Dublin, published his palimpsest fragments of Saint Matthew, and when palimpsest literature rose to importance in the hands of the celebrated Angelo Mai (q.v.). The great historian Niebuhr about the same time applied himself to the subject, and was followed by Blume, Pertz, Gaupp, Mommsen, Studemund, and other German scholars, whose labors, however, were for the most part confined to the department of ancient Roman law. Tischendorf's (q.v.) labors drew attention to the biblical texts thus preserved, and Cureton's examinations of Syriac and other Eastern manuscripts showed the importance of this field, where the most valuable result has been the discovery in the monastery at Mount Sinai of an early Syriac version of the Gospels under some lives of female saints.

GREEK PALIMPSESTS. Among these, the first place in importance belongs to the biblical pa-

limpsests, the earliest of which was *Fragments of the Gospel of Saint Matthew*, in fac-simile as well as in ordinary type, printed from a palimpsest manuscript of Trinity College, Dublin, by Barrett (Dublin, 1801). The original writing appears to be of the sixth century. Barrett's transcript of the text was not in all respects correct, and a revised edition was published by Abbott in 1880. It is chiefly, however, to a collection of Syriac manuscripts brought from the East that we are indebted for the more recent palimpsest restorations of the ancient biblical readings. In this line the chief discoverer has been Tischendorf. Of these the best known is the celebrated *Codex Ephremi*, in the National Library, Paris. This manuscript had been early observed to be palimpsest, and the original Greek text was collated by Wetstein in 1716. It was completely published by Tischendorf, the New Testament in 1843, and the Old in 1845. The modern writing of this palimpsest consists of a Greek translation of works by Saint Ephrem the Syrian. Another palimpsest of interest is the *Codex Nitriensis*, in the British Museum, containing part of the Gospel of Saint Luke from the sixth century, part of the *Iliad* of about the same date, and a somewhat later Euclid, all used by a monk of the Nitrian monastery for a copy of a Syriac treatise. The number of these fragments constantly grows, and now probably about 30 Greek, Old Latin, and Gothic biblical palimpsests are known, of which the majority are Greek. As most of them belong to the fifth or sixth century, their testimony is often of great value.

In Greek classical literature the results from the palimpsests are not great. The Homer fragments are older than other parchment codices, but are outranked by the numerous papyri. A small part of the *Phaëthon* of Euripides is preserved in the *Codex Claromontanus* at Paris, and a collection of extracts from the later historians, containing some passages from lost works, has been published by Mai in his *Scriptorum Veterum Nova Collectio* (Rome, 1825-38). In Greek, however, no such discoveries have been made as in Latin, though it should be said that the Eastern libraries contain many palimpsests not yet carefully examined.

LATIN PALIMPSESTS. The first fragment of Latin literature printed from a palimpsest original is the portion of the ninety-first book of *Livy* already referred to, published at Hamburg and also at Rome in 1773. It was reëdited in a more complete form by Niebuhr in 1820. Of the Latin palimpsests edited by Mai, the earliest were some fragments of lost orations of Cicero from two different palimpsests in the Ambrosian library at Milan, in the later of which the second writing consisted of the acts of the Council of Chalcedon. These orations were published in two successive volumes in 1814. He also published eight orations of Symmachus (1815) and the comedies of Plautus, including a fragment of the lost play entitled *Vidularia* (1815). This is the celebrated *Codex Ambrosianus* in Milan, which has since been studied by Ritschl and other Plautine scholars, notably Studemund (Berlin, 1889). Mai likewise edited the works of M. Cornelius Fronto, together with the epistles of Antoninus Pius, Lucius Verus, M. Aurelius, and others (1815), as well as the celebrated dialogue of Cicero, *De Republica*, from a palimpsest

of the Vatican, the modern writing on which is the commentary of Saint Augustine on the Psalms (1821). Soon after the *De Republica* he published another volume from palimpsest sources, the most important of whose contents were some fragments of ancient Roman law, which prepared the way for the more distinguished success of Niebuhr, who, in a palimpsest of the library of Verona, recognized a portion of an ancient work on Roman law, afterwards identified as the *Institutiones* of Gaius. The text was deciphered by Göschen and others, and the first edition published at Berlin in 1820. A careful new collation was published by Studemund in 1874, and a text edition carefully revised by Krüger and Studemund (4th ed. Berlin, 1899). The latest considerable Latin publication in this department is *Gaii Gracii Liciniani Annalium Quæ Supersunt* (Berlin, 1857), edited from a palimpsest of the British Museum by the younger Pertz. This palimpsest, as was already stated, is a thrice-written codex, the earliest and original contents being the *Annales* of Gracius Licinianus, a writer of the second century A.D. The second writing was also in Latin, and the work is a grammatical treatise, of which the chapters *De Verbo* and *De Adverbio* are still legible. The most modern writing is Syriac, written in the cursive character.

It will be gathered from the above that the ancient works recovered by means of palimpsest manuscripts are all fragmentary, and one might be led to rate at a low value the result thereby obtained. Yet such works as the *Republic* of Cicero, the *Institutes* of Gaius, and the very early text of Plautus in the Ambrosian palimpsest are of priceless value. And it must be remembered that in some of the departments to which these palimpsestic fragments belong every scrap, no matter how trifling, has an independent value. In biblical remains, for example, a single text may present a valuable reading, the merest fragment may throw light on an important critical question. In history, in like manner, a small fragment may disclose an interesting fact, or supply a significant commentary upon facts otherwise ascertained. And as regards critical uses especially, it must not be forgotten that the obliterated text of the palimpsest manuscripts for the most part far exceeds in antiquity the very oldest known codices which we possess, and is, probably, second only in age to the papyri of Herculaneum.

The method of treating palimpsest manuscripts, with a view to deciphering their contents, has been fully described by different editors. Mai, after having washed the palimpsest with an infusion of galls, exposed it to the light and air, and, generally speaking, found this sufficient for his purpose. Peyron washed the parchment in water, afterwards in dilute muriatic acid, and finally in prussiate of potash. A mixture compounded on this principle is called from its inventor, M. Gioberti, *tinctura Giobertina*. Sometimes the treatment does not succeed equally well on both sides of the parchment, the outer surface, from its softer texture and more thorough erosion, yielding poorer results. When the ink contained animal substances, as milk, or the blood of the cuttlefish, Mone plunged the parchment into a close vessel filled with oil, which he heated to a temperature of 400° R. But almost, if not quite, all of the earlier processes have re-

sulted, after the course of some years, in such darkening, and sometimes corrosion of the surface of the manuscripts treated, as to make them quite illegible and worthless. Von Sickingen recommended an apparently harmless process, that of washing the pages of the manuscript discreetly with a potash soap, and then immersing them in clear water, from which treatment they take no injury if they are carefully dried afterwards. Pringsheim published the details of a process purely photographic, whereby, through successive photographings, the effect on the plate of the later writing is weakened, and that of the earlier and fainter hand is intensified, until the erased writing becomes legible in the negative.

Consult: Mone, *Latinsche und griechische Messen* (Frankfort, 1850); id., *De Libris Palimpsestis tam Latinis quam Græcis* (Carlsruhe, 1855); Wattenbach, *Das Schriftwesen im Mittelalter* (3d ed., Leipzig, 1896). See PALEOGRAPHY.

PALINDROME (Gk. *παλινδρομος*, *palindromos*, a running back, from *παλιν*, *palin*, back + *δρομος*, *dromos*, a running, from *δραμειν*, *drakein*, to run). A name given to a kind of verse the peculiarity of which is that it reads the same backward as forward. It is very common in Latin. Examples are:

*Si bene te tua laus taxat sua laute tenebris.
Et necat eger amor non Roma regis tacente,
Roma reges una non anus eger amor.*

In this, *eger* is the mediæval spelling for *æger*. To a Roman lawyer is credited the following:

Si nummi immunis,

which Camden translates:

Give me my fee, and I warrant you free.

Consult: Wheatley, *Anagrams* (Hartford, 1862); Clark, *Palindromes* (Glasgow, 1887).

PALINGENE'SIA (ML., from Gk. *παλινγενεσία*, new birth, from *παλιν*, *palin*, again + *γένεσις*, *genesis*, birth). A term that appears to have originated among the Stoics, who employed it to denote the act of the *demiurgus*, or creator, by which, having absorbed all being into himself, he reproduced it in a new creation. The occurrence of the word in the New Testament (Titus, iii. 5, where it is used to denote regeneration) has given it a place in Christian theology, and divines have variously used it to express the resurrection of men, the new birth of the individual soul, and the restoration of the world to that perfect state that it lost by the fall—"the new heavens and the new earth wherein dwelleth righteousness."

PALINGENESIS (Neo-Lat., from Gk. *παλιν*, *palin*, again + *γένεσις*, *genesis*, birth), and **CENOGENESIS**. The recapitulation theory (q.v.) or 'biogenetic law' is a statement of the general fact that the development of the individual is an epitome of that of the class to which it belongs. Haeckel, and Fritz Müller in substance before him, further distinguished two modes of operation of this law. To the first he gave the name 'palingenesis.' Briefly defined, it is the fact of the regular repetition of ancestral features caused by inheritance. Thus the shrimps and crabs in the egg pass through a nauplius stage, the embryo possessing the rudiments of only three pairs of appendages, but they hatch in an advanced larval condition called the *zoëa*. The lobster, on the other hand, before hatching passes through phases which recall the nauplius,

and also the zoëa stages, and the animal hatches in a more advanced stage than the zoëa, undergoing a partial metamorphosis. The toad or frog, in the embryo, pass through an ascidian, an amphioxus, a fish, and a salamander stage, before they assume the tailless adult condition. The animal thus repeats in its own development certain (but not all) of the features which characterized its successively ascidian, Amphioxus-like, and fish-like ancestors.

The second phase or mode of operation of the law of recapitulation is 'cenogenesis,' which means the modification of palingenesis by the inheritance of later acquired characters, the ancestral characters having been lost or crowded out, owing to the lapse of heredity. This was fully explained by Fritz Müller, his illustration being the metamorphosis of the more specialized insects, such as the butterfly, bee, and fly. The larval stages of these insects (caterpillar, maggot) are secondary. The most primitive insects were born in the shape of the parent, and passed through no larval stage. The primitive features of the ancestral insect have been lost, except the transitory indications of a series of abdominal legs, showing that the insects all descended from polypoidous forms; but the caterpillar and maggot stages are recent acquisitions, and to this phenomenon the term cenogenesis (or recent genesis) is applied. As Müller expressed it: In contradistinction to the *inherited* metamorphosis of the prawns, we may call that of the Coleoptera, Lepidoptera, etc., an *acquired* metamorphosis. He then goes on to show at some length that the 'complete' metamorphosis of insects was not inherited from the primitive ancestor of all insects, but acquired at a later period. See RECAPITULATION THEORY.

Consult: Fritz Müller, *Facts for Darwin* (London, 1869); Haeckel, *Generelle Morphologie* (Berlin, 1866); Hyatt, *Phylogeny of an Acquired Character* (Philadelphia, 1894); Lang, *Text-book of Comparative Anatomy*, vol. i. (New York, 1891).

PALINURO, pā'lē-nō'rō. CAPE, or CAPE SPARTIMENTO. A promontory on the coast of Lucania, Italy, projecting into the Tyrrhenian Sea, northwest of the entrance to the Gulf of Policastro (Map: Italy, K 7). It was named in honor of Palinurus (q.v.), the pilot of Æneas, said to have been buried here, where some ruined walls bear the name of his tomb. In B.C. 253 and in B.C. 36 Roman fleets were wrecked on this point.

PALINU'RUS. A pilot of Æneas. When the Trojans were approaching the coast of Italy, he slept and fell overboard. The ghost of Palinurus appeared to Æneas on his visit to Hades, and said that he had been washed ashore and murdered by the natives. In accordance with the promise of the Sibyl, his body received suitable burial.

PALISA, pā'lē-sā, JOHANN (1818—). An Austrian astronomer, born at Troppau. He was assistant in the Vienna observatory (1870), and in the observatory at Geneva (1871), and director of the Marine Observatory at Pola until 1880, when he became adjunct in the Vienna Observatory. Before the use of photography Palisa discovered more than 50 asteroids and made special research on comets, mostly published in the *Astronomische Nachrichten* (1871 et seq.). His

valuable charts based on observations were begun in 1878.

PALISADE CELLS (Fr. *palisade*, from *paliser*, to inclose with pales, from OF. *palisse*, *palisc*, *palice*, from ML. *palitium*, paling, from *palus*, pale). The green working cells (*mesophyll*) upon the more exposed side of foliage leaves. Since these cells become elongated and stand close together, with their long axes at right angles to the epidermis, this arrangement suggested the name. See LEAF.

PALISADES. The name given to the line of cliffs that extend along the western shore of the Hudson River from near Haverstraw, N. Y., to Weehawken, N. J., a distance of about 30 miles. The cliffs for most of this distance rise almost directly from the water's edge in a single escarpment which simulates a wall of masonry and lends a characteristic and picturesque effect to the scenery in this section of the Hudson Valley. Their height ranges from 200 to 550 feet. They are formed by the outcrop of a thick sheet of diabase which was intruded while in a molten condition between sandstones and shales of the Newark system. The overlying strata have been partially removed by erosion, and the harder igneous rock now stands exposed in the form of a ridge along the eastern edge of the sheet. The scarp wall of the Palisades is a complex fault (q.v.). Extensive accumulations of talus are found in places. The fissure through which the molten rock rose toward the surface is situated near the western edge of the sheet. The slope toward the west is for the most part very gradual. See HUDSON RIVER.

PALISOT DE BEAUVOIS, pā'lē-zō' de bō'-vwā', AMBROISE MARIE FRANÇOIS JOSEPH (1752-1820). A French naturalist, born at Arras. He became a corresponding member of the Academy of Sciences in 1781, and five years later set out on a journey, during which he visited West Africa, Santo Domingo, and North America. He returned to France in 1798, succeeded Adanson at the Institute in 1806, and in 1815 became a member of the council of the University of Paris. Among his works are: *Flore d'Oucare et de Bénin* (1804-21); *Insectes recueillis en Afrique et en Amérique* (1805-21); *Essai d'une nouvelle agrostographie* (1812); *Muscologie, ou traité sur les mousses* (1822).

PALISSY, pā'lē-sē', BERNARD (c.1510-89). A celebrated French art potter, scholar, and author, born at La Chapelle Biron, near Agen (Lot-et-Garonne). The son of a poor workman in glass, his education was limited, but by his own studious efforts he acquired a considerable knowledge in the natural sciences, besides geometry, drawing, and painting, and extended it while traveling for a period throughout France, in Flanders, and on the Rhine. In 1539 he married and settled at Saintes, where he practiced glass and portrait painting, at the same time carrying on the business of a land surveyor. An enameled cup of faience which he saw by chance inspired him with the resolution to discover the mode of producing white enamel. Neglecting all other labors, he confined himself to investigations and experiments for sixteen years, exhausting all his resources until, unable any longer to buy fuel, he was reduced to the necessity of burning his furniture piece by piece, and finally the flooring of his rooms. Scoffed at by his

neighbors, overwhelmed with reproaches by his wife, and besought by his starving family crying for food, he nevertheless persisted in the search, and at length his efforts were crowned with success. A few pieces adorned with figures of animals, colored to represent nature, sold for high prices, after which he became famous and was patronized and encouraged by the royal family and the nobility, who employed him to embellish their mansions with specimens of his art. An enthusiastic follower of the Huguenot cause, he was arrested in 1562 and imprisoned at Bordeaux, but was soon released by order of the King, who gave him a patent as inventor of 'figulines rustiques.' He removed to Paris about 1564, and set up his pottery-works on a plot of ground assigned to him near the Tuileries. There he worked and prospered for years, escaping the Massacre of Saint Bartholomew under the protection of Queen Catharine de' Medici, and in 1575 began a course of lectures on natural history and physics, which were attended by all the learned men of the day and made him prominent as a man of science. All his views of nature have been fully supported by subsequent discovery and investigation, and have made good his title to a very high rank among the natural philosophers of the sixteenth century. On a fresh outburst of religious fanaticism in 1587, he was thrown into the Bastille as a heretic, and condemned to death, but died before the sentence was carried out. The faience of Palissy is of a peculiar style. His figures and other ornaments are all executed in colored relief, the colors being usually bright, but not of great variety, blues, grays, and yellows prevailing. The most remarkable of his productions are the 'pièces rustiques,' dishes ornamented with crayfish, frogs, lizards, fishes, snakes, shells, and plants, admirably true to nature in form and color. Magnificent specimens of his work are in the Louvre, the Musée de Cluny, and at Sèvres. A few may be seen in the South Kensington and British museums, but the Fontaine Collection at Narford Hall, England, is hardly equaled by any even in France. His *Œuvres complètes*, edited by France (Paris, 1880), containing also a most stirring autobiography, fully justify Lamartine's verdict assigning to Palissy a high position among French writers. For his life and work, consult Henry Morley (London, 1852), Audiat (Paris, 1868), Burty (ib., 1886), and Dupuy (ib., 1898); consult also: Delange and Borneman, *Monographie de l'œuvre de Bernard Palissy* (Paris, 1862), and Marryat, *A History of Pottery and Porcelain* (3d ed., augmented, London, 1868).

PALITZSCH, pāl'lich, JOHANN GEORG (1723-88). A German astronomer, born at Prohlis, near Dresden. On Christmas night, 1758, he discovered, a month before any one else, the comet usually called Halley's, and in 1782 simultaneously with Goodrike determined the period of variation in Algol, a star in Perseus. Palitzsch made his own instruments and continued to live as a peasant in the country near Dresden.

PALIZZI, pā-lēt'sā, GIUSEPPE (1812-98). An Italian landscape and animal painter, born at Lanciano, in the Abruzzi. He studied in Naples, and under Troyon in Paris, where he afterwards lived. His works, usually of Italian subjects, are notable for energetic treatment and fine

color. They include "Goats in the Vineyard" (1855), and "Goats of the Abruzzi," in the Montpellier Museum. His brother, FILIPPO PALIZZI (?-1899), born at Vasto, in the Abruzzi, was one of the ablest of those Neapolitan painters who, in the second half of the nineteenth century, did so much to revive Italian art.

PALK STRAIT. The northern portion of the passage between the south coast of Hindustan and the island of Ceylon (Map: Asia, G 8). This passage is continued southward by the Gulf of Manar (q.v.). It is from 40 to 80 miles wide, 80 miles long, and so shallow that it cannot be navigated in safety by large vessels.

PALL (Lat. *palla*, robe, mantle, curtain). A small square, generally of cardboard, covered on both sides with fine linen, which is used in the Roman Catholic Church to cover the chalice during the mass. It seems to have evolved from a fold of the corporal (q.v.), which in earlier times was turned back over the chalice; this custom, which maintained itself as late as the twelfth century, is still preserved in the Carthusian Order, and a trace of it remains in the fact that the Pontifical has no separate form for blessing the pall as distinct from the corporal. The Theatines use a second pall on which to lay the host; and in the Greek rite also two are used, one to cover the chalice, the other the paten. The name is also applied to a covering of black or purple (sometimes white for young persons) thrown over a coffin while it is being carried to burial.

PALL. A bearing in heraldry (q.v.). See also **PALLIUM**.

PALLA, pāl'lā, or **IMPALLA** (South African name). A South African antelope (*Epyceros melampus*), called 'rodebok' by the Dutch, because reddish. It is a wood-loving species and fond of water; and in former days gathered into large herds in winter, when this species furnished the principal food of the lion and leopard. Consequently these antelopes were exceedingly suspicious, and were not only hard to shoot, but were likely to alarm all other game in the neighborhood by their shrill whistling as soon as they discovered the hunter. The genus is peculiar in having no dew-claws. The males alone have horns, which are lyrate with an abrupt angular bend in the middle.

PALLADIO, pāl-lā'dē-ō, ANDREA (1518-80). An Italian architect of the late Renaissance. He was born at Vicenza, November 30, 1518. He studied architecture in his native city, his patron, Trissino, enabling him to visit Rome, where he prepared himself by a thorough study both of Vitruvius and of ancient monuments, which he assimilated more thoroughly than any other architect of the Renaissance. His first great work was the magnificent two-storied arcade around the Basilica of Vicenza (1545). He produced many works of both civil and religious architecture in and near his native city, which he made a great architectural centre. His scientific treatise on architecture, *I quattro libri dell' architettura* (1570), attained immediate success. The precise rules and formulas, clearly expressed, carried his style not only throughout Italy, but through Europe and Great Britain, where they found especial favor. Palladio became the standard bearer of late Renaissance architecture.

His strength lay rather in composition than in detail, and his originality was manifested in the knowledge, taste, and skill with which he reproduced the composition, proportions, and details of Roman architecture, and adapted them to the requirements of his time. The Basilica of Vicenza was epoch-making; so was his theatre (Teatro Olimpico). His palaces were equally characteristic. A few had two orders of columns, the finest of these being the Barbarano and Chierigiti palaces, in Vicenza. Of the more numerous palaces with but a single colossal order of pilasters or engaged columns standing on a rustic basement, the masterpiece is the Marceantonio Tiene Palace, which is finer even than the Porto and Valmarana palaces. Of his numerous villas the most famous is the Rotonda Capra, outside Vicenza, with circular hall in the centre and four Ionic façades; its interior ornaments in stucco are especially fine. In Venice his works were all ecclesiastical; the earliest was the atrium in front of the Church of La Carità, the church itself coming later; then came the refectory and later the Church of San Giorgio Maggiore, with its beautiful tower (the façade being of later date, by Scamozzi); in 1562 the façade of S. Francesco della Vigna; and in 1578-80 the Church of Il Redentore—all of them marked by great dignity and refinement of composition. His Vicentine buildings have suffered from being executed in brick, stucco, and wood, instead of stone. Consult: Scamozzi, *Fabbriche di Palladio* (Venice, 1786); and the monographs by Temanza (Venice, 1762), Boito (Milan, 1883), Melani, in *L'Art* (Paris, 1890), and Fletcher (New York, 1902).

PALLADISM. See SATANISM.

PALLADIUM (Lat., from Gk. Παλλᾶδιον, *Palladion*). Among the Greeks, an image of the protecting divinity of a city, on whose preservation the safety of the town was believed to depend. In general, these images seem to have had the form of armed figures, usually with shield and spear, of rude workmanship, often scarcely more than a mere column, but gradually assuming the type of the Athena Promachos, the colossal bronze statue on the Acropolis at Athens. They were early identified with that goddess, and their name is connected with hers, Pallas. Such images are seen even on Mycenaean gems and paintings, and are frequent in later works of art. In literature the great example is the Palladium of Troy, believed to have fallen from heaven, like many another palladium or venerable cult-image. This was stolen by Odysseus and Diomedes, and its subsequent fate was the subject of many different legends, since various cities desired to show that they possessed the original. With the acceptance by the Romans of the belief in their descent from the Trojans arose the belief stated by Varro that the Palladium, which was kept in absolute secrecy in the house of Vesta, was the Trojan original and had been brought to Italy by Æneas. Consult Chavannes, *De raptu Palladii* (Berlin, 1891).

PALLADIUM (Neo-Lat.). A metallic element discovered in 1803 by Wollaston, who named it from the planet Pallas, which had been discovered by Olbers in 1802. It is found in grains usually containing platinum and iridium in the proportion of about 2 per cent., and with gold and silver in the proportion of 5 to 10 per

cent.; also with gold and lead selenide in the Harz. The principal sources are the platiniferous sands of Brazil, the Urals, and other localities where platinum ores are found. For its separation the ore is dissolved in aqua regia; the solution is kept boiling for some time with an excess of caustic soda, then acidified with hydrochloric acid and precipitated with ammonium chloride; the filtrate is then boiled with copper foil, the metallic powder thus obtained is extracted with nitric acid, and metallic palladium is precipitated from the nitric acid solution by shaking the latter with metallic mercury.

Palladium (symbol, Pd; atomic weight, 106.36) is a white lustrous metal with a specific gravity of 11.4 at 22.5° C. It melts at about 1500° C., and is fairly malleable and ductile. It is remarkable for its capacity for absorbing hydrogen. The metal itself is used for making scales and division marks on scientific instruments and for coating and preserving silvered ware. The wire finds some use in dentistry on account of its hardness. An alloy of palladium with steel is used in making parts of physical instruments.

Palladium combines with oxygen to form a suboxide (Pd₂O), a monoxide (PdO), and a dioxide (PdO₂), but none of its salts has any important application.

PALLADIUS. An early Christian writer. He is supposed to have been born in Galatia in the latter half of the fourth century. At the age of twenty he started on foot to visit the cells of the famous monks in different parts of the Roman Empire. He spent some time in Egypt in the Nitrian Desert, then went to Palestine and lived several years with the monks of the Mount of Olives. At the beginning of the fifth century he was consecrated a bishop in Asia Minor, but he is probably not the Palladius who was Bishop of Helenopolis in Bithynia. He was the author of a work addressed to Lausus, a chamberlain at the Imperial Court, and hence called *Historia Lausiaca*, which is a rich collection of pictures of the monkish life in Egypt and Palestine, based on personal knowledge, oral testimony, and probably also written sources. The existing manuscripts differ greatly and the text has not yet been established. It was published in the original Greek by Migne in *Patrol. Græca*, xxxiv., and in Latin translation in *Patrol. Lat.*, lxxiii., lxxiv. Palladius was an adherent of Origen and an opponent of Jerome. He may also have been the author of a *Dialogus de vita S. Johannis Chrysostomi* (in Migne, *Patrol. Græca*, xlvi.). Consult Preusschen, *Palladius und Rufinus* (Gießen, 1897).

PALLADIUS, RUTILIUS TAURUS ÆMILIANUS. A Roman author, who probably lived in the fourth century A.D., under Valentinian and Theodosius. He wrote a work, *De Re Rustica* (On Agriculture), in fourteen books, the last of which is a poem of eighty-five elegiac couplets. It is, from a literary and grammatical point of view, full of faults; but as it was a complete calendar of Roman agriculture, it was very useful for its time, and was much read and followed during the Middle Ages. The best edition is that by Schneider in his *Scriptores Rei Rusticæ Veteres Latini* (4 vols., Leipzig, 1795), and the most recent by Schmitt (ib., 1898). The

work of Palladius was translated into English by Owen (London, 1803).

PALLANZA, pà-làn'tsà. A town in the Province of Novara, Italy, situated on a headland in Lake Maggiore, 45 miles northwest of Milan (Map: Italy, C 2). It is esteemed as a winter resort, owing to its mild climate and delightful situation. Population (commune), in 1901, 5237.

PAL/LAS. The Greek goddess of wisdom, identical with Athena. See MINERVA.

PALLAS, päl'làs, PETER SIMON (1741-1811). A German-Russian traveler and naturalist, born in Berlin. He studied natural history, and was employed in classifying many valuable collections both in Holland and England. In 1764 he was elected a foreign member of the Royal Society. He gained a high reputation by the publication of his *Elenchus Zoophytorum* (1766), a work still much valued, and *Miscellanea Zoologica* (1766). In 1768 the Empress Catharine II. invited him to Saint Petersburg, where he was made a member of the Academy of Sciences, and he was subsequently appointed naturalist to a scientific expedition bound for Siberia, the immediate object of which was to observe the transit of Venus. Pallas spent six years on his journey (1768-74), exploring in succession the Ural Mountains, the Kirghiz Steppes, a great part of the Altaian range, the country around Lake Baikal, and the steppes of the Volga, returning to Saint Petersburg in 1774 with an extraordinary treasure of specimens in natural history, which form the nucleus of the museum of the Academy of Saint Petersburg. His travels, *Reisen durch verschiedene Provinzen des russischen Reichs*, were published at Saint Petersburg (1771-76), and were followed by his *Sammlung historischer Nachrichten über die mongolischen Völkerschaften* (1776-1802), and his *Neue nordische Beiträge zur physikalischen und geographischen Erd- und Völkerbeschreibung Naturgeschichte und Oekonomie* (1718-93). Without neglecting any branch of natural history, he now devoted himself more particularly to botany; his magnificent *Flora Rossica* (1784-1815) and his *Species Astragalorum* (1800-02) were among the results of his studies. He published also *Icones Insectorum præcipue Rossicæ Sibiricæque Peculiarium* (1718-98), and contributed to a glossary of all the languages of the Russian Empire, which was published at Saint Petersburg. As he wished to live in the Crimea, the Empress Catharine presented him with an estate in the finest part of that peninsula, where he resided after 1796. His *Bemerkungen aus einer Reise durch die südlichen Statthalterschaften des russischen Reichs* was published in 1799-1801. In 1810 he went to Berlin, where he spent the last year of his life.

PALLAVICINO, päl'là-vè-ché'nò, SFORZA (1607-67). An Italian historian, son of the Marquis Alessandro Pallavicino of Parma. He was born at Rome, Italy, November 28, 1607. He took orders, and held several important ecclesiastical appointments during the pontificate of Urban VIII. In 1637 he became a member of the Company of Jesus, and was created a cardinal in 1659 by Pope Alexander VII. He died in Rome, June 5, 1667. In Latin he wrote theological and polemical works, such as the *Vindicationes Societatis Jesus* and the *Asserti-*

num Theologicarum Libri. Of his Italian works there may be mentioned the fragmentary *Fasti sacri* in octaves; the tragedy *Ermeneigildo* (1644); the *Avvertimenti grammaticali a chi scrive in italiano* (1661), and the posthumously published *Della vita di Alessandro VII., libri cinque* (1839-40), one of his best works; and his correspondence (*Lettere*, recent ed., Rome, 1848). The most noted of all his writings is the *Istoria del Concilio di Trento ove insieme rifiutasi con autorevoli testimonianze un' istoria falsa divulgata nell'istesso argomento da Pietro Soave Polano* (Rome, 1656-57; 2d ed. 1664). This work, written to do away with the history by Paolo Sarpi, has many decided merits, but, as Ranke has stated, it sins by being unduly partial.

Consult the *Opere edite e inedite di Sforza Pallavicino*, containing in vol. ii. Affo's *Memorie della vita e degli studi del cardinale Sforza Pallavicino* (Rome, 1844-48).

PALLESKE, päl-lès'ke, EMIL (1823-80). A German author and dramatic reader, born at Tempelburg, Pomerania. He studied at the universities of Berlin and Bonn, then became an actor at Posen, and from 1845 until 1851 was attached to the Court theatre at Oldenburg. Subsequently he was widely known in Germany through his public readings of Shakespeare's dramas, later on also of selections from the works of Fritz Reuter. Besides three dramas he published *Die Kunst des Vortrags* (3d ed. 1892), but he owes his reputation as an author chiefly to his *Schillers Leben und Werke* (15th ed. 1900).

PAL/LISER, Sir WILLIAM (1830-82). An English soldier and inventor. He was born in Dublin, Ireland; was educated at Rugby, Trinity College, Dublin, Trinity Hall, Cambridge, and the Staff College, Sandhurst; and entered the rifle brigade as ensign in 1855. He was transferred to the hussars in 1858; retired from the service in 1871, and was knighted in 1873. He introduced a number of inventions, among them being the chilled projectiles known by his name, improvements in the manufacture of ordnance, and the process of converting smooth-bore guns into rifled ordnance. He was elected to Parliament in 1880.

PAL/LIUM (Lat., mantle, cloak). The name given in the Roman Catholic Church to an ecclesiastical vestment worn by the Pope, by patriarchs, and by archbishops. Its use is very ancient, and a respectable tradition carries it much further back than the earliest positive historical notice of it, in the life of Pope Marcus, a contemporary of Constantine the Great. By archbishops it cannot be worn until it has been solemnly asked for and granted by the Pope, and even then only at high mass on certain specified great festivals or on the occasion of important functions, such as the consecration of bishops or churches. The pallium is a narrow band of white woolen web, about three inches wide, embroidered with black crosses, which encircles the neck of the archbishop, and from which two narrow bands of the same material depend, one falling over the breast, the other over the back of the wearer. It is made by nuns wholly or in part from the wool of two lambs, which are blessed annually on the festival and in the Church of Saint Agnes. During the night before the feast of Saint Peter and Saint Paul the *pallia* made of this wool are placed on the

altar above the tomb of these Apostles. Within three months of his consecration every new archbishop is obliged to apply to the Pope, in person or by proxy, for the pallium; nor is it lawful for him, until he shall have received it, to exercise any act of what is properly archiepiscopal jurisdiction. Consult: Thurston, *The Pallium* (London, 1892); Vespasiani, *De sacri pallii origine* (Rome, 1856).

PALL MALL. The name of a street of London, famous for its clubs and palaces. The name is derived from the old game of *pail mail*, introduced during the reign of Charles I. Originally a suburban promenade, Pall Mall became a street at the close of the seventeenth century. Many important historical and literary personages have lived along its borders. Among the prominent clubs are the Athenæum, Travellers', Reform, Carlton, Army and Navy, Oxford and Cambridge, White's, and the Devonshire Club. The Crimean Monument, the York Column, the statue of George III., and Sir John Franklin are the principal works of sculpture on the thoroughfare, upon which Her Majesty's Theatre and the Haymarket Theatre also front. The London House, the Winchester House, the Marlborough House, St. James's Palace, and the Spencer House are the principal places of note.

PALM (AS. *palm*, from Lat. *palma*, palm-tree, palm of the hand; connected with Gk. *παλάμη*, *palamē*, Skt. *pāni*, OIr. *lam*, OHG. *folma*, AS. *folm*, palm of the hand, and ultimately with OHG. *fuolen*, Ger. *fühlen*, AS. *fēlan*, Eng. *feel*; so called from the resemblance of the leaves to the outspread hand). The great tree group of about 130 genera and 1200 species of monocotyledons, displayed almost exclusively in the tropics, where they form a most striking part of the vegetation. Having been described chiefly from cultivated and incomplete specimens, the species are very inadequately understood, as may be seen from the fact that in a collection of Porto Rican palms, thirteen were new species and seven were new genera. The general habit of the palm, with its columnar trunk often buttressed at the base, sometimes rising more than 100 feet and crowned by a rosette of huge leaves, is well known. All palms, however, do not exhibit this habit, for some have branching stems (e.g. doom palm), some are but three or four feet high, and some have such long and slender stems that they are rope-like and climbing by means of hooked spines, as in the rattan palms. Some species have flexible stems which often attain a height of 500 and even 600 feet. Indeed, Rumphius asserts that they are sometimes 1200 or even 1800 feet long.

The leaves of palms are of two general kinds, the palmate or fan forms, and the pinnate or fern forms, for example, the date palm (*Phoenix dactylifera*) and the cocoanut palm (*Cocos nucifera*). Examples of the former are the common fan palm (*Livistona Sinensis*) and the palmetto (*Sabal Palmetto*) of the Southern States. In the latter some species produce leaves 50 feet long and 8 feet broad; in the former 30 feet long and 4 to 5 feet broad, undivided. The flowers occur in enormous clusters at first ensheathed by huge and frequently woody spathes which often burst with an explosion, and are usually more or less pendant from among the crown of leaves. Humboldt estimated the number of flowers on a

single palm (a species, *Elæis*) to be about 600,000. The fruit is sometimes a kind of berry, sometimes a drupe, either with a fleshy or fibrous covering; and sometimes contains a very hard and bony nut. It is sometimes only of the size of a pea or a cherry; sometimes, as in cocoanut, notwithstanding the smallness of the flowers, it is of very large size. See Plate of PALMETTO.

A few species are found in temperate regions; one species only, *Chamarops humilis*, being a native of Europe, and extending as far north as latitude 44°, while the northern limit of palms in Asia is about latitude 34°, and in North America, latitude 35°. In South America the southern limit of palms is latitude 36°; in Australia it is latitude 35°; in Africa no native species is found farther south than latitude 30°; but in New Zealand one species extends as far south as latitude 38°. Some of the species which are found in tropical America grow in mountain regions bordering upon the limits of perpetual snow. Some species are restricted to very narrow geographical limits. The cocoanut palm, which is by far the most extensively distributed, grows in maritime, others in inland, districts. Some grow on dry and sandy ground, others in the richest alluvial soil, and some in swampy situations; some in open districts, others in dense forests. Some species are generally found singly, some in groups; some even cover tracts of country in which no other tree appears.

There is almost no species of the palm which is not capable of being applied to some use, and in economic importance the order is excelled by no other order of plants except the grasses. For the vast variety of its products, see ABRACK; ASSAI; DATE PALM; COCOANUT; OIL PALM; PALMYRA PALM; SAGO; RATTAN; ASTROCARYUM; PALMETTO; etc.

The classification of Drude of the suborders and principal genera is as follows: *Phœniceæ*—*Phoenix*; *Sabaleæ*—*Chamarops*, *Sabal*, *Rhapis*, *Corypha*, *Livistonia*, *Copernicia*; *Borasseæ*—*Borassus*, *Lodoicea*; *Mauriteæ*—*Mauritia*; *Metroxyleæ*—*Raphia*, *Metroxylon*, *Calamus*; *Arecineæ*—*Caryota*, *Arenga*, *Leopoldinia*, *Ceroxylon*, *Oreodoxa*, *Euterpe*, *Areca*; *Cocconeæ*—*Elæis*, *Attalea*, *Cocos*, *Bactris*, *Desmoneus*; *Phytelephantineæ*—*Phytelephas*, *Nipa*.

The cultivation of palms in hot-houses is generally attended with great expense. In hot-houses they are cultivated merely as objects of interest, and for the gratification of a refined taste, never for the sake of their fruit or any other product.

The earliest fossil palms date back to the Middle Cretaceous. They are common in the Upper Cretaceous of North America, where they occur as far north as Greenland, and they are found also in the Tertiaries of North America and Europe. The prominent genera are *Flabellaria*, *Chamarops*, *Sabal*, *Phoenix*, allied to the modern fan, palmetto, and date palms.

PALM, JOHANN PHILIPP (1766-1806). A bookseller of Nuremberg, who has acquired historic celebrity as a victim of Napoleonic justice in Germany. He was born in Schorndorf, Bavaria, and succeeded his father-in-law, Stein, as a bookseller in Nuremberg, the old name of the firm being retained. In the spring of 1806 a pamphlet, entitled *Deutschland in seiner tiefen Erniedrigung*, which contained some bitter truths concerning Napoleon and the conduct of the

PALMS



1. ROYAL PALM



2. WINE PALM



3. SAGO PALM

French troops in Bavaria, was sent by this firm to a bookseller in Augsburg in the ordinary course of trade, and, as Palm to the last moment of his life averred, without any regard, on his part, to its contents. Napoleon's police traced it to the shop in Nuremberg, and an investigation was ordered. Palm was in Munich, but he returned to Nuremberg, and was there arrested. An extraordinary court-martial, held at Braunau, to which place he was removed, condemned him to death (August 25, 1806), no advocate being heard in his defense. General Saint-Hilaire declared that the orders of the Emperor were positive; and the sentence was executed at two o'clock on the same day on which it was pronounced. The execution of Palm served to stir up a feeling of bitter hatred among the German people against the domination of the French, and aroused the general indignation of Europe. With the murder of the Duc d'Enghien (q.v.) this was one of Napoleon's gravest blunders. Consult Schultheiss, *Johann Philipp Palm* (Nuremberg, 1860).

PALMA, päl'mä. One of the Canary Islands (q.v.).

PALMA. The capital of the island of Majorca (q.v.) and of the Spanish Province of Baleares (Map: Spain, G 3). It is situated on the southwest coast of the island, on the Gulf of Palma, which, between capes Figuera and Blanco, is 18 miles long, and sweeps 12 miles inland. The city is surrounded by orange plantations, and is walled and fortified. The houses, some of which are built of marble, are mostly in the Moorish style of architecture; a number of the streets are wide and regular. It is the see of a bishop, and has a Gothic cathedral which, from its lofty situation, dominates the whole city. It is simple but beautiful in style, with a spire which, from the delicate and airy character of its construction, is called the Angel's Tower. Besides other ecclesiastical edifices, the town has a number of fine modern commercial and other secular buildings, such as the Bank of Spain, the Exchange, a beautiful and ornate structure in Germano-Gothic, and the Governor's palace. The chief educational institutions are a seminary, a normal school, a school of fine arts, and a museum of paintings. The chief manufactures are alcohol, liquors, chocolate, starch, sugar, flour, soap, leather, and glass. In the port, a mole 500 yards in length runs out from the bastions facing the south; and on each side of it are ship-building yards. The harbor is well sheltered, and is much used as a port of call; steamers leave it regularly several times a week for Barcelona, Valencia, and Alicante. The chief exports are oil, wine, and fruit. Population, in 1887, 60,514; in 1900, 63,783.

PALMA, JACOPO, called IL VECCHIO (1480-1528). A Venetian painter of the High Renaissance. He was born at Serinalta, near Bergamo, about 1480, and studied principally under Giovanni Bellini, but there is a latitude in his art method that indicates the successive dominance of several artists. His earlier works call to mind the style and technique of Bellini, as may be seen in the "Tobias and the Angel" in Stuttgart. His second manner reflects the influence of Giorgione and Titian, and is characterized by rich coloring and brilliant lighting, combined with masterly breadth of treatment. Like his great contemporaries, he achieved ideal-

ism through the perfection of nature. The finest example of this period is the altar-piece of Saint Barbara in the Church of Santa Maria Formosa, Venice. The figure of the saint is one of the most beautiful and majestic female forms in Venetian art. His later works, cast in a lower key and executed with less care, constitute his third (*blonde*) manner. The "Three Sisters," Dresden, is typical of this class. Palma was a prolific painter, and at the time of his death, which occurred at Venice, August 18, 1528, no fewer than forty unfinished works remained. Among his works the following may be selected as characteristic: "Adam and Eve," Brunswick; "The Virgin Enthroned," altar-piece at Zerman, near Treviso; "Saint Peter Enthroned" and "Healing of the Widow's Son," in the Academy, Venice. To the best period are assigned "The Adoration of the Shepherds," in the Louvre; "Meeting of Jacob and Rachel," Dresden Gallery; "Saint Peter Presenting a Worshiper to the Infant Christ," Colonna Palace, Rome; "The Madonna and Child Adored by Saints," and a number of female portraits in the Vienna Museum. Consult: Crowe and Cavalcaselle, *History of Painting in North Italy* (2d ed., London, 1871); Rosenberg, in Dohme, *Kunst und Künstler Italiens*, iii. (Leipzig, 1879); Morelli, *Italian Masters in German Galleries* (London, 1883); Locatelli, *Notizie intorno a Giacomo Palma* (Bergamo, 1890).

PALMA, JACOPO, called IL GIOVANE (the younger) (c.1544-1628). A Venetian painter, grandnephew of the preceding. He was born in Venice, where he passed most of his life. A pupil of Antonio Palma, a second-class Venetian painter, he received his real inspiration from the study of the works of Titian and Tintoretto, and later, during an eight years' stay in Rome, came under the influence of the great masters of the Roman Renaissance. He acquired a mastery of expression and a facility in handling beyond that possessed by the majority of his contemporaries. The great deficiency in his work is the mechanical or manneristic method, which makes itself felt in spite of the excellencies of color or line. A number of his best productions, which are historical and religious in character, are in the Ducal Palace, the Academy, and the churches of Venice, a typical example being "Saint Catharine Rescued from the Wheel," in the Church of the Frari. Other examples are in the galleries of Vienna, Madrid, Munich, Dresden, etc.

PALMA, RICARDO (1833-). A Peruvian poet and prose writer, born at Lima. He was educated at the University of San Marcos del Rimac, and as associate editor of the Lima periodical *El Diablo* (1860) he was banished for a time for his political opinions. He held a position in the Peruvian National Library, and after it was destroyed by the Chileans in 1881, Ricardo undertook its restoration with foreign help. Besides translations from the German, Portuguese, French, English, and Italian, he published in Lima *Los anales de la inquisición de Lima* (1863) and a volume of poems, some of which had been previously printed in Paris (1865) and in Havre (1870). His *Tradiciones* (1883-87) contain many interesting historical and other legends of Peru.

PALMA, TOMAS ESTRADA (c.1836-). First President of Cuba, born near Bayamo, where

his father owned large estates. He studied law at the University of Seville in Spain. Upon the outbreak of the ten years' war (1868-78) he joined the revolutionists, soon rose to the rank of general, and toward the end of the war was elected to the Presidency of the Cuban Republic. Soon afterwards he was captured by the Spaniards and sent to Spain, where he was kept in confinement until the end of the insurrection. Then, as his parents were dead, and his estates confiscated, he went to Honduras, where he married the daughter of the President, and became Postmaster-General. A few years later he removed to the United States and opened a school for Latin-American boys at Central Valley, Orange County, N. Y. This he maintained until 1895, when the Cubans again rebelled; whereupon he closed his school and organized in New York City the Junta to which the present Republic in great measure owes its existence. His services were remembered by his countrymen when in 1901 they were called upon to choose their first President, for after Máximo Gomez (q.v.) refused to be a candidate Palma became their almost unanimous choice. He was inaugurated on May 20, 1902, and on the same day the United States formally relinquished all claim to jurisdiction over the internal affairs of the new nation.

PALMA DI MONTECHIARO, dè mōn'ta-kyā'rō. A town in the Province of Girgenti, Sicily, near the southwest coast, 13 miles southeast of Girgenti (Map: Italy, H 10). It is comparatively modern, dating from 1637. It has a trade in almonds, dried fruits, and sulphur. Population (commune), in 1881, 11,702; in 1901, 14,330.

PALMA CHRISTI. See CASTOR-OIL PLANT.

PALMAROLI, pāl'mā-rō'lē, PIETRO (1750-1828). An Italian painter, chiefly distinguished as a restorer of paintings. He invented the art of transferring frescoes from the wall to canvas. The first work which he transferred in this manner was the "Descent from the Cross," by Daniele da Volterra, in the Church of Trinità de' Monti in Rome in 1809. This transfer created great interest throughout Italy, and in 1820 he was called to Dresden, where he restored above fifty paintings, including the Sistine Madonna. He afterwards transferred and restored a number of famous paintings at Rome, including Raphael's "Sibyls" in Santa Maria della Pace.

PAL'MAS, CAPE. See CAPE PALMAS.

PALMBLAD, pāl'm'blād, VILHELM FREDRIK (1788-1852). A Swedish author, professor of history, geography, and Greek at Upsala, and editor of the great *Swedish Biographical Dictionary* (23 vols., 1835-52). While a student at Upsala (1806-10) he purchased the university printing-press, and used it for the popularization of learning. He published the literary journal *Phosphorus*, an annual *Poetic Calendar*, and a literary review. In these enterprises Atterbom (q.v.) and Hammarsköld were associated with Palmblad in efforts to supplant the classical by romantic literary ideals. Palmblad was an industrious writer. His *Manual of Physical and Political Geography* (5 vols., 1826-37) is the best in Swedish. His contributions to history are superseded, as are his translations of Greek dramatists and his Greek Etymology (1845). Of his novels, the best are *Familjen Falkensvärd* (1844)

and *Aurora Königsmark* (1846). Of his short stories, *Amala* (1817) and *Holmen i sjön Dall* (1819) are good.

PALM CIVET. A civet (q.v.) of the genus *Paradoxurus*; a paradoxure, tree-cat, or toddy-cat. This group differs from the true civets in important points of skull structure, dentition, and coloration (the tail not being distinctly ringed), and in having mainly arboreal habits. All are Oriental, and ten or a dozen species are scattered over India, the Malay Peninsula and Archipelago, and Southern China. They have the slender, sharp-nosed civet form, are about the size of house-cats, and their relatively long fur is often beautifully striped and spotted. The animals spend most of their time in trees, especially palms, but often live in the thatched roofs of cottages. During the day they sleep, coiled into a ball, and they become active only in the night, when they display remarkable agility in climbing. Their food is mainly vegetable, but all eat more or less of insects, birds' eggs and fledglings, and other small creatures. Like the fox-bats, they are very fond of the palm-juice or 'toddy' collected by the natives in vessels attached to the cut spathes of various Indian palms, especially the jaggery (*Caryota urens*). They are sometimes domesticated. Consult: Jerdon, *Mammals of British India* (London, 1868); Blanford, *Fauna of British India: Mammals* (London, 1888); Lydeker, "Cats, Civets, and Mongoose," in *Allen's Natural History* (London, 1894); Wallace, *Tropical Nature* (London, 1878).

PALMER, pāl'mēr. A town, including several villages, in Hampden County, Mass., 15 miles east by north of Springfield; on the Chicopee River, and on the Central Vermont and the Boston and Albany railroads (Map: Massachusetts, C 3). It has a public library, the Young Men's Library Association, with more than 6000 volumes; and is prominent as an industrial centre, its manufactures including cotton and woolen goods, carpets, straw hats, wire, etc. The government is administered by town meetings. Population, in 1890, 6520; in 1900, 7801.

Settled in 1716, Palmer became a district in 1752 and a town in 1775. Before incorporation it was known variously as New Marlborough, Kinsfield, The Elbow Tract, and from 1741-52 as Kingston, in honor of the first settler, John King. Consult Temple, *History of the Town of Palmer, Massachusetts* (Palmer, 1880).

PALMER. See PILGRIM.

PALMER, ALICE (FREEMAN) (1855-1902). An American educator. She was born at Colesville, N. Y., was brought up in Windsor, graduated at Michigan University in 1876, and taught in Ottawa, Ill., and East Saginaw, Mich. Elected to the chair of history in Wellesley College in 1879, after a year she became acting president, and then received a permanent appointment (1882). Under her direction the college grew, and its organization was perfected. She married George Herbert Palmer, professor of philosophy at Harvard, in 1887, and became prominent in the Woman's Educational Association of Boston. She received the appointment of non-resident dean of the women's department in the University of Chicago in 1892. She died suddenly in Paris. Consult *Report of a Memorial Service With Addresses by J. B.*

Angell, Caroline Hazard, W. J. Tucker, and C. W. Elliot (Boston, 1903).

PALMER, ANTHONY (c.1675-1749). An American colonial Governor, born probably in England. After engaging in mercantile pursuits in Barbadoes for some years, he emigrated to Pennsylvania in 1707, and settled in Philadelphia. From 1708 until his death he was a member of the Provincial Council of Pennsylvania, ultimately becoming its president, in which capacity, after the resignation of Lieutenant-Governor Thomas in 1747, he acted as Governor for a year and a half, taking measures for the protection of the colony against Spain and France, then at war with Great Britain, and making several important Indian treaties. He was the founder of what is now the 'Kensington District' of Philadelphia.

PALMER, ARTHUR (1841-97). An English Latinist, born in Guelph, Ontario, Canada. He was reared in Canada, studied with high honors at Trinity College, Dublin, and became fellow there in 1867, and professor of Latin in 1880. His field was Latin poetry, especially of the Augustan age, and he was famed for his brilliant Latin style and for his felicitous emendations of Plautus, the Augustan poets (save Vergil), and Aristophanes. In the first editions of Herondas (1891) and of Bacchylides (1897) he was active. He edited: Ovid's *Heroides*, with Planudes's version (1874; revised 1898), probably his greatest work; *Propertius* (1880); and Horace, *Satires* (1883; 5th ed. 1893).

PALMER, ARTHUR HUBBELL (1859-). An American Germanic scholar, born in Cleveland, Ohio, and educated at Western Reserve College. After two years' study in Europe he became professor of German at Adelbert College, and from 1886 to 1891 was librarian of the college as well. In 1891 he was called to Yale University as professor of German language and literature. He edited various German texts, among them Schiller's *Wilhelm Tell* (1898) and *Thirty Years' War* (1899), and Goethe's *Hermann und Dorothea* (1902).

PALMER, BENJAMIN MORGAN (1818-). An American Presbyterian clergyman, born in Charleston, S. C. He was a student at the University of Georgia, and studied theology at Columbia Theological Seminary, S. C. Afterwards he was in charge of churches at Savannah (1841-43) and at Columbia (1843-46). He had the chair of Church history and polity in the Columbia Theological Seminary from 1853 until 1856, when he took charge of the First Presbyterian Church at New Orleans. He was moderator in the first General Assembly at Augusta, Ga., in 1861. In 1847 he founded *The Southern Presbyterian Review*.

PALMER, EDWARD HENRY (1840-82). An English Oriental scholar. He was born in Cambridge, and went into business in London. In 1863 he entered Saint John's College, Cambridge, where he graduated in 1867, and was in that year appointed fellow. In 1869 he went to Sinai on the Sinai survey expedition; and in 1870 he again made explorations in the desert of Tih, Edom, and Moab with C. F. T. Drake. In 1871 he became professor of Arabic at Cambridge. In 1881 he resigned this position and went to London, where he engaged in journalism. In 1882 he was sent on a secret service mission among

the Bedouin tribes to induce them not to ally themselves with Arabi Pasha (q.v.) in his rebellion against the Khedive. He met with eminent success, but while on the mission was betrayed by a guide and shot by the rebels. Palmer was a prolific writer on Oriental topics. Among his works are the following: *Oriental Mysticism, Theosophy of the Persians* (1867); *The Desert of the Exodus* (2 vols., 1871); *The Negeb or South Arabic Language* (1874; 2d ed. 1885); *A Concise Dictionary of the Persian Language* (1876; 2d ed. 1884); *English-Persian Dictionary*, completed after his death by G. Le Strange (1883); a translation of the Koran in the series *Sacred Books of the East* (1880); several translations from and into Persian; *The Poetical Works of Beha-ed-din Zohair of Egypt, with a Metrical English Translation, Notes and Introduction* (1876-77; the notes were never published); and a *Simplified Grammar of Hindustani, Persian, and Arabic* (1882; 2d ed. 1885). Consult his *Life* by Walter Besant (London, 1883).

PALMER, ERASTUS (1817-). An American sculptor. He was born at Pompey, Onondaga County, N. Y., April 2, 1817. He was a carpenter by trade, but in 1846-48 entered upon an artistic career in Albany as cameo-cutter. He then attempted sculpture, and in 1851 exhibited his first marble bust, the "Infant Ceres," at the Academy of Design, New York. His works include the bas-reliefs "Faith," "Mercy," and "Peace in Bondage;" the ideal busts "Resignation," "Spring," and "June;" portrait busts of Alexander Hamilton, Washington Irving, and of Dr. Armsby, Washington Park, Albany, N. Y.; and the statues "The Sleeping Peri," "The White Captive," and "The Angel of the Sepulchre" (Rural Cemetery, Albany, N. Y.).

PALMER, GEORGE HERBERT (1842-). An American educator and writer on classical and pedagogical subjects. He was born in Boston, graduated at Harvard in 1864, studied at Tübingen, Germany, and Andover Theological Seminary, became instructor in Greek at Harvard College in 1870, assistant professor in philosophy there in 1883, and Alford professor of natural religion, moral philosophy, and civil polity in 1889. He was twice married, first to Ellen Margaret Wellman (1871-79), next (1887) to Alice Freeman, then president of Wellesley College. His publications include *New Education, The Glory of the Imperfect, Self-Cultivation in English*, and translations of the *Odyssey* of Homer and the *Antigone* of Sophocles.

PALMER, JAMES SHEDDEN (1810-67). An American naval officer, born in New Jersey. He entered the United States Navy as midshipman in 1825, was made lieutenant in 1836, and during the Mexican War commanded the blockade-schooner *Flirt*. In 1855 he was promoted to be commander, and at the outbreak of the Civil War he was in command of the *Iroquois* of the Mediterranean squadron. He was soon recalled and attached to Admiral Dupont's blockading fleet; was made captain in 1862, led the advance in the passage of the Vicksburg batteries, and participated in the fight with the Confederate ram *Arkansas*. In 1863 he was promoted to be commodore. He became a close friend of Farragut, whose flag-captain he was at Mobile Bay and New Orleans. In 1866 he was made rear-

admiral, and commanded the North Atlantic Squadron until his death.

PALMER, JOHN (c.1742-98). An English actor, born in London. He made his first appearance on the stage in 1762, but gained no great success until 1768. In 1772 he played at Liverpool, and four years afterwards reappeared at the Haymarket, where in 1777 he was the first Joseph Surface in *The School for Scandal*. Palmer built the *Royalty* in 1785, but never made it a success. The pamphleteering war in which he then engaged broke his spirit and health, and he died on the stage in the fourth act of Lewis's *Castle Spectre*, in which he was playing Father Philip.

PALMER, JOHN MCAULEY (1817-1900). An American soldier and political leader, born at Eagle Creek, Scott County, Ky. In 1831 he removed to Illinois and in 1839 was admitted to the bar. He took an active interest in politics, and was elected by the Democrats to the State Senate in 1852, but soon afterwards became identified with the new Republican Party, was chosen a delegate to its first national convention, and in 1856 zealously supported Frémont's candidacy. On the outbreak of the Civil War he was commissioned colonel of the Fourteenth Illinois Volunteers, and on December 20, 1861, was promoted to be brigadier-general. He served with Frémont in Missouri, and with Pope at New Madrid (March 13, 1862) and Island No. 10 (April 8, 1862). The same year he was advanced to the rank of major-general and given command of a division, which he led at Murfreesboro (December 31, 1862, to January 2, 1863). At the battle of Chickamauga (September 19-20, 1863) he led one of Crittenden's divisions, and at Chattanooga commanded the Fourteenth Corps of the Army of the Cumberland. His corps formed part of Thomas's command during the Atlanta campaign, and took part in the desperate charge at Kenesaw Mountain (June 27, 1864), and in the battle at Peach Tree Creek (July 20, 1864), soon after which Palmer gave up his command. In 1868 he was elected Governor of Illinois by the Republicans, but four years later returned to the Democratic Party, and in 1876 energetically supported Samuel J. Tilden. In 1890 he was elected United States Senator, and in 1896 accepted the nomination for President from the Gold Democrats.

PALMER, JOHN WILLIAMSON (1825-96). An American poet, born in Baltimore, Md., April 4, 1825. He studied medicine, was city physician in 1849, went to China in 1851, volunteered in the East India Company's service, and was surgeon on a war steamer in the Burmese campaigns (1852-53). He was war correspondent for the *New York Tribune*. In 1853 he returned to the United States and wrote for various publications till his death. He wrote novels and books of travel, e.g. *The New and the Old, or California and India in Romantic Aspects* (1859), and many poems, which have been collected (1901). He is best known for his stirring ballad *Stonewall Jackson's Way*, written September 17, 1862, while the battle of Antietam was in progress. He was also an editorial assistant on the *International*, the *Century*, and the *Standard* dictionaries.

PALMER, NATHANIEL BROWN (1799-1877). An American sea-captain, the discoverer of the

Palmer Archipelago. He was born at Stonington, Conn., and was educated at a private school. He went to sea at the age of fourteen, and in 1821, in command of the sloop *Hero*, a vessel of only 40 tons, set out from Yankee Harbor in the South Shetlands to investigate a new land that had been sighted to the southward. On his return from this land he met the Russian exploring expedition under Bellinghausen. The region that he discovered was for more than half a century held to be a portion of that spur of the alleged Antarctic continent which lies below South America; but more recent investigations have shown that it is merely a part of the archipelago lying above what is supposed to be the continental mass. Palmer was subsequently in command of various clipper ships and was himself a designer of clippers, among them the *Hoqua* and the *Oriental*. In 1849 he retired from the sea. He became a director of the Fall River line of steamers and was mainly instrumental in building the *Bristol* and the *Providence*.

PALMER, RAY (1808-87). An American clergyman and hymn-writer. He was born at Little Compton, R. I., studied at Phillips Academy, Andover, Mass., and graduated from Yale College in 1830. After graduation he taught in a private school in New York City, and later became associated with Prof. E. A. Andrews in conducting a young ladies' institute at New Haven, Conn. Becoming a licentiate in 1832, he was called to the pastorate of the Central Congregational Church, Bath, Maine, in 1835, where he remained until 1850, when he resigned to accept a call from the First Congregational Church, Albany, N. Y. In 1866 he relinquished pastoral work and became secretary of the American Congregational Union at New York. The years previous to his death were spent at Newark, N. J. He is chiefly remembered as a writer of hymns, one of which—"My faith looks up to Thee"—exists in twenty different languages. His collections of hymns are: *Hymns and Sacred Pieces* (1865); *Hymns of My Holy Hours* (1868); and *Voices of Hope and Gladness* (1880).

PALMER, ROUNDELL, first Earl of Selborne (1812-95). An English politician and judge. He graduated in 1834 from Oxford after a brilliant career there, and received his master's degree in 1836. In the following year he was admitted to the bar, and soon became noted for his keen and subtle mind and his vast learning. In 1847 he entered Parliament for Plymouth and joined the adherents of Peel. After a varied Parliamentary career, losing his seat on two occasions, he became Solicitor-General in Palmerston's Cabinet in 1861, and in 1863 Attorney-General, which post he held until 1866. Palmer gave an independent support to Gladstone, and in 1872 became Lord Chancellor, and was raised to the peerage as Baron Selborne of Selborne. As Chancellor, Selborne had much to do with the reformation of the judiciary. In 1874 he was displaced, but again became Chancellor in 1880, and in 1882 was created Viscount Wolmer of Blackmoor and Earl of Selborne. He was opposed to home rule for Ireland, and became a Liberal-Unionist. Selborne also wrote several works on hymns, and held at different times posts of honor in the universities, receiving also various honorary degrees.

PALMER, SAMUEL (1805-81). An English landscape painter, illustrator, and etcher. He was born at Newington, January 27, 1805. He first studied under an obscure artist named Wate, and then in the antique school of the British Museum; but his style was formed under the influence and advice of his father-in-law, John Grinnell, and William Blake. After sketching extensively in Wales and Devonshire, he went to Rome in 1837, remaining there two years. From this time he devoted himself mainly to water colors, becoming a full member of the Water Color Society in 1854. He also illustrated a number of works, the best of which were Milton's *Comus*, *L'Allegro*, and *Il Penseroso*. Palmer was the last of the ideal school of landscape painters, represented in England by Wilson, Turner, and others. His paintings, mostly aquarelles, are good in color and chiefly characterized by wealth of poetic feeling. Among the best are: "Dream on the Apennines" (1864); "Curfew" (1870); "The Waters Murmuring" (1877); "The Eastern Gate" (1881); "The Bellman" (1882); and the "Street of the Tombs, Pompeii" (1870), an oil painting. As an etcher he is placed in the first rank by Ruskin and Hamerton; he became a member of the Etchers' Club in 1853. His best plates include: "The Sleeping Shepherd," "The Skylark," and "The Rising Moon" (1857); "The Herdsman" (1865); "Morning of Life" (1872); "The Lonely Tower" (1880). Like his water colors, his etchings are highly finished and are marked by a subtle treatment of light. His literary proclivities are shown by his translation of Vergil's *Eclogues*, which he began to illustrate, but completed only one etching, "The Opening of the Fold," before his death, which occurred near Reigate, May 24, 1881. Consult: A. H. Palmer, *Samuel Palmer, Painter and Etcher* (London, 1891); Varley, *Samuel Palmer, Memoir* (ib., 1882).

PALMER, WALTER LAUNT (1854-). An American landscape painter. He was born at Albany, N. Y. He was a pupil of F. S. Church at Hudson, N. Y., in 1870-72, and of Carolus Duran in Paris. He became noted for his landscapes, especially winter scenes with snow effects, but also painted Venetian scenes. His chief works include: "Venice" (1882), in private possession, Lynn, Mass.; "January" (1887); "Autumn Morning" (1892); "Panorama of Venice," "Domes of La Salute," "End of a Winter Day," and "Under the Pines" (1896); "The Open Door" (1901). He was awarded the second Hallgarten prize at New York in 1887, and a gold medal at the World's Columbian Exhibition in 1893, and received honorable mention at Paris in 1900. He is a member of the National Academy, the Society of American Artists, and the American Water-Color Society.

PALMERÍN DE OLIVA, päl'má-rén' dā ò-lé'vā (Sp., Palmer of the Olive Tree). The first of a series of chivalrous romances written in the Spanish Peninsula in imitation of the earliest and most famous work of the kind, the *Amadis*, and likewise of great importance in the development of the modern novel. The *Palmerín de Oliva* is attributed to Francisco Vázquez, and seems to belong to about 1511. The series of *Palmerines* ended with the *Palmerín de Inglaterra* (c.1544) of the Portuguese Francisco de Moraes. Consult the English translations of

this latter romance by Anthony Munday, begun in 1589 and completed in 1595, and by Southey (1807). The earliest French *Palmerin* appeared at Lyons in 1553.

PALMERSTON, pām'er-ston, HENRY JOHN TEMPLE, Third Viscount (1784-1865). A celebrated English statesman. He was born in Hampshire, October 20, 1784, a descendant of an old and historic family. Receiving his early education at home under an Italian refugee and at Harrow, Palmerston studied later in the University of Edinburgh, under Dugald Stewart, in whose family he lived, and at Saint John's College, Cambridge, where he received his master's degree in 1806. His eminent abilities were early recognized, for he was scarcely of age when the Tory Party in the university selected him (1806) as their candidate to succeed Pitt. Twice unsuccessful, he entered Parliament for Newtown, which seat he held till 1811, when he was chosen at Cambridge and represented his *alma mater* for twenty years, only losing his seat when he became a member of the Grey Ministry and supported the Reform Bill. After a term for Bletchingley, and one for South Hampshire, he found a seat at Tiverton, in 1835, which he held till his death. In 1809 he accepted the office of Secretary at War in the Duke of Portland's Administration. This office he held during the governments of Perceval, Liverpool, Canning, Goderich, and Wellington—a period extending from 1809 to 1828. There was ample scope at the War Office for Palmerston's administrative talents and activity. The military system swarmed with abuses, and the labor thrown upon the Secretary at War during the peninsular campaign was prodigious. Palmerston early attached himself to the Canning section of the Liverpool Administration, and accepted a seat in the Cabinet of Canning. His official connection with the Tory Party ceased in 1828, when Wellington insisted on accepting Huskisson's resignation, which was followed by Palmerston's retirement. The Duke's Government was swept away in the reform flood of 1830, and Earl Grey, who became Prime Minister, offered the seals of the Foreign Office to Palmerston. The European horizon was so disturbed at this crisis that war seemed inevitable, but Palmerston brought about friendly relations with the new King of France, Louis-Philippe, and the two countries thus acting in reasonable harmony, the independence of Belgium was effected, and constitutional governments were established in Spain under Queen Isabella, and in Portugal under Queen Maria. In addition to the above questions Palmerston had to deal with Eastern problems. He supported Turkey against Russian aggression. Later (1840) he united with Russia against France to curb the rising power of Mehemet Ali, apparently fearing that French influence in Egypt might endanger England's communication with India. The Opium War of 1840-42 resulted in the opening of five Chinese ports to trade. In 1841 the Quintuple Treaty to suppress the African slave trade was negotiated, but failed, being opposed by Lewis Cass on account of the right of visitation clause. A strong foreign policy, a blunt and aggressive style, gave Palmerston during these years greater reputation abroad than in England. At home he favored free trade, labor laws, shorter hours, and factory acts.

In 1841 Palmerston went out of office with

the Whigs on the question of corn duties; but on their return in 1846 he resumed the seals of the Foreign Office. His second foreign administration furnished various subjects of hostile party criticism. A vote of censure on the foreign policy of the Government was carried in 1850 in the House of Lords on the motion of Lord Stanley (afterwards Earl of Derby). A counter-resolution, approving the foreign policy of the Government, was thereupon moved in the House of Commons. The debate lasted four nights. In December, 1851, however, Palmerston was dismissed from the Russell Cabinet. He had in an unofficial oral way expressed his approbation of the coup d'état of Louis Napoleon, without consulting either the Premier or the Queen; and, as explanations were refused, her Majesty exercised her right of dismissing her Minister. A few weeks later Palmerston avenged himself by bringing about the fall of the Russell Administration on a comparatively trifling question regarding the militia. He refused an offer from the Earl of Derby to join the Government which that statesman was commissioned to form, but accepted the post of Home Secretary in the coalition Administration of the Earl of Aberdeen in 1852. The fall of this Government, on account of the mismanagement in the Crimean War, placed Palmerston in the position of Prime Minister, to which he was unanimously called by the voice of the nation (February, 1855). He vigorously prosecuted the Russian war until Sebastopol was taken and peace was made. His Government was defeated in March, 1857, on Cobden's motion condemnatory of the Chinese war. Parliament was dissolved, and Palmerston met the House of Commons with a large majority. But his Administration fell in February, 1858, on account of the Conspiracy Bill, intended to protect foreign rulers against the machinations of plotting refugees. A short Conservative administration followed; but in June, 1859, Palmerston was again called to the post of First Lord of the Treasury and Premier, which he continued to fill up to his death. His sympathies were always with oppressed nationalities, so he favored Italian unity, and opposed the war of Prussia and Austria against Denmark in 1864. It was his ambition to be considered the minister of a nation rather than the minister of a political party; and his opponents were constrained to admit that he held office with more general acceptance than any English minister since the time of Chatham. As an orator, he was usually homely and unpretending, but always sensible and practical. He was a dexterous tactician, and a ready, witty, and often brilliant debater. He was popular as a minister, because he was thoroughly English in his ends and aims. He died without issue October 18, 1865. Lord Dalting (Sir Henry Bulwer) prepared the *Life of Palmerston to 1847*, in three volumes; this work was completed by Sir Evelyn Ashley in two additional volumes (London, 1870-76). Consult also: Ashley, *Life and Correspondence of Henry John Temple, Viscount Palmerston* (London, 1878); Sanders, *Life of Viscount Palmerston* (ib., 1888); Lorn, *Biography of Lord Palmerston* (New York, 1891); Francis, *Opinions and Policy of Viscount Palmerston* (London, 1852).

PALMETTE. A conventional ornament, so called because of its resemblance to a palm-leaf,

of which it is a conventionalized form. It was very generally used in Greek art, either carved or painted, upon friezes, columns, vases, cloths, etc. Since the Renaissance it has been frequently applied in modern decoration.

PALMETTO (from Sp. *palmito*, diminutive of *palma*, palm), *Sabal Palmetto*. A species of palm, a native of maritime parts of North America, from Florida to North Carolina, found farther north than any other American species of palm. It attains a height of 40 to 50 feet, and has a crown of large palmate leaves, the blade from one foot to five feet in length and breadth, and the footstalk long. The flowers are small, greenish, and in long racemes; the fruit black, about as long as a pea-pod, and inedible. The leaves are made into hats, mats, etc., and are also largely used for thatch. The terminal bud or cabbage is eaten. The wood is extremely porous, but is preferred to every other kind of wood in North America for wharves, as it is very durable, and not liable to be attacked by the teredo. A second American species, the saw palmetto (*Serenou serrulata*), occurs from South Carolina to Florida. It has a short stem and numerous clustered fan-shaped leaves. Its berries are reputed to have medicinal properties. A still smaller species is the dwarf palmetto (*Sabal Adansonii*), a stemless species which bears a cluster of leaves a foot or two long. (See CABBAGE PALM.) The *Chamerops humilis* of the south of Europe is also called palmetto, and the name is applied to other species.

PALMETTO STATE. South Carolina. See STATES, POPULAR NAMES OF.

PALMI, päl'mè. A town in the Province of Calabria, Italy, situated on the southwest coast, 21 miles northeast of Reggio by rail (Map: Italy, K 9). Near by rises Mount Elia, commanding a magnificent view, and surrounded by vineyards, and orange and olive groves. The harbor affords good fishing. Population (commune), in 1881, 11,082; in 1901, 13,297.

PALMIERI, päl'mè-à'rè, LUIGI (1807-96). An Italian physicist, born in Faicchio. He was appointed professor of physics at the University of Naples in 1847, and in 1854 became director of the meteorological and seismological observatory on the slope of Mount Vesuvius, whose eruptions and other phenomena he studied most carefully. He published a series of annals of this observatory (1869-73) and various studies in electricity, seismology, and volcanology. He was the inventor of a seismograph, an electrometer for the study of atmospheric electricity, and other meteorological instruments.

PALMIRA, päl-mè'rà. A town of the Province of Santa Clara, Cuba, 8 miles north of Cienfuegos, on the Cienfuegos-Santa Clara Railway. Palmira lies in the midst of a district producing largely sugar, corn, and tobacco. Its population, in 1899, was 4519.

PALMIRA, päl-mè'rà. The capital town of the province of the same name, in the Department of Cauca, Colombia, 160 miles southwest of Bogotá, and 7 miles from the right bank of the Cauca. It is situated on a spacious plain called Llanos de Malagana, famous as a rich agricultural district, and especially for the cultivation of a fine grade of tobacco. Stock-raising is also an important industry. It is a modern town,



OLD FAN PALMS (*Washingtonia Filifera*) AT PASADENA, CALIFORNIA



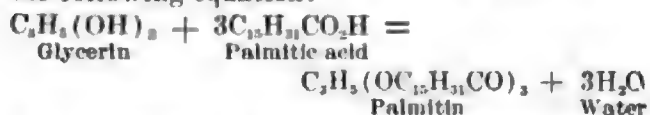
SABAL PALMETTO, FLORIDA

and now ranks as the second in the department, with a population of about 12,500.

PALMISTRY. See CHIBOMANCY.

PALMITIC ACID, $C_{15}H_{31}O_2$. One of the most important of the fatty acids. In a pure state, when crystallized from alcohol, it occurs in the form of beautifully white acicular crystals arranged in tuft-like groups. These crystals are devoid of odor or taste, communicate a fatty feeling to the finger, melt at 62° C., and solidify on cooling in the form of crystalline scales. The acid is lighter than water, in which it is insoluble; but it dissolves freely in boiling alcohol and in ether, and the solutions have a distinctly acid reaction. In small quantities it may be distilled without decomposing, if the heat be carefully regulated; and it may be distilled in any quantity under reduced pressure. The neutral palmitates of the alkalis constitute soaps, and are soluble in warm water; if, however, their solutions are largely diluted with cold water, they are decomposed, an insoluble acid salt being precipitated, while a half of the alkali remains in solution. The other most important compounds of palmitic acid are those which it forms with glycerin and with cetyl alcohol. With glycerin this acid forms three compounds, the most important of which is palmitin (q.v.). In combination with cetyl alcohol, whose composition is represented by the formula $C_{16}H_{33}OH$, it is the main constituent of spermaceti (q.v.), and as palmitate of melissyl it occurs in beeswax. The calcium salt of palmitic acid is found in adipocere, its sodium salt in blood and in serous fluids. Palmitic acid was first obtained from palm oil—hence its name. It may be obtained from oleic acid by fusing with caustic potash (see OLEIC ACID), but is now usually prepared either from Japan wax or myrtle wax.

PALMITIN, or TRI-PALMITIN. A white fat, usually occurring, when crystallized from ether, in the form of a mass of small scaly crystals, insoluble in water, but readily soluble in ether and in boiling alcohol. It is a constituent of almost every kind of fat, and is the preponderating ingredient in those of a semi-solid consistence, and in many oils. It receives its name from the abundance in which it occurs in palm oil, from which it may be readily obtained, and then purified by recrystallization from ether. The true melting-point of the pure substance is 61° C. (See STEARIN.) Chemically it is a compound formed by the union of one molecule of glycerin with three molecules of palmitic acid, three molecules of water being set free, according to the following equation:



It is saponified, or broken up into its constituents with formation of soap, by boiling with the caustic alkalis.

PALM OIL. An oil obtained from the fruit of several species of palm. When fresh it is of an orange tint, sweetish taste, and violet-like odor. It is of the consistency of butter, for which it is sometimes used, and, like butter, it easily becomes rancid. It is prepared by boiling the fruit in water. It is used in candle and soap making, and, on account of its pleasant odor, as a scent to toilet preparations.

PALM SUNDAY (Lat. *Dominica Palmarum*). The last Sunday of Lent, so called from the custom of blessing branches of the palm tree, or of other trees substituted in those countries in which palm cannot be procured, and of carrying the blessed branches in procession, in commemoration of the triumphal entry of Christ into Jerusalem (John xii.). The date of the origin of this custom is uncertain. Some special celebration of the day is described as early as 386, but the ceremony of blessing the branches can hardly be referred to an earlier date than the ninth, or possibly the eighth century. A procession is formed, the members of which issue from the church carrying branches in their hands, and singing the hymn of Venantius Fortunatus, "*Gloria, laus, et honor.*" In the Greek Church the book of the Gospels is borne in front. In some countries a priest, or occasionally a lay figure, was led at the head, mounted upon an ass, a usage which still exists in Spain and in Spanish America. Before their return to the church the doors have been closed, and certain strophes of the hymn are sung alternately by a choir within the church and by the procession without, when, on the sub-deacon's knocking at the door with the shaft of the processional cross, it is again thrown open, and the procession re-enters. During the singing of the passion in the solemn mass, which ensues, the congregation hold the palm branch in their hands, and at the conclusion of the service it is carried home to their respective houses, where it is preserved during the year. The ashes employed in the service of Ash Wednesday are made by burning the palms of the preceding year.

PALM-SWIFT. A bird. See SWIFT.

PALM-WEEVIL. See GRU-GRU.

PALMYRA (Lat., from Gk. *Παλμυρά*, translation of Heb. *Tadmōr*, Tadmor, from *tāmār*, palm-tree). The Greek Tadmor, connected by tradition with a city built by King Solomon (I. Kings ix. 18; II. Chron. viii. 4), an ancient city in an oasis of the Syrian desert, 150 miles north-east of Damascus (Map: Turkey in Asia, H 5). It owed its importance to two springs of water which produced luxurious vegetation. Being halfway between the Orontes and the Euphrates, it became, at an early date, a caravan station for the trade between the Mediterranean and the Tigris-Euphrates Valley. Its population was, therefore, always hybrid, though in the main Aramean. The city is first mentioned in B.C. 41 in connection with the wars of Antonius against the Parthians, when the Triumvir made an unsuccessful attempt to possess himself of its riches. At an early time it was reckoned as belonging to the Roman Empire, though retaining a large measure of independence. No Roman troops were stationed here, and Palmyra had to patrol the district between Damascus and the Euphrates with her own troops. In the wars of Trajan the city was almost destroyed, but was rebuilt by Hadrian (130) and called Hadrianopolis or Hadriana Palmyra. It was made a Roman colony under Caracalla (212), receiving the *Jus Italicum*. In the course of time a semi-independent monarchy was developed here. Originally it was governed by a senate, at the head of which was a senator. The first senator of whom we have mention was Hairan, son of Wahballat (222-235), who took the name of Septimius.

He was followed by his son Udainath (Odenathus), who in turn was followed by his son Hairan (Septimius Hairanes, died 255). He was followed by his brother Udainath II., who, though still called *Vir Consularis*, was made King of Palmyra and Viceroy of the Emperor for the East. After his death he was given the high-sounding title of 'King of Kings' (inscription of the year 271). The city itself was governed by another Palmyrene, Septimius Varodes, as procurator. Udainath took the part of Rome in her war against the Persian King Sapor; relieved Edessa, recovered Nisibis and Carrhæ (264), marched against Ctesiphon, drove out the Persians, expelled the Goths from Cappadocia, and marched into Emesa (266). He seems to have had Armenia, Cilicia, Cappadocia, Syria, and Arabia in his power. He was killed in the year 267. His son Wahballat (Athenodorus) was too young to rule, and the Prince's mother, Zenobia (in Palmyrene Bat-Zabbai), wielded the sceptre in his stead. She bore the title 'Queen of Palmyra and the East,' and she tried to free herself from Roman tutelage. Under her rule the Palmyrene realm reached its greatest extension. Her adviser and instructor in Greek was the Platonic philosopher Longinus. She defeated the Roman army under Heraclianus, and attempted to add Egypt to her dominions, sending thither Zabdas with an army of 70,000 men. Though he occupied Alexandria for a time, he was driven out of Egypt (270) by Probus, the general of Aurelian. The Emperor himself marched against her in 272, and being only weakly supported by the Parthian Varahran, she was defeated in Syria, and Palmyra was besieged. Zenobia escaped to the Euphrates, but was captured and graced the triumph of the conqueror in 274. While Aurelian was on his way home the Palmyrenes rose, appointed a certain Antiochus their ruler, and massacred the Roman garrison. Aurelian turned back and destroyed the city (273), taking the most beautiful spoils of the Temple to Rome. The city now lost its chief importance as a trade centre, the caravans being sent via Bosra and Ctesiphon. An attempt was made by Diocletian (284-305) to rebuild the city. It was the seat of the first Illyrian regiment, and later became also the seat of a Christian bishopric. Justinian rebuilt the churches and the public buildings and placed a garrison there. The city, however, continued to decline. It was taken by the Arabs under Khalid in 634, destroyed again in 744, severely injured by an earthquake in 1157, and plundered by the Tatars under Tamerlane in 1401. Toward the end of the sixteenth century the Druse chieftain Man Oghlu fortified it; but the fortifications were destroyed by the Turks in the seventeenth century. Since then the place has been occupied by the Aneze Bedouins. The modern city is a miserable conglomeration of Bedouin huts, containing about 1500 souls.

Palmyra was an Aramean city, thickly overlaid with Greek culture. Its municipality was patterned after those of the other Greek cities in the Roman Empire. Its officials had Greek titles. With the district around it, it formed a separate tariff union, the customs being collected by the community itself. The tariff of duties, engraved on stone, found in 1882, is in Palmyrene and Greek. The caravans formed regular associations, the leaders of which were the promi-

nent and influential men of the place. There were also guilds of goldsmiths and silversmiths. Remains of a Jewish synagogue were found there by Euting in 1883, and Mitwoch in 1899. The ruins of Palmyra were discovered by Huntington in 1678 and were visited by Wood and Dawkins in 1751. Since then many travelers have described these ruins and have given an idea of the beauty and stateliness of this city in the desert at the time of its grandeur. The great temple of Baal had a colonnade of 390 columns of the Corinthian order. It was surrounded by walls 50 feet high. There must have been numerous other shrines, as the Palmyrene pantheon was quite extensive. The walls of Justinian still remain, as well as the ruins of the aqueduct and many beautifully carved commemorative towers. The Palmyrene language belonged to the western branch of the Aramaic family. The script is a development of the Aramaic branch of Semitic writing and is the direct parent of the square Hebrew. A large number of grave inscriptions have been found, not only in Palmyra itself, but also in Rome, Africa, and Britain, the latter set up by soldiers of Roman legions at one time quartered in Palmyra. Most of the grave inscriptions are accompanied by reliefs of the dead persons, most beautifully executed. The inscriptions are often bilingual and two have been found in Dacia only in Latin. Other inscriptions have been found engraved upon clay medallions, which evidently served as talismans. Consult: Mommsen, *Römische Geschichte*, vol. v., ch. ix. (3d ed., Berlin, 1886); Von Oppenheim, *Vom Mittelmeer zum Persischen Golf*, vol. i., ch. viii. (Berlin, 1899); Wright, *An Account of Palmyra and Zenobia* (New York, 1895); Abamelek-Lasarew, *Archäologische Untersuchungen* (Saint Petersburg, 1885); De Vogüé, *Inscriptions semitiques* (Paris, 1869); Sallet, *Die Fürsten von Palmyra* (Berlin, 1866); Moritz, *Zur antiken Topographie der Palmyrene* (Berlin, 1889).

PALMYRA. A city and the county-seat of Marion County, Mo., 16 miles southwest of Quincy, Ill., on branches of the Chicago, Burlington and Quincy Railroad (Map: Missouri, E 2). It has Centenary Academy, a fine courthouse, fair grounds, and a 'Big Spring.' The industries are represented by flour and grist mills, a creamery, a pickle factory, and a carriage and wagon factory. Settled in 1818. Palmyra was laid out in the following year, and incorporated in 1855. Population, in 1890, 2515; in 1900, 2323.

PALMYRA PALM (named from the city of Palmyra in Syria), *Borassus flabellifer*. A species of palm with a magnificent crown of fan-shaped leaves. It occurs throughout India and the Archipelago, and in tropical West Africa. The stem attains a height of 20 to 100 feet, and tapers slightly upward. The leaves are about 4 feet long, with spiny-edged stalks of about the same length, each leaf having 70-80 rays. The fruit is somewhat triangular, about the size of a child's head, having a thick, fibrous, and rather succulent yellowish-brown or glossy black rind, and containing three seeds each as large as a goose's egg. The Palmyra palm is the most common palm of India, growing spontaneously in many districts, cultivated in others, and reaching as far north at latitude 30°. It is one of the most valuable palms known, more

than 800 uses having been enumerated for its different parts. It is of slow growth, and the wood near the circumference of the stem in old trees is very hard, black, heavy, durable, susceptible to a high polish, and valuable, easily divided in a longitudinal direction, but very difficult to cut across. The Palmyra palm abounds greatly in the north of Ceylon, forming extensive forests; and the timber is exported to the opposite coast of India, being of superior quality to that which is produced there. It is much used in house-building. The stalks of the leaves are used for making fences, etc. The leaves are used for thatching houses; for making baskets, mats, hats, umbrellas, and large fans; and for writing upon. Their fibres are employed for making twine and small rope. A fine down found at the base of the leafstalks is used for straining liquids and for stanching wounds. The Palmyra palm yields palm wine, arrack, and sugar (*jaggery*) of India. (See ARRACK.) The fruit is cooked in a great variety of ways, and used for food. The seeds are jelly-like, and palatable when young. A bland fixed oil is extracted from the fruit. The young plants, when a few inches high, are esteemed as a culinary vegetable, being boiled and eaten generally with a little of the kernel of the cocoanut; and sometimes they are dried and pounded into a kind of meal. Multitudes of the inhabitants of the north of Ceylon depend almost entirely on the Palmyra palm to supply their wants. In the 'Palmyra regions' of the southern Deccan vast numbers of the people subsist chiefly on the fruit of this palm.

The Deleb palm, so important to the inhabitants of Central Africa, formerly considered as a distinct species, is now believed to be the same as the Palmyra palm.

PALMYRA WOOD. Properly this name applies only to the wood of the Palmyra palm (*Borassus flabellifer*), but it is generally used for all kinds of palm-tree wood upon the market, of which very much is the wood of the cocoanut palm (*Cocos nucifera*) and the allied species *Cocos plumosa*. These woods are also called speckled wood and porcupine wood by the dealers, the former name being applied to those veneers cut transversely, and showing the ends of numerous black fibres mixed with the lighter colored portions, and the latter to longitudinal sections, in which the mixed black and white fibres much resemble porcupines' quills.

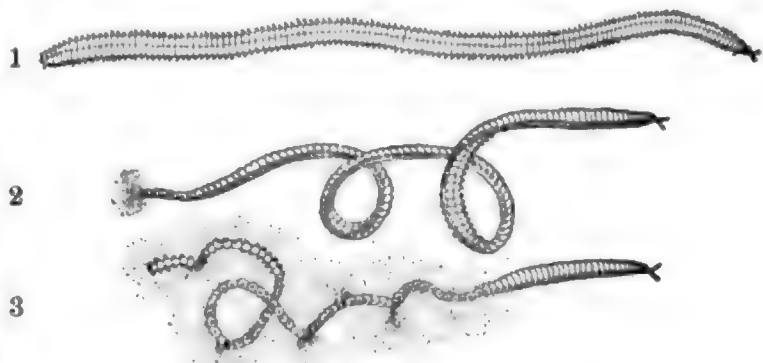
PALO, pā'lō. A town of Leyte, Philippines, situated on the northeast coast, six miles south of Tacloban (Map: Philippine Islands, K 8). Population, 17,736.

PALO ALTO, pā'lō al'tō. A town in Santa Clara County, Cal., 33 miles southeast of San Francisco, on the Coast Division of the Southern Pacific Railroad (Map: California, B 3). It has a beautiful location and healthful climate, and is the seat of Leland Stanford Junior University (q.v.), and of a large Roman Catholic theological seminary. There are municipal water-works and a municipal electric-light plant. Palo Alto was settled in 1890-91, and was incorporated in 1894. Population, in 1900, 1658.

PALO ALTO. A place in southern Texas, 8 miles northeast of Brownsville (q.v.), where on May 8, 1846, the first important battle in the war between Mexico and the United States was fought, 2300 Americans under General Taylor defeating about 6000 Mexicans under General Arista. It was essentially an artillery battle, though the Mexicans made a futile cavalry charge late in the day. Early on the following day General Arista retreated, and took up a strong position at Resaca de la Palma (q.v.), where he was again defeated. The Americans lost at Palo Alto 4 killed, 127 wounded; the Mexicans, according to the official report of General Arista, 102 killed, 127 wounded, and many more missing. Consult: Bancroft, *History of Mexico*, vol. v. (San Francisco, 1885); and Howard, *General Taylor* (New York, 1892), in the "Great Commanders Series." See MEXICAN WAR.

PALO DEL COLLE, dël kō'lā. A town in the Province of Bari delle Puglie, Italy, 12 miles southwest of Bari. It is in a fruit-growing region, and carries on a trade in wine and cattle. Population (commune), in 1881, 10,278; in 1901, 12,851.

PALOLO (pā-lō'lō) WORM (Samoan name, Fijian *mbalolo bololo*). One of the annelid worms (*Eunice viridis*) allied to *Nereis*, which on a certain night in November appears in immense numbers at the surface of the shores of the Samoan and Fiji islands. It is then collected as food by the natives and considered a great delicacy. In this worm the sexual or hinder part of the body (epitoke), when the eggs or sperm are ripe, separates from the rest of the body and swims to the surface, where the reproductive elements are discharged, after which the worm collapses and dies. The swarming of this singular worm has been observed by A. Agassiz, at Bololo Point, Fiji Islands. On his arrival, before



1, Palolo worm, the anterior end of the body at the right; 2, the same discharging the sexual products in the water from broken front end of body; 3, the same breaking into pieces and discharging the sexual products from the rents. (After Mayer.)

daylight, his guide fished up a few of the worms, and soon the water was full of them, both males and females, and men and women were catching them in all kinds of utensils. Their activity was wonderful, and the bursting of the animal when reproduction was over was most peculiar.

The Atlantic palolo worm (*Eunice fucata*) is abundant at the dry Tortugas, Fla., near Porto Rico, and probably it will be found to be widely distributed. The animal commonly lies coiled upon itself within its burrow, and very often another worm (*Polynoe granulata*) is found sharing the same burrow. The worm does not

live in new and compact coral rock, or in coquina of recent formation, but abounds in that which is disintegrating and has become infested with *Pholas* shells, other worms, crustacea, etc. The burrow of the palolo always opens outward at the surface of the rock, although as far as is known the worm never leaves its burrow permanently until the time of the breeding-swarm. The Atlantic palolo swarms within three days of the time of the moon's last quarter, between June 29th and July 28th. When the swarm occurs the hinder end of the worm crawls out backward from the burrow, and attempts to swim away from the anterior, non-sexual part, which remains within the burrow. A constriction appears, allowing the sexual portion to break away from the anterior part of the worm; and immediately the posterior end darts upward to the surface, upon reaching which it continues to swim hind end foremost very near to the surface of the ocean. The worms move in all directions and begin to discharge sperm or eggs through their genital outlets (nephropores), but the least stimulus, such as being lifted from the water, or the current from the stroke of an oar, will cause them to contract violently, often breaking themselves into fragments and casting the sexual products out through rents in the skin. This normally occurs as soon as the first rays of the sun fall upon the water, and in a few minutes after sunrise all the worms will have completely freed themselves of genital products, so that the ocean becomes milky with the vast quantity of sperm and eggs. Two or three hours after sunrise no worms remain to be seen. In a dense swarm there may be on an average about one worm per square foot over wide areas of the sea, commonest where the water is about six fathoms in depth. Great numbers of the worms are devoured by fishes as they sink, although they are not attacked to any great extent while on the surface. When set free the sexual ends swim vertically upward with such rapidity that they run little risk of capture, and this habit must be a great advantage to the worm. If the swimming worm be broken into fragments each piece continues to swim backward in a normal manner, showing that the reaction is not controlled by any one ganglion, or localized group of ganglia, but that the whole sexual end of the worm is affected by the stimulus which causes the breeding-swarm.

PALOMINO DE CASTRO Y VELASCO, pāl'lo-mē'nō dā kā'strō é vā-lī'skō, ACISLO ANTONIO (1653-1726). A Spanish painter and author, born at Bujalance. He studied under Valdés Leal and Alfaro at Cordova. Afterwards he was associated with Claudio Coello at Madrid, and became Court painter in 1688. He executed a number of large frescoes at Valencia, Salamanca, Granada, and Madrid, which are clearly designed. He wrote *El museo pictórico y escala óptica* (1715-24), which contains a history of art and a biographical dictionary from Antonio del Rincon to his own time. It furnished much of the material for the later work of Cean-Bermudez.

PALOS, pāl'los, or **PALOS DE LA FRONTERA**. A small town on the southwest coast of Spain in the Province of Huelva, near the mouth of the Rio Tinto (Map: Spain, B 4). It was formerly an important port, and from here Columbus set

sail with his three caravels on August 3, 1492, on the voyage which resulted in the discovery of America. Population, in 1900, 1619.

PALPITATION (Lat. *palpitatio*, from *palpitare*, to throb, frequentative of *palpare*, to feel, move quickly). The term used to signify inordinately forcible pulsations of the heart, so as to make themselves felt, and frequently to give rise to a most troublesome and disagreeable sensation. It may be either functional or a symptom of organic disease of the heart. Although it may be persistent, it far more frequently comes on in paroxysms, which usually terminate within half an hour, recurring afterwards quite irregularly, sometimes daily or several times a day, and sometimes not till after a long interval. The attack often comes on under some mental or physical excitement, but sometimes when the patient is quite composed, or even asleep. If the paroxysm is a severe one, the heart feels as if bounding upward into the throat; and there is a sensation of oppression over the cardiac region, with hurried or even difficult respiration, and even nausea. In milder attacks there is simply a consciousness of sinking or fluttering of the heart.

Palpitation is due to many different causes. It is more common in women than in men, and is apt to occur especially at puberty, the menstrual periods, and the menopause. An anæmic condition of the blood is a frequent cause. Palpitation is present in unstable states of the nervous system, such as occur in neurasthenia, hysteria, worry, anxiety, and excitement. The excessive use of tea, coffee, alcohol, and tobacco predisposes to cardiac irregularities. Perhaps the most frequent cause is a flatulent and distended stomach, acting both reflexly and directly. Palpitation is a symptom of exophthalmic goitre, and lastly it is a concomitant of organic disease of the heart itself. Either hypertrophy or degeneration of the cardiac muscle may produce it as well as affections of the valves.

The treatment of palpitation naturally depends on the causation. When the stomach is at fault, dietetic errors will need to be corrected. Tea, coffee, alcohol, and tobacco should be interdicted, since they not only affect the nerves, but hurt the digestion. Anæmia calls for iron, and neurotic conditions for sedatives such as the bromides, valerian, and camphor. When the cardiac muscle is diseased and palpitation is an expression of weakened power, digitalis, strychnine, and other cardiac stimulants must be given. During the paroxysms, relief may be had from the diffusible stimulants, as ammonia, in the form of the aromatic spirit.

PALSGRAVE, pāl'z'grāv, JOHN (c.1490-1554). An English grammarian, chaplain to Henry VIII. He was born in London, studied at Corpus Christi, Cambridge, and at the University of Paris, and taught French to Henry's sister, the Princess Mary, whom he accompanied to Paris on her marriage to Louis XII. Thanks to her favor, he was rapidly advanced in ecclesiastical honors. About 1517, as we know from the testimony of Sir Thomas More and of Erasmus, Palsgrave studied at Louvain, and, eight years after, he was appointed tutor to the Duke of Richmond, a natural son of Henry VIII. Palsgrave is known now as the author of one of the earliest French grammars for English use,

Lesclarcissement de la langue Francoyse (1530), a work which still has value as a treasury of idiomatic English of this unliterary period. It is very rare and was reprinted in France in 1852. Palsgrave translated into English Fullonius's Latin comedy *Acolastus* (1540).

PALSY. See PARALYSIS; PARALYSIS AGITANS.

PALTOCK, pāl'tōk, ROBERT (1697-1767). An English author, born in London. He was educated at Saint Paul's School, studied law, and always lived in London. His fantastic romance, *The Life and Adventures of Peter Wilkins, a Cornish Man*, which probably appeared first in 1750, was published anonymously, and the author was not known for several years. He also wrote an inferior work, *Memoirs of the Life of Parnese* (1751).

PALUDAN-MÜLLER, pāl'ly-dān mū'lēr, FREDERIK (1809-76). A Danish poet, born at Kjersteminde. He entered the University of Copenhagen in 1828, studied law there, and afterwards traveled abroad. As early as 1831 he became known through some of his poems. A year afterwards his play *Kjaertlighed ved Hoffet* ("Love at Court") was successful, and the Byronic *Danserinden* (1833) and the lyric drama *Amor og Psyche* (1834) established his reputation. But his most important work is *Adam Homo* (1841-48), a novel in verse. His other writings include: *Abels Død*, *Dryadens Bryllup*, *Benedikt fra Nursia*, *Paradiset*, *Ahasverus*, *Kalanus* (1861), a notable poem on the life of the Indian sage, and *Adonis* (1874), a romance, also in verse. His *Poetiske Skrifter* were published in 1878-79. His two prose works, *Ungdomskilden* ("The Fountain of Youth," 1865) and *Ivar Lykkes Historie* (1866-73), are among his most characteristic productions, although it is as a poet that he is best known.

PALUDISM. See MALARIA AND MALARIAL FEVER.

PALUS, pāl'loo. A tribe of Shahaptian stock (q.v.) occupying the country about Palouse River and the adjacent portion of Snake River in southeastern Washington. They are closely connected with the Nez Percé and Yakima, but, although mentioned as parties to the treaty made with the latter tribe in 1855, they have never come upon a reservation or recognized any treaty limitations, but still continue a wandering existence within their ancient territory. They retain most of their primitive characteristics and adhere to the religion of Smohalla (q.v.). They are supposed to number from 400 to 500.

PALY. A term in heraldry (q.v.).

PAMEKASAN. The capital of the island of Madura (q.v.).

PAMELA, OR VIRTUE REWARDED. A novel by Samuel Richardson (1740). Begun as a series of letters for the use of the illiterate, it grew into the story of a maid-servant dishonorably pursued by her mistress's son, who, after her withstanding his advances, finally married her. With all its defects, it is of interest as marking the starting point of the modern novel.

PAMIERS, pām'yā'. The capital of an arrondissement and an episcopal see in the Department of Ariège, France, on the Ariège, 40

miles south of Toulouse (Map: France, H 8). It has an ancient cathedral of mixed architecture, a communal college, a seminary, and a large hospital. It manufactures hardware, woollens, paper, and flour; has iron foundries and saw mills, and a trade in corn and wine. Population, in 1901, 10,886.

PAMIR, pām-ēr', or THE PAMIRS (Pers. *Bām-i-dunyā*, Roof of the World). An elevated mountain region in Central Asia, forming in greater part the southeastern corner of Russian Turkestan, and bounded by Chinese or East Turkestan on the east and Bokhara and Afghanistan on the west, while on the south a narrow projection of Afghanistan separates it from the extreme north-western part of British India (Map: Asia, G 5). It stretches in either direction about 170 miles, and its area is estimated at 36,000 square miles. Along its eastern boundary runs the short but lofty Sarikol Range, which is the nucleus from which the four great mountain systems of Central Asia radiate, the Hindu Kush toward the west, the Himalayas to the south-east, the Kuen-lun to the east, and the Tian Shan to the northeast. The culminating point of the Sarikol is the Mustagh-ata, 25,790 feet (or 24,400 feet, according to most recent measurements) above the sea. Westward the Sarikol sends out a number of parallel spurs or cross ranges dividing the country into level-floored valleys four or five miles broad. These valleys, which are known as Pamirs and form the characteristic feature of the country, lie from 10,000 to 14,000 feet above sea level. They differ in formation from the Tibetan Plateau, and seem to have been originally deep river-gorges which have been filled with detritus from the mountain sides. They are watered by the headstreams of the Oxus, and contain a number of beautiful lakes. The climate is very severe, cold and stormy; the mountains are always, and the valleys for more than half of the year, covered with snow. The country is treeless, but the valley floors are covered with grass which yields rich pasture in summer.

Though there is a considerable population in the extreme western valleys, the population of Pamir proper, or Russian Pamir, is very sparse, consisting only of a few hundred nomadic Kirghiz seeking the pastures during summer. The great plateau of Pamir was formerly regarded as the place of dispersion, if not of origin of the Aryan or Indo-European peoples. Its ethnological importance is lessened by the fact that the best opinion among investigators of Aryan prehistory to-day fixes the seat of this great branch of the white race in some part of Northern or Eastern Europe. The Pamirian region is, however, interesting from the fact that about it cluster Aryan peoples of a rather primitive sort, the remnants, in all probability, of the Aryan invasion of Asia and the representatives of a comparatively undeveloped Aryan character. Eastward of the Pamir was also the primitive home of the Chinese, while north of it lay the region of development of the Tatar or Turkic peoples. South of it various Aryan tribes have lived and wandered for ages. Here naturally, as languages, religions, customs, and habits show, considerable intermingling of races has taken place.

Considerable interest has been centred around

Pamir owing to its frontier position between Russian and British possessions, and during the last three decades of the nineteenth century it was probably more thoroughly explored than any other part of Central Asia. Great Britain desired in 1891 to have the region portioned between Afghanistan and China, but in the same year Russia sent an official expedition into the country in order to substantiate its claims. In 1895 the boundaries were defined as outlined above by a treaty between Russia and Great Britain. Russia has established a fortified outpost, Pamirsky Post, on the Murghab River. Consult: Bonvalot, *Through the Heart of Asia* (London, 1889); Geiger, *Die Pamirgebiete* (Vienna, 1887); Dunmore, *The Pamirs* (London, 1893); Cobbold, *Innermost Asia* (New York, 1900).

PAMLICO (pām'lē-kō) **SOUND**. The largest of the numerous sea-lagoons which line the eastern coasts of the United States. It stretches along the coast of North Carolina from Roanoke Island 80 miles southward, and has an average width of 20 miles (Map: North Carolina, F 2). It is separated from the Atlantic Ocean by long, narrow sand bars or beaches, which run out into an angle known as Cape Hatteras, and which are broken by the Ocracoke and Hatteras Inlets. The depth along the centre of the sound ranges from 10 feet in the north to 20 feet in the south, but on either side are large areas of shallow water, and the inner shores are lined with marshes. The Neuse and Pamlico rivers enter the sound through large estuaries, and north of Roanoke Island the Pamlico connects with the Albemarle Sound (q.v.). The fisheries on the Pamlico are important, and large numbers of wild fowl frequent its waters.

PAMMARI, pām-mā'rē. An Indian tribe of Brazil. See PURUPURU.

PAMPA, pām'pā, LA. A territory of Argentina, bounded on the north by the provinces of Mendoza, San Luis, and Córdoba; on the east by Buenos Ayres; on the south by the Territory of Rio Negro; and on the west by the Territory of Neuquén and the Province of Mendoza (Map: Argentina, D 11). Its estimated area is 56,320 square miles. Its territory belongs almost wholly to the pampas region, with some hills and woodlands in the northwest, and médanos (shifting sand hills) in other portions. The Rio Colorado forms its southern boundary with an affluent, the Curaco, wholly within its territory. There are many lagoons and small lakes, into the largest of which flows the Rio Salado. Since the Indians were driven out in 1879 the country has been occupied by sheep and cattle ranches. The capital of the territory is General Acha (population about 2000), which has railway communication with the coast. The population of the territory, in 1895, was 25,914; in 1900 (estimated), 46,662.

PAMPANGA, pām-pān'gā. A province of Central Luzon, Philippines. It is situated north of Manila Bay, and bounded on the north by the Province of Tárlac, on the east by Bulacán, and on the west by Zambales (Map: Luzon, D 6). Its area is 2209 square miles. It is mountainous in the west, but the eastern and southern portions are taken up by a part of the low and marshy delta of the Rio Grande de la Pampanga. Agriculture is extensively carried on, yielding rice, sugar-cane, sweet potatoes, tobacco, and

cotton. Industries are also well developed; just before the Spanish-American War there were over 12,000 looms and 177 steam sugar mills in operation. The population of the province in 1901 was 223,922, chiefly of the Pampango race. The capital is Bacolor (q.v.).

PAMPANGA, RIO GRANDE DE LA. The second largest river of Luzon, Philippines, draining the greater part of the large central plain between Manila Bay and the Gulf of Lingayén (Map: Luzon, E 5). It rises on the Caraballo Sur and flows southward through the provinces of Nueva Ecija and Pampanga, emptying into Manila Bay through the numerous ramifications of a large, marshy delta. It is about 125 miles long, and receives several large and innumerable small tributaries. In the rainy season its inundations cover large extents of territory, which are converted into excellent rice fields.

PAMPANGA. A group of tribes in Central Luzon speaking a Malay language and having at the conquest by Spain their own culture and mode of writing. See PHILIPPINE ISLANDS.

PAMPAS, pām'páz (Sp., Port. *pampa*, from South American Indian *pampa*, Quichua *bamba*, *banba*, plain). The designation of certain plains in South America. In Peru the name is applied to the forested region along the Ucayali River and also to the dry lake basins on the Andean Plateau. The more common signification of the term, however, refers to the immense grassy plains which occupy the central part of Argentina between the Rio Salado on the north and the Rio Negro on the south and which merge into the forested region of the Gran Chaco and the steppes of Patagonia. The pampas comprise an area of about 250,000 square miles, with a flat or gently undulating surface sloping toward the southeast and south. On their western border the elevation ranges from 1000 to 1300 feet above the sea, while along the Atlantic it is generally less than 100 feet. The soil is mostly clay of Quaternary and Tertiary age. During the wet season a luxuriant growth of grasses covers the plains, affording pasturage to great herds of cattle and flocks of sheep. A portion of the region along the Paraná is adapted to agriculture, and there are smaller areas of arable land in the interior. In the northern and western parts the surface is often broken by deep ravines or barrancas and by shallow depressions which are filled with brackish water during a part of the year. Strips of sandy, arid land are known as *travesas*. The inhabitants comprise the half-wild gauchos of mixed Spanish and Indian blood, who are chiefly occupied in hunting and grazing, and European immigrants. See ARGENTINA.

PAMPAS CAT. A robust, yellowish-gray wild cat, of the Argentine pampas and La Plata Valley. It is striped with straw-colored bands running obliquely backward across the flanks, and horizontally on the chest and legs. It has an exceedingly short head, and only two pre-molar teeth in the upper jaw. Other names are 'grass-cat' and 'straw-cat.' Hudson (*Naturalist in La Plata*, London, 1892) speaks of it as one of the most characteristic animals of the pampas; and Mivart notes the resemblance between it and Pallas's cat (*Felis manul*) of the steppes of Russia.

PAMPAS DEER. A small deer of Argentina (*Cervus campestris*), locally called 'guazuti.'

whose antlers are marked by the development of the forked posterior tine, and a consequent stunting of the unbranched front tine, giving three points to each antler. See Plate of FALLOW DEER, MUSK, ETC.

PAMPAS DEL SACRAMENTO, dël säk'ra-män'tò. An extensive plateau region in North-eastern Peru between the Huallaga and Ucayali rivers. It consists largely of open savanna country, and was settled by Jesuit missionaries in the middle of the eighteenth century, but is now almost uninhabited.

PAMPAS GRASS (*Gynerium argenteum*). A grass common in Brazil and Argentina, usually along watercourses, and not, as formerly stated, upon the pampas or vast plains of South America. It has been introduced into various countries as an ornamental plant. It is quite hardy in England, but requires protection in winter as far north as New York. Its tufts have a splendid appearance. The leaves are six to eight feet long, the ends hanging gracefully; the flowering stems 10 to 14 feet high; the panicles of flowers silvery white, and from 18 inches to 2 feet long. The herbage is too coarse to be of any agricultural value. The male and female flowers are on separate plants, in panicles, the paleæ of the female florets elongated, awn-shaped, and woolly. The pampas grass is grown commercially in California, where it was introduced about 1880. Another Brazilian species of the same genus, uva grass (*Gynerium saccharoides*), yields a considerable quantity of sugar. Stapf, in a monograph of this genus, published in the *Gardener's Chronicle* for 1897, separates the genus, placing the pampas grass in the genus *Cortaderia*, and leaves *Gynerium saccharoides*, or uva grass, as the only representative of *Gynerium*. For illustration, see GRASSES.

PAMPELUNA, pä'm'pä-löo'nä. A city of Spain. See PAMPLONA.

PAMPHILUS (Lat., from Gk. Πάμφιλος). A Greek painter of the early fourth century B.C. He was a native of Amphipolis, but studied and lived at Sicyon, where he succeeded his master, Eupompos, as the head of the Sicyonian school. Of his works we hear of a "Battle at Phlius," painted for the Athenians, "Odysseus on the Raft," and apparently of a "Cognatio" or "Relationship," which may have been a family group, though the text of Pliny is probably corrupt at this point. It is possible also that Aristophanes refers to a painting by him of the Heraclidæ as suppliants at Athens. He was noted for his thorough technical knowledge, insisting that arithmetic and geometry were necessary to the painter, thus performing for painting a service similar to that which the Canon of Polyclitus did for sculpture. Through his influence, we are told, drawing was introduced into the schools as part of the education of free-born boys. This scientific training always characterized the Sicyonian school, and was emphasized by the great pupils of Pamphilus, Apelles and Melanthius.

PAMPHILUS (?-309). A Christian teacher and writer of the fourth century. He belonged to a good family of Berytus (Beirut), Syria, studied under Pierius of Alexandria, and spent most of his life as a priest at Cesaræa in Palestine, where he founded a Christian school and estab-

lished a valuable and celebrated ecclesiastical library. He multiplied copies of the Scriptures and gave liberally to the poor. He was an admirer of Origen and teacher of Eusebius, who took the name of Eusebius Pamphili. With Eusebius he prepared an edition of the *Septuagint* from the text in Origen's *Hexapla*, which was generally used in the Eastern Church. During the persecution of the Christians under Maximinus he was imprisoned (307-309) and employed himself in writing an apology for Origen in five books, to which Eusebius added a sixth. All of the work has perished and our knowledge of it depends upon the untrustworthy Latin translation by Rufinus of Book I. and Photius's summary. Pamphilus died a martyr in 309. Consult his literary remains in Migne, *Patrol. Græca*, x., xvii.

PAMPHLET (of uncertain etymology). A small book, whether stitched or bound, with or without covers, written to provoke discussion on some topic of current interest. On its first appearance among English writers, the word seems to have been used to designate any booklet, whatever its aim. It was so employed by Richard of Bury (died 1345), in his *Philobiblon*, a Latin hand-book to his library at Durham College; and by Caxton in his *Encycdas* (1490), where printed matter is classed as 'paundlettis and bookys.' Sometimes single pieces of verse in manuscript or in print were also called pamphlets by the poets of the fifteenth century. But since the Reformation, when pamphlets began to be employed in controversy, they have come to stand mainly for a class of writings that deal with questions of the day, in politics, religion, and literature. They are thus to be differentiated from academic theses and dissertations and from all other short scientific treatises written with a calm didactic aim. Besides being brief, pamphlets are spirited in style and often vehement and angry in tone. The sober pamphlet is represented by Sidney's *Apology for Poetry*, and the vehement by Milton's *Tenure of Kings and Magistrates*. Both are pamphlets by virtue of their controversial aims.

A history of English pamphlets would fall little short of a history of English institutions from the establishment of the House of Tudor to the death of George III. In them as nowhere else is to be found the story of the fierce controversies whereby Protestantism won against the Roman Catholic Church, and whereby the English people wrested from their kings their social and political rights. Several hot debates have also marked the course of our literature. Somewhat earlier than the date here assigned, the pamphleteer was abroad. Wielik, for example, circulated among the people little sheets copied by the poor priests, in which an appeal was made against the abuses of the professional clergy and against the current authority in religion. Of these tracts the *Septem Hereses* is perhaps the most famous. The beginning of the Reformation in England has been ascribed, of course with exaggeration, to the *Supplication of Beggars* (1529) of Simon Fish, copies of which were strewn abroad in the streets of London, apparently with the connivance of Henry VIII. As no other pamphlet had yet done, it hit the public view concerning "the ravenous wolves going in shepherds' clothing and devouring the

flock." With little effect Sir Thomas More replied to Fish in the *Supplicacyon of Soulia*. This incident is but an example of what was taking place everywhere throughout the Reformation period. Erasmus, Luther, and Melancthon were all pamphleteers. The Anglican Church was no sooner established than it was attacked by the Puritans, for example, by Thomas Cartwright in an *Admonition to Parliament* (1572). Then followed the Martin Mar-Prelate controversy (q.v.), the most heated religious dispute in the reign of Elizabeth. At this time, too, were debated, in stitched sheets of varying length, questions in literature, especially the essence and form of poetry, and the principles underlying the drama. In these discussions some of the great Elizabethans bore a hand, like Campion, Daniel, and Sidney.

Numerous as were the pamphlets in the Elizabethan age, they were but a sign of the deluge that was to come during the great Civil War, when the passions of sects and factions ran high. Prynne alone, it is estimated, was the author of nearly two hundred pamphlets, of which may be cited *A Looking Glass for All Lordly Prelates*. If he was the most prolific of all the Puritan pamphleteers, it must be remembered that he was only one among hundreds. Indeed, on both the Puritan and Royalist sides the news-letters which were issued in all the larger towns were little more than controversial pamphlets. Milton dropped his poetry and entered the lists on a variety of questions, discussing in turn education, divorce, the press, and the right to put to death kings and magistrates. Substantial as are Milton's tractates, as he sometimes called them, he was surpassed in brevity and directness by Col. Edward Sexby in *Killing No Murder* (1657), addressed to 'His Highness, Oliver Cromwell,' and containing the memorable sentence: "Let this consideration arm and fortify your Highness's mind against the fears of death, and the terrors of your evil conscience, that the good you will do by your death will something balance the evils of your life."

After the Restoration (1660), freedom to print was strongly repressed by the Government, and pamphlets had to be printed and circulated privately. Still, one should not forget *A Rough Draft of a New Model at Sea* (passed about in manuscript during 1667), in which George Savile, Marquis of Halifax, attacked the scandalous behavior of the navy in the war with the Dutch; nor the protests of the Quaker George Fox against the formalism of the established Church; nor the virulent debate between Samuel Parker and Andrew Marvell on the relation of Church and State. Much of the literature of the time, as Dryden's essays and satires, was also controversial in tone and was issued in pamphlet form.

Dr. Johnson was probably right in describing the reign of Queen Anne as *par excellence* the age of pamphlets. The Revolution of 1688 had transferred political power to the House of Commons; two great parties, Whig and Tory, had come into existence, depending for the retention of office upon the people; and by the lapse of the licensing act in 1695, the press had become practically free. As the newspaper had not yet become thoroughly organized, the pamphleteer was a necessity for explaining, defending, and attacking public policies. Party spirit extended

to literary questions, and dissent from the State Church was assuming new forms. Under these circumstances, the pamphleteer reaped a harvest. To pass over the horde of minor writers, the Marquis of Halifax, already mentioned, paid his compliments to Whig and Tory, in *Some Cautions for the Choice of Members of Parliament* (1695), and gave the Dissenters some excellent advice in *A Letter to a Dissenter* (1687), a tract that went everywhere and provoked a score of replies. Defoe in *The Shortest Way with the Dissenters* (1702) urged the complete extirpation of all Dissenters—a piece of irony surpassed only by Swift. Charles Leslie—"a reasoner not to be reasoned against," said Dr. Johnson—rode roughshod over Quakers and Deists. William Law attacked the latitudinarian opinions of the Bishop of Bangor, and two hundred pamphlets followed from fifty different pens. Of all his contemporary pamphleteers, Swift was easily the prince. His *Argument to Prove that the Abolishing of Christianity . . . May be Attended with Some Inconveniencies* (1708) is a superb example of ironical humor. Swift also performed valuable services to the Tories in many pamphlets, of which may be mentioned *The Conduct of the Allies* (1711) and *Some True Thoughts Upon the Present State of Affairs* (1714). The condition of Ireland was handled in a masterly manner in the *Drapier's Letters* containing the famous "Modest Proposal." With Arbuthnot, Pope, and others, he joined in excellent foolery aimed against literary quacks and poetasters. Of this joint work the best is perhaps *The Art of Political Lying* (1712), mostly from Arbuthnot, though Swift bore a hand.

Later in the eighteenth century there were other debates in which were active Bolingbroke, 'Junius' (q.v.), who may have been Sir Philip Francis, and Burke, who defended the French Revolution. The rise of the great reviews soon after 1800 turned controversy into new channels. Still the war of pamphlets has never quite ceased. Bowles and Byron fought over the question as to whether Pope was a poet; and pamphlets played an important part in the discussion over the poor laws, the corn laws, the Crimean War, the Irish land laws, the Armenian massacres, and the struggles between the shifting parties in the Church. Even nowadays, a poet occasionally challenges his reader by issuing his verse in pamphlet form. Such, for example, seems to be the intent of John Davidson, who began in 1901 a series of verse pamphlets dealing with the religious and philosophical questions of special interest at this time. Consult Arthur Waugh, *The Pamphlet Library* (4 vols., London, 1897-98). This work contains examples of political, religious, and literary pamphlets, from Wiclif to Newman. There are also historical essays under each division.

PAMPHYLIA (Lat., from Gk. Παμφυλία). In ancient geography, a country on the south coast of Asia Minor, with Cilicia on the east and Lycia on the west. On the north it was separated from Pisidia by the Taurus range, and the southern boundary was formed by the crescent-shaped Gulf of Attalia. The population was a mixed race, in which there was a strong Greek element; and the inscriptions show a dialect strongly resembling that of Cyprus and Arcadia, which seems to indicate Greek immigration prior

to the Dorian conquest of the Peloponnesus. The chief cities, Perge, Sillæum, Aspendus, and Side, were Greek, but the country early lost touch with the mother country and plays no part in Greek history, though it was on the river Eurymedon in Pamphylia that the Athenian Cimon won his great victory over the Persians. The country was freed from the Persian rule by the conquests of Alexander, and after his death passed into the hands of the Seleucid kings of Syria. With the rise of Pergamum it became a part of that kingdom, and Attalus II. founded the city of Attalia, now Adalia. With the rest of the kingdom it passed to the Romans, and from this time shared the history of the rest of Asia Minor. For the inscriptions, see Collitz, *Griechische Dialect Inschriften*, vol. i. (Göttingen, 1884). Consult also: Lanckoronski, *Die Städte Pamphyliens und Pisidiens* (Vienna, 1890); Ramsay, *Historical Geography of Asia Minor* (London, 1890).

PAMPLONA, pām-plō'nā (often called by English writers **PAMPELUNA**, pām'pe-lōō'nā). The capital of the Province of Navarre (Navarra), in Northern Spain, and in the Middle Ages capital of the Kingdom of Navarre. It is situated on an eminence dominating the surrounding plain among the foothills of the Pyrenees, 16 miles from the French frontier (Map: Spain, E 1). It is a military station of the first class and is surrounded by a circle of detached forts. The streets in the old quarters are narrow, while in the suburbs have sprung up many modern houses lining broad and well-kept streets. The city has three beautiful plazas, of which the Plaza del Castillo, with its arcades flanked by the edifice of the provincial deputation and the simple modern theatre, is the best, and four charming promenades and the park-like Forest of Tijerfa; while among the principal buildings are the Gothic cathedral, begun in 1397, with a Græco-Roman façade, and the historic Sala Preciosa, where formerly met the Cortés of Navarre; the ornate municipal palace, the vice-regal palace, and the bull ring, capable of seating 8000 persons. The aqueduct of Noain, eight miles long, for a portion of its course supported by 97 arches, furnishes the city with its water supply. The town possesses also a large hospital, a provincial institute, normal schools, and a seminary. The chief manufactures are linen, flour, soaps, beverages, leather, and paper, and there are iron, lead, and copper foundries. Population, in 1887, 26,663; in 1900, 30,609.

The name Pamplona is said to be derived from *Pompeiopolis* (the city of Pompeius), though this etymology is disputed. Being a fortified frontier town, Pamplona has figured in the wars with the French and also in the Carlist wars.

PAMUNKEY, pā-mūŋ'kī. A former leading tribe of the Powhatan confederacy (q.v.) of Virginia and one of the very few tribes of the Atlantic Coast region of the United States which have retained their organization. On the first colonization of Virginia in 1607 they were estimated at nearly three hundred warriors, being the largest tribe of the confederacy. Their most noted chiefs were Opechancanough (q.v.), Totopotomoi, and Queen Anne. The war begun under Opechancanough in 1622 resulted in the destruction of their town, which was burned by Governor Wyatt in 1625, after a desperate battle in which he met and defeated nearly 1000 Indians. A second ris-

ing in 1644 ended a year later in the capture and death of Opechancanough and the disruption of the confederacy, each tribe, including the Pamunkey, making a separate treaty of peace and being assigned to a reservation held on condition of the payment of an annual tribute. About the year 1654 the Pamunkey suffered another terrible loss in the death of their chief Totopotomoi with nearly one hundred of his men, who had volunteered their services to the English to repel an invasion of a hostile mountain tribe. Queen Anne, the widow and successor of Totopotomoi, maintained her friendship with the English, and for her services in later Indian wars was presented with a silver coronet by the English Government. In 1781 the Pamunkey occupied the same reservation which they still hold, consisting of a few hundred acres in a bend of Pamunkey River. Here about 140 mixed-bloods still keep the name and tribal organization under State laws. They are all fishermen or hunters, making a good living from their annual catch. They do not vote or pay taxes, but still present the Governor of Virginia an annual tribute of game in token of their former submission.

PAN (Lat., from Gk. Πᾶν, connected with Lat. *pasci*, to feed, *pastor*, shepherd, Skt. *pā*, to protect). A Greek god of herds and hunters, pastures and forests. He seems to have been originally the god of shepherds and goatherds, while he is but slightly connected with neat cattle, which formed a very unimportant part of the wealth of the region where his cult grew up. This was especially the mountainous district of Arcadia, and the varied aspects of the god can be easily referred to the wandering life of the herdsmen, which led them from the lower pastures and valleys up to the high mountains and cooler regions in the summer. From this life also is derived Pan's connection with the hunt and fishing, as both are diversions of the herdsman's life. He seems to have passed into a war-god with the growth of the mercenary service of the Arcadians, though from relatively early times we hear of the *Panic fear*, which he inspired. This seems derived from the apparently causeless 'stampedes' of herds, often hurrying them to destruction, and the observation that similar frenzy seemed to seize an army at times and drive it into mad rout. Pan is not mentioned in the epic, and his worship seems to have spread but gradually beyond Peloponnesus. It was introduced into Athens after the battle of Marathon, when Pan was believed to have fulfilled a promise to help the Athenians. He was then given a sanctuary in a cave on the northwest side of the Acropolis, and many votive reliefs of Pan and the nymphs attest his popularity. He was also honored with annual sacrifices and a torch race. Owing to the character of his cult, the legends about Pan are largely local. He is called the son of Zeus and Callisto and twin brother of Arcas; of Hermes and the daughter of Dryops, or Penelope; or by later mythographers, who connected the name with πᾶν, 'all,' as the son of Penelope and all the suitors. A late Homeric hymn tells of his birth, and how Hermes carried him to Olympus, where he delighted all the gods. Later philosophers, especially some of the Stoics, transformed this divinity into the great All-God, but this was never a general belief. Pan's appearance was described in accord-

ance with his nature. Goat's legs and horns, a shaggy beard and hair, and goat-like features bespoke his origin, and this type is common in art, though associated from the middle of the fifth century B.C. with another, representing him as a youth, whose animal nature is only marked by short horns on the forehead. Hellenistic art also introduced female Pans and child Pans, though the Greek religion knew of but the one god. In art he became attached especially to Dionysus, perhaps on account of the satyrs. The artistic type of Pan seems also to have contributed to the development of the popular representations of the Devil in the earlier Christian art.

PANA. A city in Christian County, Ill., 99 miles northeast of Saint Louis, Mo., on the Illinois Central, the Baltimore and Ohio Southwestern, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads (Map: Illinois, C 4). It carries on considerable trade, and is largely engaged in coal-mining. Settled in 1853, Pana was incorporated by a special charter in 1867. The government is administered under a general law of 1870, which provides for a mayor, elected every two years, and a council. The city owns and operates the water-works. Population, in 1890, 5077; in 1900, 5530.

PANÆTIUS, pā-nē'shī-ūs (Lat., from Gk. Πανάγιος, *Panaitios*) (c.185-c.112 B.C.). A Greek Stoic philosopher, born at Rhodes. He studied and taught in Athens, where Lælius became his pupil. He went to Rome, and became one of the literary circle patronized by the younger Scipio; but it seems that he returned to Athens several years before his death. He belonged to the Middle (or eclectic) Stoa, borrowing much from Plato and Aristotle; and his great work on moral obligation was the basis of Cicero's *De Officiis*. Consult: Van Lynden, *De Panætio Rhodio* (Leyden, 1802), and Fowler, *Panæti Fragmenta* (1885).

PANAMA, pā'nā-mā'. A department of Colombia, South America, bounded by the Caribbean Sea on the north, the Colombian department of Cauca on the east, the Pacific on the south, and Costa Rica on the west (Map: Colombia, B 2). Its area is 31,571 square miles. The department is only sparsely settled, and the population in the cities is supported chiefly by the inter-oceanic commerce. Agriculture is in a backward state, but stock-raising is becoming important. The commerce has greatly increased since the opening of the Panama Railway, connecting Panama, the capital, with Colón. The population was estimated at 285,000 in 1896. Consult: Peratta, *Costa Rica, Nicaragua y Panamá* (Madrid, 1883); Reclus, *Panama et Darien* (Paris, 1881).

PANAMA. The capital of the Department of Panama, Colombia, situated at the head of the Bay of Panama, on the south shore of the Isthmus. It is at the southern terminus of the Panama Railroad and of the canal route (Map: Colombia, B 2). Though its streets are narrow, the town is well built, and has a large cathedral, a Jesuit college, several convents, a modern hotel, and a hospital, built by the Canal Company. The inhabitants are supported almost wholly by the inter-oceanic transit trade, and since the definite proposal of the United States Government to complete the Panama Canal (q.v.), the

importance of the town has been much enhanced. The harbor of the town itself is shallow, and large boats formerly had to anchor seven miles from the place where they loaded and unloaded by means of small steamers and lighters. In 1898, however, a new wharf 1000 feet long and accessible for large steamers was completed at the canal terminus. The population of the city is about 25,000. Panama was founded in 1519 by Pedro Dávila, being the first town founded by Europeans on the American continent. During the seventeenth and eighteenth centuries it was the chief port for the Spanish trade in the Pacific. In the nineteenth century its commerce declined, but received a new impetus by the completion of the Panama Railroad in 1855. It has often suffered from civil wars.

PANAMA, ISTHMUS OF. A narrow strip of land extending between the southern end of the active volcanic region of Central America and the northern termination of the Andes (Map: Central America, G 6). Its outline is that of a gentle arc stretching in an east and west direction, its limit on the east being the Atrato River, and on the west the southeastern boundary of Costa Rica. In a broad sense much of major Central America is included in this Isthmian region, but the expression is commonly confined to the limits of country here indicated, extending between the meridians of 79° and 83° W. longitude, or about 415 statute miles. Its average width is nearly 70 miles, which is reduced to 31 miles between the bays of Panama and San Blas. There is no well-defined coastal plain, though occasional stretches of beach, as at Panama, are exposed at low tide, but their continuity is interrupted by abrupt cliffs and mountains fronting on the sea. The surface of the greater part of the Isthmus consists of low mountains and hills covered with dense forests. These elevations are not arranged in systematic chains or ridges, but are very irregularly distributed. Only in the extreme west and in the neighborhood of San Blas are there mountains of systematic arrangement. With these exceptions the topography consists of hills from 200 to 1500 feet in height, separated by drainage valleys that are cut down almost to sea level. There are, however, a few small areas of nearly level treeless upland, as from the mouth of the Bayano River to the Costa Rican boundary on the Pacific side. The region assumes the character of lofty mountains in its western section, where also are found a number of towering and seemingly extinct volcanoes (Chiriqui, Pico Blanco, both over 11,000 feet in height).

There is no well-defined water parting. The drainage is about equally divided between the two oceans. The streams are of great age, and the larger rivers, receiving the waters of many branches, usually reach sea level so far inland that they become tidal rivers, sometimes at a distance nearly half way across the Isthmus. The Atrato, rising in Colombia about latitude 4° N., flows nearly 600 miles almost due north into the Gulf of Darien, with a fall of less than one foot to the mile. The Tuyra drains most of the country west of the Atrato as far as the Gulf of Panama and empties into the Pacific. This is the largest drainage basin of the Isthmus. Farther westward the Bayano, with many tributaries, drains the central part of the Isthmus. It

is succeeded farther west by the drainage of the Chagres Basin, whose waters are carried to the Caribbean, though the basin extends nearly to the Pacific. From the Chagres to the Costa Rican border, the drainage consists of less complicated streams rising nearer the central or axial line and flowing into either ocean. Thus the drainage of the eastern or larger part of the Isthmus is complex and reaches the sea by concentrating into three principal channels, while to the westward it is simple.

Among the hills covering the Isthmus are a number of natural passes which afford the easiest routes between the two seas. These passes are: Culebra (287 feet); Atrato-Sucubti (583 feet); Atrato-Napipi (778); Caledonia (1003); San Blas (1142); and Atrato-Morte (1143).

The mean annual temperature, 78° to 80° F., is somewhat higher on the Atlantic coast, owing to the warmer waters of the Caribbean. The extreme annual range of temperature rarely exceeds 30°, the limits being 65° and 95° or 100°. The entire region is under the influence of the northeast trades between December and April, and in the remainder of the year these air currents are replaced by southeasterly winds. The rainfall is very heavy, and the climate is very unhealthy. The whole region is covered with a jungle of grasses, sedges, wild plantains, and trees characteristic of the lower lands of the Caribbean. Owing to less copious rainfall, vegetation is less exuberant on the Pacific than on the Atlantic side. The oceanic fauna on the Caribbean side differs greatly from that on the Pacific side, and even the land animals differ in the same way, to some extent.

The general level of the Isthmus has been enormously lowered by long continued erosion. The surface is rapidly approaching base level. Antiquity is stamped upon every form. The igneous rocks are now exposed by erosion. But the volcanic fires which still persist eastward in the Andes and westward in Central America have long ceased to exist in the Isthmus. There is no evidence that the oceans have ever communicated across the Isthmian regions since Tertiary times. If the Isthmus could be lowered 300 feet at present the waters of the two oceans would commingle through the low Culebra Pass.

Most of the inhabitants are a mixed people of Spanish, Indian, and negro origin. Some of the aborigines, however, as the Guaymí and Chocós, have preserved their physical type, customs, and speech. The Isthmus is thinly peopled and has no very important towns except the ports of Panama and Colón, the termini of the Panama Railroad and of the proposed Panama Canal. Politically the Isthmus proper forms the Panama department of the Republic of Colombia. In other respects, however, it has small relations with the Republic. Its ports are not used in the commerce of the rest of Colombia; there is very little trade between the Isthmus and the other departments, and its railroad is merely a means of transport for the commerce (duty free) of other nations. The most complete treatment of the geographic and geologic aspects of the Isthmus is contained in Hill, "The Geological History of the Isthmus of Panama and Portions of Costa Rica," *Bulletin of Museum of Comparative Zoölogy at Harvard University*, vol. xxviii., No. 5 (Cambridge, 1903); and of the Isthmus in all its fea-

tures in Reclus, *The Earth and Its Inhabitants, North America*, vol. ii. (New York, 1893).

PANAMA CANAL. The projected ship canal across the Isthmus of Panama, connecting the Atlantic and Pacific oceans. The first project for the construction of such a canal to result in the actual beginning of the work grew out of a concession granted by the Government of Colombia to Lieut. Lucien N. B. Wyse and others in May, 1878, giving to them the exclusive privilege, for 99 years, of constructing and operating a canal across the territory of the Republic between the Atlantic and Pacific oceans. An international congress of 135 delegates, mostly engineers, 11 being from the United States, was held at Paris in May, 1879, under the auspices of Ferdinand de Lesseps, who had been induced to assume the leadership in the undertaking, and after a session of two weeks decided that the route for the canal should be across the Isthmus of Panama, between the cities of Colón and Panama, and that the canal should be a sea-level one and without locks. For the purpose of construction the Panama Canal Company, officially known as the 'Compagnie Universelle du Canal Inter-océanique de Panamá,' was organized under the laws of France with Lesseps as president. It purchased the Wyse concession for 10,000,000 francs, and at once entered upon the task of surveying the route and doing other preliminary work. The plan adopted provided for a sea-level canal 29.5 feet in depth, with a bottom width of 72 feet, involving an excavation of 157,000,000 cubic yards of earth and rock. The estimated cost of construction, as calculated by Lesseps, was \$127,000,000, and the time required was estimated at eight years, both of which estimates were considerably under those made by the International Congress. Work was begun in 1881, but in a short time it became evident that the undertaking involved difficulties which had not been foreseen, and that the estimates were absurdly low. In order to obtain additional funds and to retain the confidence of the French public, bribery on an almost unprecedented scale was resorted to, prominent newspapers were subsidized, and a number of members of the French Chamber of Deputies were corrupted. In 1892 many of the transactions of the company or its agents became known to the public, and the disclosures, implicating a number of the most prominent men in France, gave rise to perhaps the greatest financial scandal in French history. The company was declared to be bankrupt, and it was found, on examination, that up to this time 1,300,000,000 francs had been expended; that the assets of the company amounted to only 700,000,000 francs, and that only a small part of the work had been done. The company was dissolved by the French courts and a receiver was appointed to take charge of its affairs. The receiver was authorized to cede to any new company all or a part of the assets and to borrow money and make contracts with a view to completing the work of construction. He asked for and received from the Government of Colombia three successive extensions of time within which the canal was to be completed and put into operation. The last extension gave the promoters until 1910 to complete the work. The receiver finally succeeded in October, 1894, in organizing the new Panama Company, with a capital stock of 650,000 shares of 100 francs each (about \$13,000,000),

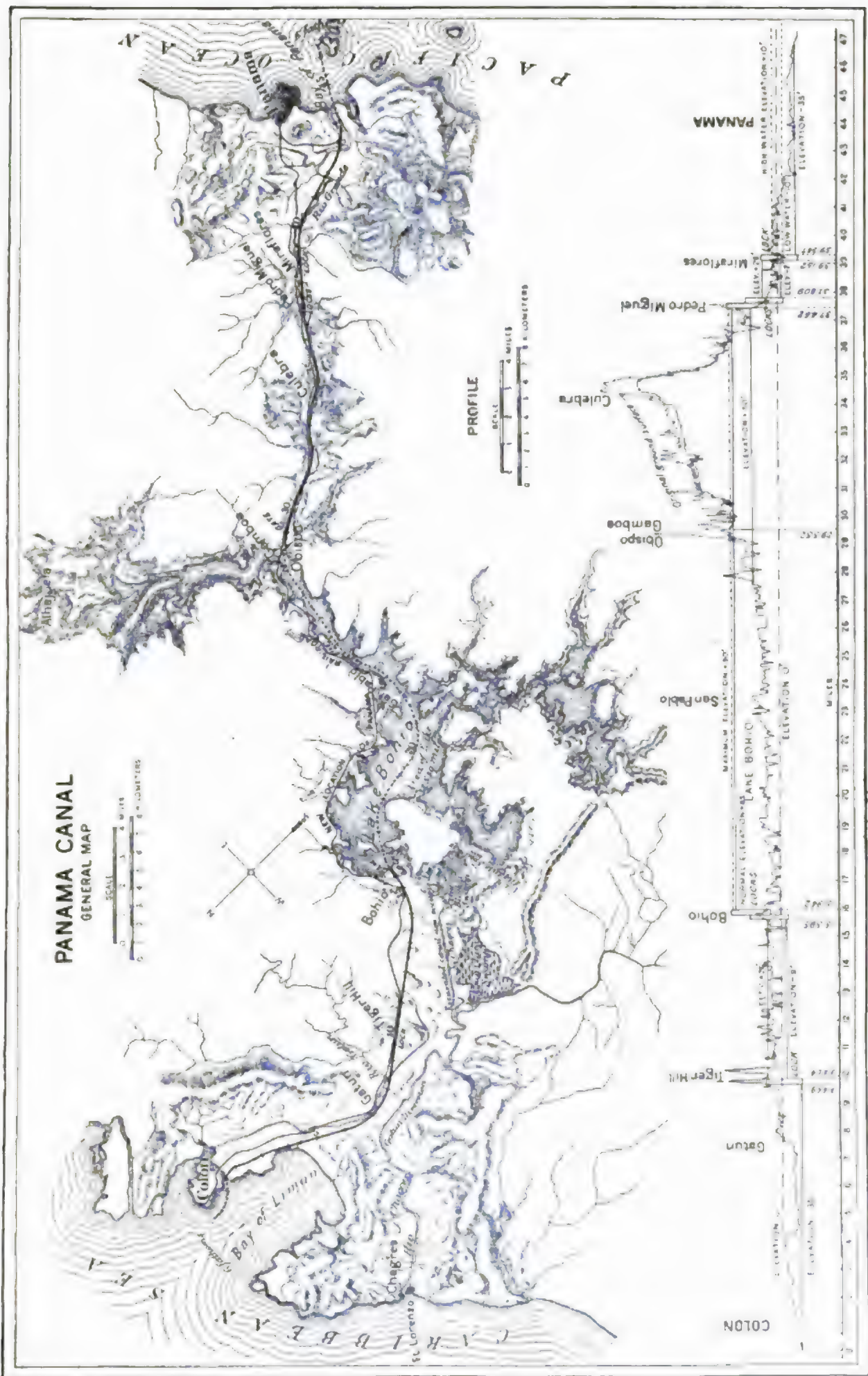
the Government of Colombia subscribing for 50,000 shares. The property and assets of the old Panama Company were now transferred to the new Panama Company. An international technical commission composed of ten eminent engineers, representing the United States, Great Britain, Germany, and France, was appointed to investigate the subject, and in November, 1899, reported unanimously in favor of the feasibility and practicability of completing the canal. They reported that the canal was already two-fifths completed, that not more than \$102,400,000 would be needed to finish the work, and that the time need not exceed ten years. The work of construction was then resumed on a small scale. Up to June 30, 1899, the new company had expended about \$8,000,000 and had excavated about 5,000,000 cubic yards of earth.

In 1899 President McKinley was authorized to appoint a commission of eminent engineers and other persons to investigate the whole question of canal possibilities on the Isthmus from Nicaragua to Colombia. After an exhaustive investigation the commission reported in favor of the Nicaragua route, chiefly on financial grounds, but upon the offer of the Panama Canal Company to sell its property and franchises to the United States for \$40,000,000, its value as estimated by the commission, the commission made a supplementary report advocating the acceptance of the offer and the completion of the unfinished canal by way of Panama. In Congress discussion of the respective advantages of the Panama and Nicaragua routes was long and earnest, finally ending in June, 1902, by the enactment of a law authorizing the President of the United States to purchase the property and franchises of the Panama Canal Company for \$40,000,000, provided a satisfactory title could be secured, and further authorizing the Secretary of War in that event to construct the canal at a cost not to exceed \$130,000,000. Negotiations were at once entered upon with the Republic of Colombia to secure the necessary concessions, and a thorough investigation was begun to ascertain the character of the legal title of the Panama Company to the property which it proposed to sell. Upon investigation it was found that the company had a valid title, and on February 16, 1903, the Government of the United States formally accepted the offer of the company to sell its rights and property for \$40,000,000, subject to the ratification of the treaty with Colombia then pending before the Senate. This treaty had been concluded after a long negotiation between the two governments, lasting through a period of six months, the delay being caused by disagreement of the two governments as to the price to be paid for the concession. In January, 1903, the treaty was laid before the Senate for ratification, but on account of opposition of a few Senators, under the leadership of Morgan, of Alabama, who favored the Nicaragua route, the Fifty-seventh Congress closed without action on it. An extra session of the Senate was called to meet on March 5th, and after two weeks of debate the treaty was ratified on March 18th by a vote of 73 to 5. The treaty provides that the United States shall pay to the Republic of Colombia the sum of \$10,000,000 in gold in cash for the concessions, to be paid upon the exchange of ratifications, and an annuity of \$250,000, beginning nine years after the date of ratification, the latter sum being a compromise

between the \$600,000 demanded by Colombia and the \$100,000 offered by the United States. The concession authorizes the new Panama Company to transfer to the United States all its property and franchises, including the Panama Railroad. The lease is for 100 years, with the privilege of perpetual renewal. The treaty further provides that the territory comprising the canal zone shall be neutral and under the guarantee of both governments. If it should become necessary at any time to employ armed forces to maintain the safety of the canal or insure its public use, the Republic of Colombia agrees to provide the necessary troops. Provision is made for a joint American and Colombian commission to establish and enforce sanitary and police regulations. Colombia agrees not to cede or lease any territory to any foreign power within certain limits for coal-ing stations, fortifications, etc., that might interfere with the construction, protection, safety, and free use of the canal, and the United States agrees to support Colombia in preventing the occupation of any such territory. Panama and Colón are to be free ports for vessels and goods intended to pass through the canal, which, it is agreed, shall be open for traffic within fourteen years, unless the United States should determine to make the canal a sea-level enterprise, in which event the time is to be extended ten years longer. In the summer of 1903 the treaty was before the Colombian Government for ratification. Already by the Hay-Pauncefote treaty (q.v.) of November, 1901, superseding the Clayton-Bulwer treaty (q.v.), the sole right of the United States to construct, maintain, and police the canal was conceded by Great Britain, which power at the same time withdrew its claim to a joint guaranty of the neutrality of the canal upon the agreement of the United States to accept substantially the rules now governing the free navigation of the Suez Canal (q.v.).

The principal advantages claimed for the Panama route are: First, the existence of excellent natural harbors at both termini of the proposed canal and the existence of a line of railroad across the Isthmus, which will make it practicable to begin work without delay; second, the estimated annual cost of operating the Panama Canal will be \$1,300,000 less than the corresponding charges for the Nicaragua Canal; third, the Panama route is 134.57 miles shorter in length than the Nicaragua route, has less summit elevation, will have fewer locks, 26.44 miles less curvature, and will require but twelve hours time for a deep-draught vessel to pass through, whereas it would require 33 hours in the case of the Nicaragua Canal. The estimated time for constructing the Nicaragua Canal is about six years, the cut through the divide west of the lake consuming about four years. The time estimated for completing the Panama Canal is eight years, the excavation through the Culebra section (43,000,000 cubic yards of hard clay) being the greatest obstacle. The estimated cost of constructing the two canals, including the \$40,000,000 to be paid the new Panama Company for its property and concessions, but excluding the cost of acquiring concessions from the governments concerned, is \$189,000,000 for the Nicaragua Canal and \$184,000,000 for the Panama Canal. Finally, the remoteness of active volcanoes and the less likelihood of injury from earthquakes is an advantage commonly claimed

PANAMA CANAL



for the Panama route. Among the disadvantages charged to the route are the (assumed) comparative unhealthfulness of the climate, which, it is thought, might impede the work of construction, and the remoteness of the Panama route as compared with the Nicaragua route from the high-ways of commerce between the Pacific and Atlantic coasts of the United States. On the other hand, the Panama route gives the direct short course to the Pacific ports of South America.

Consult: *The Report of the United States Isthmian Canal Commission, 1899-1901* (Washington, 1901); *The New Panama Canal Company* (official publication) (New York, 1899); and *Canal de Panamá, Rapport de la commission* (Paris, 1899).

Consult also the authorities cited under NICARAGUA CANAL.

PANAMA CONGRESS. A congress of delegates representing various nations of America, which met at Panama in June, 1826, for the consideration of questions of common interest. Soon after the establishment of the independence of the South and Central American republics and of Mexico, a movement, largely under the direction of Simon Bolivar (q.v.), President of Colombia, was set on foot for the organization of an American Confederacy. In 1823 Bolivar invited the governments of Mexico, Peru, Buenos Ayres, and Chile to send to Panama delegates empowered to take such action; but Buenos Ayres and Chile held back, and in December, 1824, Bolivar sent a circular letter to all the Spanish-American republics, proposing that each appoint representatives to assemble immediately at Panama. This invitation was promptly accepted by Mexico, Peru, Chile, and Guatemala, and in November, 1825, the ministers of Mexico, Colombia, and Guatemala at Washington formally invited the United States to send delegates to the proposed congress, stating in a general way the questions which would be brought up for discussion. President Adams, influenced largely by Henry Clay, then Secretary of State, promptly accepted the invitation and in his annual message to Congress stated that "ministers will be commissioned to attend." This was the signal for one of the most animated debates in the history of the United States Congress, opposition being aroused particularly by the fear of 'entangling alliances,' by the proposed discussion of the recognition of Hayti, the suppression of the slave trade, and the liberation from Spanish rule of Cuba and Porto Rico, and to some extent by the reluctance on the part of many to commit the United States to the policy enunciated in the 'Monroe Doctrine.' Finally, however, Adams's appointment of two envoys extraordinary, Richard C. Anderson and John Sergeant, was ratified by the Senate, and an appropriation for the mission was voted in the House. The congress met on June 22, 1826, Colombia, Central America, Peru, and Mexico being represented. Chile, Brazil, and Buenos Ayres approved of the congress, but did not send delegates. After holding ten sessions and agreeing to a treaty of perpetual union for defense against Spain, the congress adjourned to meet again at Tacubaya, Mexico, in the following year. The treaty of union was subsequently ratified only by Colombia. The United States was not represented, Anderson having died on the way to Panama, and Sergeant not reaching that place until after

the congress had adjourned. The meeting at Tacubaya was never held.

PANAMA HATS. Hats made from the immature unexpanded leaves of the stemless screw-pine (*Carludovica palmata*), a native of Central America and Colombia. After special treatment to remove the soft parts of the leaf, the fibre is soaked to render it pliable, and the weaving is done under water. The hats most valued are made from single leaves.

PAN-AMERICAN CONGRESS. After the failure of the Panama Congress, held in 1825-26 for the purpose of taking measures looking toward a close union among the American republics for the furtherance of their common welfare, various efforts followed at intervals to bring together a congress of all the American States with a view to a more lengthy and earnest discussion of the important questions of common interest to the republics of America. Finally in 1847 a congress representing five South American republics was held at Lima and resulted in treaties of confederation and of commerce and navigation, a consular convention, and a postal treaty. Again in 1864 a congress of delegates representing seven South American republics and one Central American State was held at Lima for the purpose of forming a Latin-American Union. The sessions were secret and its work was without substantial result. In 1878 a third congress was held at Lima and consisted of representatives from seven South American States and the island of Cuba. Treaties of international law and extradition were prepared and afterward ratified by Guatemala and Uruguay. In 1881 the governments of the Central States issued invitations for a congress of American republics, to be held at Washington, D. C., in November, 1882, for the purpose of "considering and discussing the methods of preventing war between the nations of America," but, on account of the war between Chile, Bolivia, and Peru and the failure of Congress to make the necessary appropriations, the invitations were withdrawn. Finally on October 2, 1889, a congress representing every American republic except San Domingo met at Washington under the Presidency of Mr. Blaine. The congress remained in session till April 21st. Its work consisted of a number of recommendations, few of which were ever adopted by the governments interested. The principal of these related to the free navigation of American rivers, a uniform system of weights and measures throughout America, a uniform standard of value, and a common silver coin, an international banking system, uniform extradition treaties, reciprocity, uniform consular fees, harbor fees and regulations, uniform sanitary regulations, and the establishment of a Bureau of Information for the dissemination of intelligence concerning the commerce and resources of the American republics. In December, 1899, the government of the United States suggested the holding of another congress, and upon the invitation of the Government of Mexico the City of Mexico was chosen for the place of meeting, and the date set was October 22, 1902. Eventually the governments of all the American republics accepted the invitation and the congress met on the date appointed. It was in session until January 30, 1903, a part of the time being spent in visiting places of interest in Mexico. The work of the

congress consisted of a number of protocols, treaties, conventions, resolutions, and recommendations. The more important of these were a protocol of adhesion to the Hague Convention for the settlement of international disputes; a treaty of compulsory arbitration signed by 10 delegations, and resolutions favoring construction of a pan-American railway; an international customs congress for international sanitation, collection, and publication of statistics relative to American trade and resources.

PAN-AMERICAN EXPOSITION. An exposition held in Buffalo, N. Y., from May 1, to November 2, 1901. It had for its purpose the illustration of the progress of civilization in the Western Hemisphere during the nineteenth century, and was originally planned for 1898, but the war with Spain intervened and the enterprise was deferred until 1901. A site in the northern part of Buffalo, covering an area of 350 acres and within three miles of the business centre of the city, was chosen. A formal ground plan introducing architecture, sculpture, and painting was early adopted, and it was agreed that the style of architecture should be a free adaptation of the Spanish Renaissance, that abrupt roofs with overhanging eaves should be used in preference to flat roofs with cornices and balustrades, that color and decorative sculpture should be introduced freely in the treatment of the buildings, and that the appearance of the exposition should be as gay and festive as possible. The buildings were arranged around a broad court having the form of an inverted T with its broad end to the south, where an approach was made over a triumphal causeway. From this on the east toward the north were the group of Government buildings, the Ethnology Building, the buildings of Manufactures and Liberal Arts, and Agriculture, while on the west side were the buildings of Electricity, Machinery, and Transportation, Temple of Music, and Horticulture, with its two wings, one of which was devoted to exhibits in Graphic Arts and the other to exhibits of Mines. At the north end of the court thus formed, and balancing the Triumphal Causeway, was the Electric Tower. In addition to the foregoing, there were two permanent buildings, one of which, constructed of white marble and bricks, served as an art building, and is now the home of the Buffalo Fine Arts Academy, and the New York State Building, of white marble, which now contains the collections of the Buffalo Historical Society. The color scheme was designed and directed by Mr. C. Y. Turner, who chose as the underlying theme the fierce struggle of man to overcome the elements. Accordingly, the buildings on the east were arranged to represent man and his affairs, or that which man had gained after long years of strife with the elements, while those on the west represented the elements themselves. The struggle was denoted by heavy, deep coloring of red, blue, green, and gold, which graduated gently but firmly into tints, until the Electric Tower was reached, where the prevalent tone was a deep green, as near the color of Lake Erie as it was possible to attain. The tower, which had sculpture work on the four corners, itself was of a light ivory color, and was tinted with blue, green, and gold, which grew fainter as the top was reached, terminating in a gilt figure of the Goddess of Light. The color treatment gained

for the Exposition the name of the Rainbow City, or the Tinted City. The sculpture was likewise harmonized with the general plan, and was under the direction of Mr. Karl Bitter. At the entrance of the Exposition, the Triumphal Causeway, which was perhaps the most ornate feature, represented the apotheosis of the United States, an allegorization of national pride, while the Electric Tower at the other end symbolized the great waters, suggesting that the importance, growth, and prosperity of Buffalo were due chiefly to the Great Lake system and waterways on which it was located. On the east side of the Esplanade the most conspicuous work was the Fountain of Man, by Mr. Charles Grady; while on the west side, which was devoted to Nature, there was placed the Fountain of Nature, by Mr. George Brewster. All of the sculpture was in white staff. The exhibits were examined by a jury of awards, and upward of 4000 awards of gold, silver, and bronze medals, and honorable mentions, were made. The total attendance was given as 8,179,674. The total cost of the Exposition was \$8,860,757, and the total receipts were \$5,534,643, leaving a deficit of \$3,326,114. On September 6th President William McKinley (q.v.) was shot down by an assassin while holding a public reception in the Temple of Music, and he died eight days later at the house of John J. Milburn, the president of the Exposition.

PANARD, pá'nār', CHARLES FRANÇOIS (1694-1765). A French song-writer, born at Courville, near Chartres. He went to Paris in early life, and was employed in the Government bureau for many years. Panard was an industrious writer of vaudeville and song, and his works in this line number more than eight hundred. His satire was never bitter, and his humor never coarse, while there was in all he wrote an insinuating grace and gayety. Marmontel gives an attractive picture of him in his *Mémoires*. Partial collections of his works were made under the titles *Théâtre et œuvres diverses* (1764) and *Œuvres choisies de Panard* (1803).

PANAS, pá'nä', PHOTINOS (1832-1903). A French surgeon and ophthalmologist. He was born in Cephalonia, and studied medicine at Corfu and in Paris, where he was naturalized in 1863. After service in various other hospitals he became surgeon to the Hôtel Dieu in 1877. Two years afterwards he was appointed professor of clinical ophthalmology in the Ecole de Médecine. In general surgery Panas won some reputation by his services in the Franco-Prussian War, through his introduction of Lister's methods into France, and by his pioneer work as a successful operator in ovariectomy. But he was better known for his ophthalmological work, and it is in this field that he wrote: *Leçons sur le strabisme* (1873 and 1893); *Leçons sur les kératites* (1876); *Sur les affections de l'appareil lacrymal* (1877); *Anatomie pathologique de l'œil* (1879, with Remy); *Sur le glaucome et les néoplasmes intraoculaires* (1893); *Traité complet des maladies des yeux* (1894); and *Leçons de clinique ophthalmologique* (1899).

PAN'ATHENÆA (Lat. nom. pl., from Gk. Παναθήναια, *Panathēnaia*, from *pās*, *pas*, all + *Ἀθήνη*, *Athēnē*, Athens). The most famous festival of Attica, celebrated at Athens in honor of Athene, patron goddess of the city. Two festivals were distinguished. The Lesser was annual,

and its origin was attributed to King Erichthonius, though Theseus was said to have changed the name from Athenæa to Panathenæa in commemoration of the union of the Attic communities into a single State. It was celebrated by a solemn procession to the Acropolis, a sacrifice and public feast, and was preceded by an evening torch-race. Probably gymnastic contests and chariot-races were also held. Like the Lesser, the Greater Panathenæa was held on the 28th of the first month of the Attic year, Hecatombæon (approximately July). Its establishment was attributed to the tyrant Pisistratus in B.C. 566. The celebration occurred in the third year of each Olympiad, and reached its culmination in the great procession which escorted to the Acropolis the sacred *peplus* of Athena. The *peplus* was a crocus-colored mantle, embroidered by chosen women of noble blood, with scenes from the contest of the gods and giants. At least as early as the end of the third century it was carried spread from the yard and mast of a ship on wheels. The procession included representatives of all the free population, the magistrates, old men with olive branches in their hands, maidens with the sacred utensils, the metics or resident foreigners with the vessels for the sacrifices, the cavalry, the chariots from the games, the animals for sacrifice, and all the other elements which were depicted by Phidias on the frieze of the Parthenon. The five days before the offering were filled with contests of various kinds. Rhapsodists contended in recitations of the epic poems, and there were also musical contests. There were prizes for pyrrhic and cyclic choruses and the ten tribes presented in competition bands of old men chosen for their beauty and strength. There were the usual athletic contests for boys, youths, and grown men, seemingly in great numbers, but the chief feature of these games was the number of the horse-races, which included, not merely the usual chariot-races with spans and four horses, but also a special variety, in which each chariot contained, besides the driver, an armed runner, who, as the chariot crossed the finish line, sprang from the moving car and ran back the length of the stadium. The last contest was a race of triremes off the Piræus. For the musical contests the prizes were crowns of gold and silver and money, for the choruses an ox for sacrifice, and for the athletic games vases filled with oil from the sacred olive-trees. Many of these vases have been found, all similar in style, showing on one side Athena brandishing her lance, between two columns, and on the other a scene from the sport for which the vase was a prize. Consult: Michaelis, *Der Parthenon* (Leipzig, 1871); Mommsen, *Feste der Stadt Athen im Alterthum* (ib., 1898).

PANAX. A genus of plants. See ARALIA; GINSENG.

PANAY, pá-ní'. One of the Philippine Islands, the westernmost of the Visayan group. It lies nearly in the geographical centre of the archipelago, and is bounded on the north by the Visayan Sea, on the east and southeast by the Strait of Guimarás, from 9 to 56 miles wide, separating Panay from Negros, and on the west by the arm of the Sulu Sea known as the Mindoro Sea, which on the northwest separates Panay from Mindoro (Map: Philippine Islands, G 8).

Panay ranks fifth in size among the Philippine Islands. Its area is 4752 square miles, and with the 118 dependent islands, 5103 square miles, the mainland being thus somewhat larger than the island of Corsica. It is broadly triangular in shape. Its southern and western coasts are very little indented, and afford no harbors except open roadsteads. On the north-east and east coasts, however, there are numerous small bays and sounds with anchorages, sheltered by the adjacent islets. The best harbor is at Iloilo, on the strait of that name separating the island of Guimarás from the mainland. Guimarás, the principal dependent island of Panay, has an area of 243 square miles, and lies in the narrowest part of the channel between Panay and Negros.

The centre of Panay is the nucleus of its mountain system, which consists of three principal mountain ranges radiating from that point to the three corners of the triangular island. These ranges divide the island politically into its three provinces, and hydrographically into its three main drainage basins, that of the Panay River in the north, the Jahaur in the south-east, and the Cadián in the west. These dividing ranges are very rugged and almost insurmountable. They have a number of peaks exceeding 3000 and 4000 feet, several above 5000, and Mount Madia-ás in the northwestern range has a height of 7264 feet. In each of the three basins the land descends gradually to the sea. The southeastern slope is gently undulating, while the western and northern are more rugged, with a number of outlying peaks. Extensive forests cover the uplands, and the lower slopes, especially in the southeast, have a pleasant park-like aspect. The soil is everywhere fertile and well watered; besides the three rivers mentioned there are many smaller streams flowing through every part of the island. For climate and natural history, see the article on the PHILIPPINE ISLANDS.

As in the rest of the archipelago, the chief occupation is agriculture, and the staple products are rice, sugar, and copra. The shipment of sugar through the port of Iloilo in 1899 amounted to 77,641 tons, and that of copra to 636 tons. Under ordinary conditions, however, as shown by the figures for 1892 (177,467 tons of sugar), the export will be more than twice as great. Other agricultural products are cotton, hemp, corn, coffee, tobacco, cacao, indigo, and pepper. There are large areas of fine grazing land in Panay, especially in Iloilo Province. Before the war with Spain there were more than 200,000 head of live stock on the island, consisting chiefly of carabaos, sheep, and horses, the latter being highly prized throughout the archipelago. The mineral wealth has not yet been exploited, but there are known to be deposits of iron, gypsum, coal, and marble, while gold has been found in various localities. The manufacturing industry yields products in sufficient quantity for export. There are numerous looms in operation producing fabrics of pineapple fibre, jusi, sinamay, silk, cotton, and hemp. Coast-ing trade and commerce with the rest of the archipelago through the port of Iloilo are also very active.

The natives of Panay offered a spirited resistance to the authority of the United States from the beginning of the insurrection. The town of

Iloilo was occupied and garrisoned by United States troops on February 11, 1899, but the insurgents practically held the whole interior of the island until the beginning of active operations in the fall of 1900. The insurgents were then dispersed and driven to the mountains after a number of sharp engagements. The surrender of General Delgado in January, 1901, followed by that of other influential leaders, practically accomplished the pacification of the island, and on April 13, 1901, civil government was inaugurated. Under the Spanish rule the island was divided into the three provinces of Antique in the west, Cápiz in the north, and Iloilo in the southeast, and the Commandancia of Concepción in the northeast. The last is now incorporated with the Province of Iloilo. The population of Antique was estimated in 1901 at 115,434, that of Cápiz at 224,000, and of Iloilo 464,444, giving a total for the whole island of 801,878. The inhabitants are nearly all Visayans, there being only a few thousand savage Mundos and Negritos in the mountains. The capitals are San José de Buenavista (q.v.) in Antique and Cápiz (q.v.) and Iloilo (q.v.) in the provinces of those names.

PANAY. A town of Panay, Philippines, in the Province of Cápiz, situated about three miles southeast of Cápiz (Map: Philippine Islands, G 8). Population, 15,500.

PANCATANTRA, or **PANCHATANTRA**, pān'chā-tān'trā (Skt., five threads, or books). The most important collection of Sanskrit beast-fables. Its date is uncertain, but is probably as old as the fifth century A.D., since it was translated into Pahlavi in the sixth century by Barzoi, the Court physician of the Sassanian King Khosru Anushirvan (531-579). The Pancatantra is almost certainly drawn from Buddhist sources. Its analogies with the Jatakas (q.v.), or birth stories of the Buddha, are too close to admit of any other explanation than direct borrowing. Thus the mingling of maxims in verse with the prose story and the similarity of the beast-fables of the Sanskrit work to many of the *jataka* tales are resemblances both striking and significant. On the other hand, the original Buddhism of the Pancatantra has been modified and given a veneer of Brahmanism by the later redactors of the collection, who exercised whatever was anti-Brahmanistic in spirit. The outline of the collection is a simple one. Amarasakti, King of Mahilaropya, a city of the south (perhaps the Maliarpha of Ptolemy, and the modern Mayilapur near Madras), had three idle and stupid sons. On the advice of his minister Śumati, he requested an aged Brahman, Vishnuserman, to teach these youths and make them princes indeed. The sage promised to achieve this result within six months, and, to inculcate in them moral principles, he wrote the Pancatantra. After the young men had read this work, they became, within the six months' space, all that Amarasakti could desire. The Pancatantra itself is divided, as its name implies, into five books. The first of these, the *Mitrabhēda* or *Separation of Friends*, tells how two jackals, Karataka and Damanaka (whence is derived the title of the Syriac version, *Kalila and Dimna*, q.v.), bring together a lion, Pingalaka, and a bull, Sanjivaka. Damanaka, however, soon feels himself neglected, and by telling the lion and the bull alike that each

is plotting against the other, he causes the death of both, and, as the lion's prime minister, becomes the gainer by his craft. The second book, called the *Mitraprāptika*, or *Acquisition of Friends*, deals with the friendship of a crow, Laghupatanaka, a mouse, Hiranyaka, a tortoise, Mantharaka, and a deer, Citranga, and sets forth the value and advantage of true friendship. The third book, the *Kōkōlūkiya*, or (*Book of*) *the Crows and Owls*, is designed to show the impossibility of real friendship between those who are natural enemies, as were Meghavarna, king of the crows, and Arimardana, king of the owls. In the fourth book, entitled *Labdhapranāsa*, or *Loss of what has been Gained*, the main story is of a crocodile, Vikaralamukha, and a monkey, Raktamukha. The latter gave the former nuts of the rose-apple tree, which so delighted the crocodile's wife, when she tasted some, that she compelled her husband to seek the heart of the monkey, which must be, she thought, better even than the nuts. Raktamukha, however, escaped, and the crocodiles for their greed and ingratitude lost all chance of future dainties. The last book is named *Aparikṣitakāraka*, or *Thoughtless Action*. A certain pious merchant named Manibhadra, who had lost all, had a vision in which he was bidden to strike a Jaina monk who should appear to him the following day. He did as he was bidden, and the apparition turned into gold. A barber seeing this, and knowing nothing of the vision, invited a number of Jaina monks to his house, and struck them so severely that many were killed, and the barber himself was impaled as a punishment for his folly. About these frameworks fables appropriate to the title of each book are built. After the introduction, the order is a box arrangement, familiar to readers of the *Arabian Nights*. The situations are often excellent, and the moral teaching beyond reproach. The quaint treatment of the beasts as men, yet retaining all their peculiar traits, has a touch of delicate humor. Thus the crocodile falls at his wife's feet, and the tiger stands with folded hands after performing his religious ablutions. The influence of the Pancatantra on literature has been considerable, as from it, in large part, the *Hitopadesa* (q.v.) was taken, and its form very probably exercised an influence, at least remotely, on the *Arabian Nights* (q.v.). The text of the work, which seems from the evidence of the oldest translation to have comprised twelve books instead of five as at present, varies considerably in the different recensions. Consult: *Pāṇcatantrum*, ed. Kosegarten (Bonn, 1848-59); *Panchatantra*, ed. Kielhorn and Bühler (Bombay, 1885-96); Benfey, *Pāṇcatantra, übersetzt mit Einleitung und Anmerkungen* (Leipzig, 1859); Lancereau, *Pāṇcatantra, traduit* (Paris, 1871); Fritze, *Pāṇcatantra, neu übersetzt* (Leipzig, 1884); Shadagopa Chari, *Panchatantra*, translated (Trichinopoly, 1887); Mankowski, *Der Auszug aus dem Pāṇcatantra in Kāhemendras Brihatkathamānjari* (Leipzig, 1892); Schmidt, *Pāṇcatantra (Textus ornatiore), zum ersten Male übersetzt* (ib., 1901). See BIDPAI; FAHLE.

PANCHALA, pān-chāl'lā. The name of a country in ancient India. It was one of the two great divisions of the so-called Madhyadeśa, or Midland Country. Its territory lay between the Ganges and the Jumna, and extended nearly from Bulandshahr to Allahabad, although at one

time it extended over the wider district which lies between the Chambal River and Gangadvara.

PAN'COAST, JOSEPH (1805-82). An American surgeon, born in Burlington County, N. J. He graduated from the medical department of the University of Pennsylvania in 1828, and in 1834 was appointed a physician at the Philadelphia Hospital. Four years later he accepted the professorship of surgery in Jefferson Medical College, a chair which in 1841 he exchanged for that of anatomy. The latter he held until 1878, when he resigned in favor of his son, Dr. William Henry Pancoast, and was elected emeritus professor. After leaving his position at the Philadelphia Hospital he was until 1845 one of its visiting surgeons, and later (1854-64) held a similar position at the Pennsylvania Hospital. He originated several important operations, and published a number of medical and surgical works, among which are: *A Treatise on Operative Surgery* (3d ed. 1852); *A Treatise on the Structure, Functions, and Diseases of the Human Sympathetic Nerve* (1831), a translation of Lobstein's Latin original; and *A System of Anatomy for the Use of Students* (1844), adopted from Casper Wistar. In addition he contributed frequently to the *American Journal of the Medical Sciences* and to the *American Medical Intelligence*.

PANCRAS, or PANCRATIUS. A Christian martyr, who suffered death at Rome at the early age of fourteen years, during the Diocletian persecution. He was highly honored during the Middle Ages and considered to be the avenger of false oaths. The French kings at one time confirmed their treaties by swearing in his name. His day is May 12th, the date of his martyrdom.

PANCRATIUM (Lat., from Gk. *παγκράτιον*, *pankraton*, complete contest, from *παγκράτης*, *pankratēs*, all-powerful, from *πᾶς*, *pas*, all + *κράτος*, *kratos*, strength). A form of Greek athletics, combining wrestling and boxing, the invention of which was ascribed to Theseus. The bare hands were used, and were curved, but not clenched, in boxing. It formed part of the great national games of Greece, and became very popular at Rome, where it appears to have been introduced in Caligula's time.

PANCREAS (Neo-Lat., from Gk. *πάγκρεας*, *pankreas*, sweetbread, from *πᾶς*, *pas*, all + *κρέας*, *kreas*, flesh). A compound racemose gland, found lying transversely across the posterior wall of the abdomen behind the stomach, varying in length from six to eight inches, having a breadth of about an inch and a half, and a thickness of from half an inch to an inch. Its usual weight is about three ounces. The large expanded end of the pancreas directed to the right is known as the head, the smaller pointed extremity extending to the left is known as the tail. The head of the pancreas lies in the concavity of the duodenum.

The secretion of this gland, or the pancreatic fluid, is conveyed from its various parts by means of the pancreatic duct to the duodenum. This gland is found in all mammals, birds, reptiles, amphibians, and osseous fishes, and in some cartilaginous fishes.

The character and function of the pancreatic fluid are described in the article DIGESTION.

The diseases to which the pancreas is subject, though few, are usually of a fatal character. Their existence is often not made manifest by

any very well recognized set of symptoms, so that a diagnosis of the affection is frequently impossible. Wounds of this organ are usually fatal.

PANCREATIN. A mixture of the ferments naturally existing in the pancreas of warm-blooded animals, and usually obtained from the fresh pancreas of the hog. The animal should be killed about six hours after a full meal, the organ being then at the height of its activity. The extract is a yellowish, yellowish-white, or grayish amorphous powder, having a faint, peculiar odor and a meaty taste. It contains or should contain the four pancreatic enzymes or ferments: trypsin, which has the property of digesting proteids (meat, eggs, etc.); amyllopsin, a diastatic ferment, i.e. converts starches into sugars; steapsin, a fat-splitting and emulsifying ferment; and a milk-curdling enzyme. It is used as an artificial agent to digest the food of invalids and old people, or those prostrated by fever or exhaustion.

PANCSOVA, pōn'chō-vō. A royal free city in the County of Torontál, South Hungary, situated on the Temes a few miles from its confluence with the Danube, and about 10 miles northeast of Belgrade (Map: Hungary, G 4). It is a well-built town with a number of squares, fine public buildings, a gymnasium, and a custom-house. Its manufactures include silk, liquors, brick, and flour. The trade in grain is important. Population, in 1890, 18,289; in 1900, 19,044, chiefly Serbs, Magyars, and Germans.

PAN'DA (perhaps an abbreviation of Naipali *niyalyaponga*, bamboo-eater), or WAH. A curious Himalayan mammal (*Elurus fulgens*), of the raccoon family, and much like a raccoon in habits. It is about the size of a house-cat, and has a very short muzzle, small rounded ears, a moderately long tail, covered with long hair, plantigrade feet with semi-retractile claws, and a singular dentition. It dwells chiefly among the rocks of the higher mountain slopes, but also climbs trees, and preys much on birds, small quadrupeds, and insects. It has a thick, fine, woolly covering, adapting it to a cold climate, concealed by long, soft, glistening and richly colored hair, mostly chestnut brown, which passes into black on the sides and legs, and into white on the head. The panda is also called *wah* and *chit-wa*, from a peculiar cry which it utters. It is restricted to the southeastern Himalayas, where these animals are occasionally captured and tamed into gentle but inactive pets. An extinct panda lived in Europe during the Pliocene period. Consult Lydekker, *Royal Natural History*, vol. ii. (London, 1896).

PANDAN, pān-dān'. A seaport town of Panay, Philippines, situated on the west coast of the island, in the northern part of the Province of Antique (Map: Philippine Islands, G 8). Population, 13,737.

PANDANA'CEÆ, the **PANDANUS**, or **SCREW PINE FAMILY** (Neo-Lat. nom. pl., from *Pandanus*, from Malay *pandang*, conspicuous). A natural order of monocotyledonous plants, constituting a remarkable feature in the scenery of many tropical countries, where they frequent the seacoast or marshes. They are trees or shrubs, sometimes decumbent or climbing, and often sending down adventitious roots, which bear curious membranous rootcaps. The order is composed of the genera *Pandanus* and *Freyinetia*, which have

long, simple, imbricated leaves, usually spiny on the back and margin, their base embracing the stem, their spiral arrangement often notably visible. The flowers are mostly unisexual, naked, or with only a few scales, arranged on a spadix and wholly covering it. The stems are numerous; the ovaries usually clustered, one-celled, each crowned with a stigma; the fruit consists of fibrous, one-seeded drupes, collected or almost combined, or of berries with many seeds. There are about 80 known species, some of which yield useful products.

PANDANUS. See SCREW PINE; PANDANACEÆ.

PANDARUS (Lat., from Gk. Πάνδαρος). (1) The son of Lycaon and a hero of the Trojan War. With the bow received from Apollo, he became famous as an archer. He was killed by Diomedes. (2) One of the companions of Æneas; killed by Turnus. (3) In Shakespeare's *Troilus and Cressida*, and in Chaucer, a go-between or procurer; the uncle of Cressida.

PĀṆDAVAS, pān'da-vāz. In Hindu legend, the five putative sons of Pandu, the son of the sage Vyasa (q.v.). As he was prevented by a curse laid on him by a sage, whom he had unwittingly killed, from having offspring, his two wives, Kunti and Madri, by a charm obtained from the sage Durvasas, were permitted to bear children by any divinities they chose to invoke. Kunti accordingly bore three of the Pandavas, Yudhishtira, Bhima, and Arjuna, by Dharma, Vayu, and Indra respectively, while Madri gave birth to the other two, Nakula and Sahadeva, by the twin Aśvins. Arjuna is by far the noblest of the brothers, and is the real hero of the epic of the Mahabharata. It is he to whom Krishna (q.v.) recites the Bhagavadgita (q.v.) on the eve of the battle of Kurukshetra. Next to him in uprightness stands Yudhishtira, while Bhima, although gifted with many good qualities, is boastful and irascible, conspicuous for physical rather than moral courage. The two sons of Madri play but a subordinate part. The strife between the Pandavas and their cousins the Kauravas, the hundred sons of Dhritarashtra, the blind brother of Pandu, is the theme of the great Sanskrit epic of the Mahabharata (q.v.). The legend seems to be a reflex of an early tribal war in Northern India.

PANDECTS (Lat. *pandecta*, from Gk. πάνδεκτης, *pandektēs*, all-receiving, from πᾶς, *pas*, all + δέχεσθαι, *dechesthai*, to receive). The leading compilation of the Roman law, made by the direction of the Emperor Justinian (q.v.). It is also sometimes known as the Digest. The celebrated Justinian Code had previously been compiled by his order, but it dealt with the more practical affairs of common occurrence, and the Pandects were designed to supplement it with all the more subtle legal learning of the age.

In A.D. 529 Justinian, by an ordinance known as the *De Conceptione Digestorum*, commanded the eminent jurist Tribonianus to select some of the most learned lawyers and jurisconsults of the Empire to assist him in making a collection of decisions and opinions on all points of law. Tribonianus, who had previously had valuable experience in the preparation of the code, formed a commission consisting of himself and sixteen others for the purpose. The work was finished

in the year 533, three years after it was commenced. The authorities which were compressed, interpreted, and put in systematic form were said to have consisted of upward of 2000 treatises, and the Pandects contain upward of 9000 separate extracts or statements, selected according to subjects from these treatises and authorities.

The Pandects are divided into 50 books, each containing several titles, and each title several extracts from the authorities, due credit being given to the lawyer or authority from which each extract is derived. The usual form of citation is by the numbers of the book, title, and section or extract. The work is also divided into seven parts, which correspond respectively with the books, 1-4, 5-11, 12-19, 20-27, 28-35, 36-44, and 45-50. This latter division is seldom referred to in citations.

The principal jurists from whose writings the extracts were taken were 39 in number, and are sometimes called the classical jurists, although some eminent writers confine that name to five of that number, viz. Papinianus Paulus, Ulpian, Gaius, and Modestinus. The extracts from these authorities indeed constitute the bulk of the collection, those from Ulpian alone making about one-third of the whole work, those from Paulus one-sixth, and those from Papinianus one-twelfth. Other writers besides these 39 are cited, but usually only indirectly, i.e. when cited by the jurists whose works constitute the basis of the collection. The Pandects were arranged according to the method of the code.

The work is deservedly one of the most famous collections of law the world has known. In its relations to the history and literature of Rome it is invaluable; and with its necessary complement, the Codex, it was the basis of all mediæval legislation, and of the civil law of to-day, besides exercising an influence on the law of England. The origin of many doctrines and terms in modern English and American law may be traced to the Pandects, and the idea of codification which prompted the work is being developed in all jurisdictions in general acts on various subjects of the law. See JUSTINIAN; CIVIL LAW; COMMON LAW; JURISCONSULT.

PANDER, CHRISTIAN HEINRICH (1794-1865). A Russian naturalist, one of the founders of embryology. He was born in Riga, studied in Germany at Würzburg and Jena, and in 1820 accompanied, as naturalist, a Russian expedition to Bokhara. His great contribution to the embryology of the Vertebrata was in the study of the development of the chick, and in 1817 he made careful research on the embryonic layers which, although known to Wolff half a century before, are commonly called by Pander's name, as is the kernel or central swelling on the germinal disk of the fowl's egg. Besides *Beiträge zur Entwicklungsgeschichte des Hühnchens im Ei* (1817), and a Latin dissertation on the changes in the egg in the first five days of incubation (1817), Pander wrote *Vergleichende Ostologie* (with D'Alton, 1820-28), and *Beiträge zur Geognosie des russischen Reichs* (1830).

PANDORA (Lat., from Gk. Πανδώρα, giver of all, also interpreted as gift of all, or gifted by all, i.e. the gods, from πᾶς, *pas*, all + δῶρον, *dōron*, gift). According to the Hesiodic poems, the first woman. To punish Prometheus

and mankind for the theft of fire, at the command of Zeus, Hephæstus formed from earth a beautiful woman, to whom all the gods contributed gifts. She was sent by the gods to Epimetheus, the brother of Prometheus, who, in spite of warnings, received her to his ruin. One version adds that Pandora opened a cask in which were kept safe many blessings, which thus became scattered and lost, only Hope being saved by the prompt closing of the lid. There are many indications that point to Pandora as an earth-goddess like Demeter, and render it probable that the original myth is of a new earth given to men as punishment for the theft of fire, from which sustenance can only be won by hard toil. The "Birth of Pandora" was represented on the base of the great statue of Athena Parthenos by Phidias, and is found on two Attic vases and two reliefs.

PANDORUS SPHINX. A large olive-brown North American hawk-moth (*Philampelus Pandorus*). See Colored Plate of MOTHS.

PANDROSOS (Gk. Πάνδροςος, all-bedewing). The daughter of the Athenian Cecrops. She was the first priestess of Athena, and with the latter was honored in the Pandroseum on the Athenian Acropolis.

PĀNDYA, pān'dyā. A country in the extreme south of ancient India, corresponding roughly to the modern Tinneveli. Its western boundary was the famous Malaya Mountain (the southern part of the Western Ghats), and its southern the Tambraparni River. The sacred island of Rameswaram, from which Rama (q.v.) began his bridge to Ceylon, was also a part of Pandya. The capital was almost certainly Madhura (now Madura), although Kalidasa (q.v.) calls the chief town 'Serpent City,' which might seem to point to Negapatam, situated on the coast, a little south of Karikal. The Kingdom of Pandya was well known to Ptolemy, Strabo, and Pliny, who call it Pandion, and according to some classical accounts the King sent an embassy to the Emperor Augustus.

PANEL (OF. *panel*, *pannel*, *paneau*, Fr. *panneau*, from ML. *panellus*, panel, diminutive of Lat. *pannus*, cloth, rag, Gk. πῆνος, *pēnos*, Doric *ῥᾶνος*, *panos*, thread on the bobbin). Primarily, a flat piece of wood engaged by its edges into the grooves of a frame surrounding it; hence, by extension, any flat surface surrounded by a frame. In carpentry and joinery the frame may be plain or molded, and the flat and relatively thin board may be set with its face flush with one face of the frame (*flush panel*); or it may have the central part of its surface project more than the portions next the frame (*raised panel*); or be itself decorated with moldings or carvings (*molded panel*, *carved panel*). In architecture any space defined by inclosing moldings or framework is called a panel. The deep panels of vaults like that of the Pantheon, and of many Renaissance ceilings, are called *caissons* or *coffers*: small round panels are called *medallions*. In Gothic architecture paneling was often adorned with carved tracery, and in the late or florid period large wall surfaces were covered with paneling itself reproducing tracery-forms, as in Henry VII.'s chapel at Westminster. Wherever woodwork is used for large surfaces, it is commonly paneled, as in doors, wainscoting, and furniture.

PANEL. A schedule or list of the names of persons whom a sheriff, or other proper officer of the court, has summoned to serve as jurors.

The term is also applied to the body of persons in attendance upon a court in response to a summons to appear and serve as jurors.

In the Scotch law the term panel is employed as being synonymous with the English phrase 'prisoner at the bar.' See JURY; TALESMAN; VENIRE FACIAS.

PANGANI, pān-gū'nē. A coast town of German East Africa, at the mouth of the river Pangani, 50 miles northwest of Zanzibar (Map: Africa, H 5). The town is the seat of a government district, with a custom house, post-office, and telegraph agency. There are a mosque and some stone houses, but most of the houses are of clay. It has the building of the German East Africa Company and is the chief export point of the colony, with an extensive inland caravan trade. Population, estimated, 6000, mostly Negroes and Arabs.

PANGASINÁN, pān-gā-sē-nān'. A province of Western Luzon, Philippine Islands, situated at the head of the Gulf of Lingayén (Map: Philippine Islands, E 3). Its area is 1316 square miles. It is bordered by mountains on the east and west, but practically the whole province is occupied by the lower valley and the delta of the Agno River. A large part of the coast region is subject to inundations, and even the rice, the staple crop, is sometimes injured by the floods. Other agricultural products are sugar-cane, corn, tobacco, and coconuts, and there are abundant deposits of salt and other minerals. The chief manufactures are mats, hats, and sugar sacks, and there is an active commerce in the hands of the Chinese. The population was estimated in 1901 at 302,178, chiefly Pangasináns. The capital is Lingayén (q.v.). For ethnology see PHILIPPINE ISLANDS.

PAN'GE LIN'GUA (Lat., Proclaim, O Tongue). One of the most remarkable of the hymns of the Roman breviary, and like its kindred hymn, *Lauda Sion*, a most characteristic example as well of the mediæval Latin versification as of that union of theology with asceticism which a large class of these hymns present. The Pange Lingua is a hymn in honor of the eucharist, and belongs to the service of the festival of Corpus Christi. It was written by Saint Thomas Aquinas (q.v.) in 1263 and consists of six strophes of verses in alternate rhyme. Besides its place in the office of the breviary, the last two stanzas form part of the service of benediction of the blessed sacrament.

PANGEN'ESIS (Neo-Lat., from Gk. πᾶς, *pas*, all + γένεσις, *genesis*, production, from γίγνεται, *gignesthai*, to be born). The name given to a theory proposed by Darwin, to account for the facts of heredity. He conceived that the hereditary characters of all organisms were handed down by means of exceedingly minute gemmules thrown off from the individual cells of the body. These invisible granules or gemmules, too minute to be detected by the microscope, were supposed by Darwin to be the bearers of heredity (q.v.). These gemmules were supposed to multiply by self-division and to find their way by various routes to the developing reproductive cells, in which they would accumulate until each reproductive cell contained gemmules represent-

ing every part of the body; each gemmule was supposed to develop into the part corresponding to that from which it was derived. This theory was disproved by Galton by experimenting on the transfusion of blood from rabbits of one breed to those of another, and finding that the results proved that "the doctrine of pangenesis, pure and simple, is incorrect." Consult: Darwin, *The Variation of Animals and Plants Under Domestication*, vol. ii. (London, 1888); Brooks, *The Law of Heredity* (Baltimore, 1883); Weismann, *Essays upon Heredity* (Oxford, 1889).

PANGLOSS, DOCTOR. A pompous prig in Coleman's *Heir-at-Law*, the tutor of Dick Dowlass. He is given to affected expressions and to quotations, to which he always adds the source.

PANGOLIN. A name for the East Indian scaly ant-eaters of the family Manidae. See MANIS.

PANHANDLE. A name given to the portion of West Virginia which protrudes between Ohio and Pennsylvania, and to similar projections of Texas and Idaho.

PAN'HELLE'NIA. A festival of Zeus Panhellenios instituted by the Emperor Hadrian, who also bore the surname Panhellenios.

PANIC. See CRISIS, ECONOMIC.

PANICALE, pā'nē-kā'lā, MASOLINO DA. See MASOLINO DA PANICALE.

PANICLE (from Lat. *panicula*, diminutive of *panus*, from Doric Gk. *πᾶνος*, *panos*, thread on the bobbin). A compound, spray-like flower-cluster produced by the branching of a raceme or corymb, as in many grasses. See INFLORESCENCE.

PANICUM. A genus of grasses. See MILLET.

PĀNINI, pā'nē-nē (fourth century B.C.). The greatest of all the grammarians of India. Of his life very little is known. Combined evidence fixes his birthplace at Salatura, near the modern town of Attock, in the extreme north of the Punjab. According to a verse in the *Pancatantra* (q.v.) he was killed by a lion. A late and trivial legend, told by Somadeva in the *Kathāsaritsāgara*, describes the future grammarian in his youth as a very stupid pupil of a Brahman named Varsha. Being sent away, Panini practiced such austerities in the Himalayas that Siva, pleased with the penance, revealed to him the grammar which he then set forth to the world. The work of Panini is the oldest Sanskrit grammar which has been preserved. Although he names no less than sixty-four predecessors in two schools, a northern and a southern, their books have been so entirely superseded by his that they have disappeared. He marks the line between Vedic and classical Sanskrit. (See SANSKRIT LANGUAGE.) His influence is shown by the fact that the language as he fixed it never changed its character so far as the literary usage was concerned. The grammar of Panini consists of eight books, each of which contains four chapters. The chapters are composed of varying numbers of extremely short rules, or *sūtras*, of which the entire work contains 3996. Of these three, or perhaps four, were not written by Panini himself. The rules are in algebraic style, and are so compact and obscure that they are unintelligible without close study.

He invented a large number of arbitrary symbols to express various grammatical terms, which increase the obscurity of his work, even while they contribute in a large measure to its brevity. There is, however, a certain amount of method beneath these apparently arbitrary syllables. His system of grammar is based on the theory of the verbal origin of nouns. The arrangement is widely different from that found in Occidental works. Thus instead of treating phonology, inflection, conjugation, and the like separately, Panini traces a given phonetic change, as the change of *n* to *ṇ*, throughout the language, without reference to the class of word in which it may occur. Syntax is not considered by him, and the inflection, strictly speaking, must be built up from the rules scattered throughout the work. The authority gained by Panini was well deserved, for his grammar is one of the most exhaustive ever written. This preëminence, together with his extreme obscurity, has called forth a number of commentaries. Of these the most important were the *Mahābhāṣya*, or Great Commentary, of Patanjali (q.v.), probably in the second century B.C. (edited by Kielhorn, 3 vols., Bombay, 1878-85), in which previous commentaries were summarized, and the first complete one, the *Kāśikā Vṛtti*, or Benares Commentary, of Jayaditya and Vamana, about A.D. 650 (edited by Bala Sastri, Benares, 1898). To the grammar there are added as appendixes a *Dhātupāṭha*, or Index of Roots, and the *Ganapāṭha*, or Index of Classes, both ascribed to Panini. The first contains 1961 roots, of which only about eight hundred have thus far been found in Sanskrit, although comparative linguistics establishes the existence of a number besides. About fifty roots known to occur in the Vedas are omitted. The second appendix is a collection of lists of words following the same rule as the first one of their series which is given in the main grammar. The chief edition is that by Böttlingk, *Pānini's Grammatik* (Leipzig, 1887).

PANINI, pā-nē'nē, GIOVANNI PAOLO (c.1695-1764). An Italian painter, born at Piacenza. He was the pupil of Benedetto Luti and Andrea Lucatelli, in Rome. He confined his attention to interiors and exteriors of buildings in or about Rome, and introduced figures and accessories, which, while not archaeologically accurate, are very picturesque in arrangement. His works include: "Interior of Saint Peter's," and "Antique Ruins," in the Louvre; "Ancient Ruins with Figures," in the National Gallery, London; and "Cardinal Polignac Visiting the Interior of Saint Peter's," in the Metropolitan Museum of Art, New York City.

PANIPAT, or **PANIPUT**, pān'ā-pūt'. A town in the District of Karnal, Punjab, British India, situated near the old bank of the Jumna, 53 miles north of Delhi by rail (Map: India, C 3). It figured in the negotiations between Yudishthira and Duryodhana about B.C. 1100. As an outpost of Delhi on the military road between Afghanistan and the Punjab it was the scene of several battles prominent in the history of Upper India. The most important are the battle of 1526, when the Afghan forces of Ibrahim Lodi, Emperor of Delhi, were routed by an inferior force of Moguls under Baber, who occupied Delhi and became Emperor; that of 1556, when Akbar, the grandson of Baber, won a vic-

tory over the Afghans under the Hindu general Hermu; and that of 1761, when the united armies of the Mahratta chieftains were defeated by the Afghans under Ahmad Shah Durani. At present the town is of little importance, and squalid in appearance. Population, in 1891, 27,547; in 1901, 26,914.

PANITAN, pá-né'tán. A town of Panay, Philippines, in the Province of Cápiz, situated on the Panay River, six miles south of Cápiz (Map: Philippine Islands, G 8). Population, 10,020.

PANIZZA, pá-né'tsá, OSKAR (1853—). A German satirist. He was born at Kissingen, studied medicine at Munich, where he was physician to an insane asylum from 1881 to 1883, and then lived in Paris and London. His early publications were lyrics, *Londoner Lieder* appearing in 1887. But he is better known for his satirical writings. Among them *Die unbefleckte Empfängnis der Päpste* (1893), *Der deutsche Michel und der römische Papst* (1894), and *Abschied von München* (1896) were suppressed by the German Government. The last mentioned refers to Panizza's condemnation to a year's imprisonment for blasphemy in his tragedy *Das Liebeskonzil* (1895; 3d ed. 1897). After his departure from Munich he lived in Zurich, and then in Paris as editor of the *Züricher Diskussionen*, and wrote *Dialoge im Geiste Huttens* (1897), *Psychopathia Criminalis* (1898), and *Parisiana* (1899).

PANIZZI, pá-né'tsá, Sir ANTONIO (1797-1879). Principal librarian of the British Museum from 1856 to 1866. He was born September 16, 1797, at Brescello, in the Duchy of Modena. He studied at the University of Parma, graduating in the faculty of law in 1818. He practiced in his birthplace. In 1882, despite favors from the Duke of Modena, he became involved in the conspiracy to overthrow the Modenese Government, and was arrested, but he escaped to England. Under the patronage of William Roscoe, the historian, he taught Italian at Liverpool. In 1828 Lord Brougham got him the Italian professorship at University College, London, and in 1831 the post of assistant librarian in the British Museum. In 1837 Panizzi was made keeper of the printed books, and in 1856 he succeeded Sir Henry Ellis (q.v.) as principal librarian. He resigned in 1866. He was made K. C. B. in 1869. Panizzi died at his London home near the Museum, April 8, 1879.

Panizzi was a man of immense energy and capacity. A friend of the leading statesmen of the time, in England, France, and Italy, he continued to wield political influence down to his death. Panizzi really made over the British Museum. Under his direction the library was removed from Montague House to its present quarters. He designed the famous reading-room and its annexes, perhaps his most brilliant conception. He framed the catalogue rules. He obtained for the library the princely bequest of Thomas Grenville, consisting of more than 20,000 rare volumes, valued at £54,000. In 1843 he drew up an elaborate report of the deficiencies in the library, which led two years later to an annual grant from the Government of £10,000 for the purchase of books. This fund, still continued, has helped to make the library the richest in the world. Panizzi wrote for the magazines, and edited Boiardo's *Orlando Innamorato*, Ariosto's *Orlando Furioso* (1830-34), and Lord Ver-

non's reprint of the first four editions of *The Divine Comedy* (1858). Consult Louis Fagan, *Life of Panizzi* (London, 1880).

PANJAB, pūn-jāb'. A province of British India. See PUNJAB.

PANJABI (pūn-jā'bé) **LANGUAGE AND LITERATURE**. The modern Indian language and literature of the Punjab (q.v.). The Panjabi represents, roughly speaking, an archaic dialect of Hindi, supplemented by a large number of loan-words from Arabic and Persian. On the other hand, the infusion of Sanskrit loan-words (technically called *tatsama*, 'identical') is small, as compared with the Eastern languages of India, especially Bengali (q.v.) and Uriya (q.v.). Panjabi, like all the Indian languages, has many small sub-dialects, which shade off into each other. The chief of these dialects are Multani in the South, which stands intermediate between Panjabi and Sindhi (q.v.), Jathki in the Centre, and Chibhali-Dogri in the North. There are several alphabets. Of these the oldest is the Gurmukhi, a modification of the Sanskrit Devanagari alphabet, with the omission of the signs for *r*, *f*, *l*, *ś*, and *kh*, but with the addition of *r* and *l*. It is in the Gurmukhi script that the *Adi-Granth* (q.v.) of the Sikhs is written. Next to the Gurmukhi the *Lundi*, which is employed by the merchant class, deserves mention. The official character of Government, however, is the Arabic, which is the one most generally employed. Panjabi has practically no literature, excepting the Sikh *Grantha*, although the New Testament and parts of the Old Testament have been translated into Multani and Dogri.

Consult: Cust, *Modern Languages of the East Indies* (London, 1878); Beames, *Comparative Grammar of the Modern Aryan Languages of India* (ib., 1872-89); Tisdall, *Panjabi Grammar and Reading Book* (ib., 1889); Wilson, *Grammar and Dictionary of Western Panjabi* (Lahore, 1899); O'Brien, *Glossary of the Multani Language* (ib., 1881); Starkey and Bussawa Sing, *English and Panjabee Dictionary* (Calcutta, 1849); Newton and Janvier, *Dictionary of the Panjabi Language* (Lodiana, 1854).

PANJANDRUM, THE GRAND. An imaginary person in a jumble of nonsense made up by Samuel Foote to test the remarkable memory of Macklin, the actor. The title is sometimes applied to a person of leading importance in a community.

PANJIM, pān-zhēn'. The capital of the Portuguese possession of Goa (q.v.) in India.

P'AN-KU, pān'kōō'. A mythical being, invented by the later compilers of Chinese legends, said to have been the first development of conscious being out of chaos. The original historians say nothing about P'an-ku, but the Chinese names given him in popular speech and in the voluminous mediæval literature seem to mean 'Embryo'; Prince of the Three Powers (of Heaven, earth, and man); Son of Heaven, etc. The legends of this reputed first conscious being are greatly embellished, according to the fancy of myth-making writers. After toiling millions of years to bring the earth into shape, he died and his breath became wind and cloud; his voice, thunder; his left eye, the sun; his right eye, the moon; his teeth and bones, metals; his marrow, pearls and precious stones; his sweat, rain; and

the parasites on his body impregnated by the wind, the human species.

PAN MICHAEL. A novel by Henryk Sienkiewicz (1887). With the novels "With Fire and Sword" and "The Deluge," it completes the great trilogy on the Polish wars of the seventeenth century. Michael Volodyovski, the little knight and marvelous swordsman, who appeared in the earlier tales, is the hero in this romance of the Tatar invasions and border warfare. Zagloba, a Polish Falstaff, draws Michael from his retirement in a monastery to the war, to which his wife, Basia, follows him. At the surrender of Kamenyets to the Sultan, Michael and Kelting blow up the castle and perish in the ruin.

PANNA, or PUNNAH, pân'â. A native State of the Bundelkhand Agency (q.v.), Central India. Area, 2568 square miles; population, in 1881, 227,306; in 1891, 239,333. Capital, Panna.

PANNO'NIA. A province of the ancient Roman Empire, bounded on the north and east by the Danube, and on the west by the mountains of Noricum, and on the south reaching a little way across the Save, and thus including part of modern Hungary, Slavonia, and parts of Bosnia, Croatia, Carniola, Styria, and Lower Austria. It received its name from the Pannonians, a race of doubtful origin, who at first dwelt in the country between the Dalmatian mountains and the Save, in modern Bosnia, and afterwards more to the southeast in Mœsia. The Roman arms were first turned against them and their neighbors, the Iapydes, by Augustus in B.C. 35, and after the conquest of Segestica or Siscia (Szigsek) he subdued them. An insurrection took place in B.C. 12, which Tiberius crushed after a long struggle, and a more formidable one of the Dalmatians and Pannonians together in A.D. 6, which was suppressed by Tiberius and Germanicus, but not without a two years' struggle. Fifteen legions had to be assembled against the Pannonians, who mustered 200,000 warriors. Hereupon the Pannonians settled in the more northern districts, which received their name, and of which the former inhabitants, the Celtic Boii, had been in great part destroyed in Caesar's time. The country was now formed into a Roman province, which was secured against the inroads of the Marcomanni and Quadi by the Danube, and on its other frontiers had a line of fortresses. Military roads were constructed by the conquerors, who also planted in the country many colonies and municipia, and thus gave it a rough coating of civilization. The country was divided by Trajan, during the Dacian wars, into Upper (or western) and Lower (or eastern) Pannonia, and under Galerius and Constantine it underwent other changes. Upper Pannonia was the scene of the Marcomannic war in the second century. In the fifth century Pannonia was transferred from the Western to the Eastern Empire, and afterwards given up to the Huns. After Attila's death, in 453, the Ostrogoths obtained possession of it. The Longobards under Alboin made themselves masters of it in 527, and relinquished it to the Avari upon commencing their expedition to Italy. Slavic tribes also settled in the south. Charlemagne brought it under his sceptre. In the reigns of his successors the Slavs spread northward, and the country became a part of the great Moravian kingdom, till the

Magyars or Hungarians took it in the end of the ninth century. In the time of the Romans the chief towns of Upper Pannonia were Carnuntum (Petronell), Petovio (Pettau), Siscia (Szigsek), Emona (Laibach), Savaria (Stein and Anger), and Vindobona (Vienna); of Lower Pannonia, Aquincum (Alt-Ofen, or Old Buda) and Sirmium (Mitrovic).

PANNUS. See CONJUNCTIVITIS.

PANO, pân'ô. A tribe of the Huallaga and Ucayali rivers, Northeastern Peru, the nucleus of those constituting the Panoan stock (q.v.). According to their traditions they have emigrated from a northern region. In 1670 the missionary Lucero collected a part of them into a settlement at the mouth of the Huallaga. In 1830 they removed to the mission of Sarayacu on the Ucayali, where they still reside. They are expert boatmen, building canoes of 40 feet in length, and they have a frank, easy, and courteous bearing, but are much given to drunkenness. It is said that they formerly preserved pictograph records painted on paper manufactured from the fibre of banana leaves. They number less than 2000.

PANOAN STOCK. An important South American linguistic stock, comprising some 20 tribes occupying the immense forest region on the upper portions of the Madeira, Beni, Parua, Javary, Ucayali, and Huallaga, east of the Andes and south of the Amazon, in Peru, Bolivia, and Western Brazil. Although apparently of more than average native intelligence, they are almost all in their original savage condition, some of them being even accused of cannibalism. Several of their tribes are light in color. Like most of the peoples of the Amazon region, they are steadily decreasing in number. Among the most important tribes of the stock are the Cashibo, Conibo, Mayoruna, Pano, Remo, Senci, Setebo, and Shipibo.

PANÓFKA, pâ-nôf'kâ, THEODOR (1801-58). A German archaeologist, born and educated in Breslau. He began the important excavations at Nola, Italy, and at the establishment of the Archaeological Institute at Rome became its secretary. In 1844 he was named professor of archaeology at Berlin. His works, which are still valuable for the material collected and for the illustrations, include: *Neapels Antiken* (1828); *Musée Blacas* (1830-33); and *Bilder antiken Lebens* (1843).

PANORAMA (Neo-Lat., from Gk. *παρ*, *par*, all + *ὄραμα*, *horama*, view, from *ὄραω*, *horan*, to see). A pictorial representation of the whole surrounding landscape as seen from one point. It differs from a painting in that the latter only gives part of the landscape, and aims at artistic effect, whereas the chief aim of the panorama is optical illusion. The first step in the construction of a panorama is to obtain sketches of the entire region to be represented; each sketch is a representation of a portion of the landscape in the form of a sector of a circle, with the sketcher's position as a centre, and the horizon for circumference. The canvas to which the sketches are to be transferred is hung round the sides of a circular room, and forms the surface of a cylinder, on the inside of which the panorama is painted. The stage from which the picture is viewed is placed in the centre of the room, about

30 feet on every side from the picture; the picture itself is fastened above to a strong circular hoop, and, hanging down, has its lower edge fastened to a similar hoop, which is heavily weighted to keep the picture steady. The light is admitted by an aperture in the roof, which is concealed by an awning from the spectators on the stage.

The idea of a panorama was first conceived by the architectural painter Breisig, of Danzig, but the first to put it in execution was Robert Barker, a painter, of Edinburgh, to whom the idea occurred while taking a sketch of the city from the top of Arthur Seat. After surmounting numerous difficulties—one of which was the invention of a new kind of perspective for the horizontal lines—he succeeded in producing an effective panoramic view of Edinburgh, which was exhibited in that city in 1788, and in London in the following year. The next panorama executed by Barker was a view of London from the top of the Albion mills, which was followed by scenes from the Napoleonic wars. In 1799 the panorama was taken up in Paris, where it was much improved, and whence it was introduced into other European cities. Its use has greatly increased since the Franco-Prussian war of 1870-71. By the employment of plastic objects, in addition to painting, the painter Philippoteaux greatly increased the optical illusion, as was seen in his admirable panorama, "The Siege of Paris," exhibited in 1875. He was also employed in the United States on a panorama of the "Battle of Gettysburg," which was exhibited in New York, 1888-91, and afterwards in other American cities. In recent years many artists of ability have painted panoramas, which are now to be found in most of the chief cities of Europe and the United States. Consult Bapst, *Essai sur l'histoire des dioramas* (Paris, 1891).

PANORMITA, pā'nōr-mē'tā, ANTONIO BECCADELLI (1394-1471). An Italian humanist, born at Palermo, whence the name Panormita by which he is commonly known. He was educated at Siena and taught classics at Pavia, Bologna, and Padua. His most notorious work was the collection of obscene elegies entitled *Hermaphroditus*, which, though attacked by some of the lesser clergy, and condemned by the Pope, won praise from the scholars of the time for its elegant Latinity. In 1435 Alfonso of Naples pensioned him and made him historiographer.

PANORMUS. The ancient name of Palermo (q.v.).

PANPSYCHISM, pān-sī'kīz'm (from Gk. *πᾶς*, *pas*, all + *ψυχή*, *psyche*, soul). A term of somewhat rare occurrence which designates the metaphysical theory that the whole of nature, inanimate and animate alike, is endowed with mind, or has a mental side or aspect; so that the atom of the physicist, no less than man himself, though of course in immeasurably less degree, is ensouled, and the movements of the atom, no less than the voluntary movements of man, are accompanied by mental process. The name may be applied, in ancient philosophy, to the Stoic doctrine of *Allbeseelung*, as opposed to the earlier *hylozoism*; and, in modern times, to such philosophical beliefs as were held by Thomas Carlyle, still more to such a philosophical system as that of Fechner. Every panthe-

istic system (see **PANTHEISM**) is also, in a sense, panpsychistic. In particular, certain of the Arabian philosophers, notably Averroes (q.v.), have been termed panpsychists by the historians of philosophy.

PANSA, HOUSE OF. The name given to the ruins of a large dwelling in Pompeii, from an election notice painted on its front wall. The house is interesting chiefly on account of the regularity of its plan. Although extensive, it contained few large apartments, but was cut up into small rooms and contained a number of shops, including a bakery. None of the wall decorations are preserved.

PANSLAVISM, pān-slāv'iz'm (from Gk. *πᾶς*, *pas*, all + Ger. *Slave*, Slav, from OChurch Slav. *Slavicninu*, Russ. *Slavyaninu* Slav). The term applied to a movement in which Russia as the great Slavic nation has assumed the leadership, for the political and cultural union of all races of Slavic descent. It had its origin about 1830 and was fostered by the general awakening of the national spirit which characterized the Europe of that time. The movement throughout Central Europe was paralleled by the Slavophile movement in Russia which had for its object the regeneration of the country through a return to the old ideas of Russian civilization as they had stood before the Western innovations of Peter the Great. Russia, owing to its predominant position in European affairs under Nicholas I., came to be regarded as the protector of the scattered Slavic peoples living under Austrian, Prussian, or Turkish rule. In 1848 the leading promoters of Panslavism summoned a congress at Prague, which was attended by Slavs from Bohemia, Moravia, Silesia, Servia, Croatia, Dalmatia, and Poland. Since 1860 Panslavism has exerted direct influence on Austro-Hungarian politics, both northern and southern Slavs tending toward united action in opposition to the Germans and Magyars. In 1867 a great Slavic congress was held at Moscow, but with little material result. It was largely as the natural champion of the oppressed Slavs of the Balkan peninsula that Russia declared war on Turkey in 1877, and the politics of the peninsula since then have been influenced to a considerable degree by the ambitions of the Panslavists. Up to the present time, however, the Panslavic spirit has asserted itself most effectually in the field of literature and more especially in philology, where the researches of many scholars have resulted in laying down the principles for a comparative science of Slavic languages.

PANSY. See **VIOLET**.

PANTÆNUS (Lat., from Gk. *Πανταίνος*, *Pantainos*). Teacher of the Christian catechetical school in Alexandria about 180-195. Little is known about him, but he was probably a native of Sicily, trained in the Stoic and Pythagorean philosophy, and converted to Christianity in adult life. His fame rests chiefly upon his work as a teacher, which is described with affectionate admiration by his celebrated pupil Clement. (See **CLEMENT OF ALEXANDRIA**.) Tradition relates that he went on a mission to India, which is not improbable. He is said to have written commentaries on the Scriptures, but none have survived. It has been suggested that he may have written the last two chapters of the *Epistle to Diognetus*. There is no trace of him after the

persecution under Septimius Severus (203). The small fragments ascribed to Pantænus are given in Routh's *Reliquiæ Sacræ* (Oxford, 1846). Consult: Harnack, *Geschichte der altchristlichen Literatur* (Leipzig, 1893); Bigg, *The Christian Platonists of Alexandria* (London, 1886); Cruttwell, *Literary History of Early Christianity* (ib., 1893).

• **PANTAGRUEL**, *Fr. pron.* pān'tā'gru'él'. The son of the giant Gargantua and the chief character in Rabelais's romance, *Gargantua et Pantagruel*. In the fifteenth century mysteries the name is given to a demon who throws salt into the mouths of sleeping persons, and Rabelais made the character King of the Dipsodes (thirsty). Like his father, Pantagruel is the hero of various burlesque adventures imitating the exploits of chivalry.

PANTALEON (?-A.D. 305). A Roman saint, physician, and martyr, born, it is supposed, at Nicomedia in Bithynia. He studied medicine and became special physician to the Emperor Galerius. He was a Christian and was martyred as such. He is the patron saint of physicians, and his feast is kept on July 27.

PANTALEON. A large dulcimer, named by Louis XIV. in honor of its inventor, Pantaleon Hebenstreit. It was four times the size of the dulcimer, and had two soundboards, on one side strung with strings of wire and brass, and on the other side with gut strings. It was played with small wooden mallets, with which the strings were struck. The pantaleon was the direct precursor of the pianoforte (q.v.).

PANTELLARIA, pān'tel-lā-ré'ā, or **PANTELLERIA**. A small island in the Mediterranean Sea between Sicily and Africa, and belonging to Italy. It is of volcanic origin, and has an extinct crater 2743 feet high, and several hot springs. The soil is fertile, producing grapes, cotton, and olives, and the harbor on the northwest coast has considerable shipping. Population, in 1901, 8619.

PANTENIUS, pān-tā'né-us, THEODOR HERMANN (1843—). A German novelist. He was born at Mitau, Courland, studied theology in Berlin and Erlangen, and for six years taught at Riga, where he edited the *Baltische Monatschrift* (1870-76). He lived at Leipzig, was editor of the weekly *Daheim* (1876, sqq.) and the *Monatshefte* (1886 sqq.); and in 1891 followed his papers to Berlin. Pantenius wrote, under the pseudonym of Theodor Hermann, some excellent sketches and novels, portraying life in Lithuania and Courland; such as *Wilhelm Wolfchild* (2d ed., 1873), *Allein und frei* (1875), *Das rote Gold* (1881), and *Kurländische Geschichten* (1892). A complete edition of his works appeared in nine volumes (1899).

PANTHEISM (from Gk. *πᾶς*, *pas*, all + *θεός*, *theos*, god). The name given usually by its opponents, and with a touch of *odium theologicum*, to any system of speculation which identifies the universe with God (*acosmism*) or God with the universe. The latter kind of pantheism is further subjected to the accusation of atheism (q.v.); the former has often been the expression of an intense religious consciousness (as in Spinoza). The term pantheism was apparently coined by John Toland in the eighteenth century, but the antiquity of the view it designates is undoubt-

edly great, for it is prevalent in the oldest known civilization in the world—the Hindu. Yet it is a later development of thought than polytheism (q.v.). Hindu pantheism, as *acosmism*, is taught especially by the Upanishads (q.v.) and by the Vedānta (q.v.). The Hindu thinker regards man as born into a world of illusions and entanglements, from which his great aim should be to deliver himself. Neither sense nor reason, however, is capable of helping him; only through long-continued, rigorous, and holy contemplation of the supreme unity (Brahma) can he become emancipated from the deceptive influence of phenomena and fit to apprehend that he and they are alike but evanescent modes of existence assumed by that infinite, eternal, and unchangeable being who is all in all.

Greek pantheism finds a somewhat inarticulate expression in Xenophanes (q.v.), but comes to full utterance in the writings of the Stoics (q.v.). To the views of Neo-Platonists (see NEO-PLATONISM) a pantheistic tendency is often attributed, but it is doubtful whether emanationism does not logically escape pantheism.

During the Middle Ages John Scotus Erigena (see ERIGENA) was one of the few Christian pantheists. Among the Arabian philosophers pantheism was more current.

Modern pantheism first shows itself in Giordano Bruno (q.v.). Spinoza (q.v.) comes next among modern pantheists in the order of time, and he is perhaps the greatest, certainly the most rigorous and precise, of the whole class that either the ancient or the modern world has seen. See Plumtre, *General Sketch of the History of Pantheism* (London, 1881).

PANTHEON (Lat., from Gk. *Πάνθεον*, *pantheon*, temple to all the gods, neu. sg. of *Πάνθεος*, *pantheios*, relating to all the gods, from *πᾶς*, *pas*, all + *θεός*, *theios*, divine, from *θεός*, *theos*, god). A temple to all the gods; hence in particular, the greatest of such temples at Rome. The first Pantheon, erected in B.C. 27 by Valerius of Ostia for M. V. Agrippa, was a rectangular edifice behind the Baths of Agrippa. Injured or destroyed by lightning under Trajan, it was replaced in A.D. 123 by the existing circular edifice erected by Hadrian, as is proved by the discoveries of Chédann in 1892. The porch of sixteen superb colossal monolithic Corinthian columns appears to have been built with materials from Agrippa's porch and to have been altered from a decastyle to an octastyle porch, perhaps by Septimius Severus, A.D. 202. The Pantheon was further remodeled by Caracalla; it is possible that the interior paneling of the dome, which offers many puzzling problems, dates from this time and was hewn in the originally smooth vault. The Pantheon is the most perfectly preserved and the noblest work of Roman architecture. It consists of a circular hall, 142½ feet in internal diameter, supporting a dome rising to a height of 142 feet, and pierced at the summit by an oculus or opening 27 feet in diameter—the only window in the edifice, but wonderfully effective in its effect of interior lighting. Seven niches for statues adorn the interior, which, however, has lost much of its original aspect since the 'restorations' of 1748-56. The Pantheon, often called in Rome 'La Rotonda,' has been since A.D. 608 a Christian church. In 663 it was despoiled of its statues and bronze adorn-

ments by the Emperor Constant, and in 1632 the superb bronze vault of the portico was removed by Urban VIII., to be used in casting the baldacchino of Saint Peter's Church.

The name Pantheon has been also applied to a number of domical buildings, among which the most important is the Church of Saint Gen-ève at Paris, erected 1764-1781 by the architect Soufflet in a somewhat cold but highly elegant and dignified classic style. During the Revolution it was desecrated and dedicated to the great men of France; according to the classic tendencies of the time, it was called 'Le Panthéon,' and has retained this name ever since, although in 1826 it was restored to Catholic worship and reconsecrated. In plan it forms a Greek cross of about 255 feet in width and length, exclusive of the noble portico in front. The dome over the intersection, 70 feet in diameter and rising 208 feet in air, is adorned externally with a superb peristyle of 32 columns.

BIBLIOGRAPHY. Hirt, *Osservazione sopra il Panteon* (Rome, 1791); Adler, *Das Pantheon zu Rom* (Berlin, 1872); Piranesi, *Antichità Romano* (Rome, 1768); Isabelle, *Edifices circulaires* (Paris, 1843); Lanciani, *Ruins and Excavations of Ancient Rome* (Boston, 1897); Gosset, *Les coupoles d'orient et d'occident* (Paris, 1889).

PANTHER (OF. *pantere*, *panthere*, Fr. *panthère*, from Lat. *panthera*, panther, from Gk. *παῖς*, *panthēr*, panther; perhaps connected with Skt. *pundarika*, tiger). (1) The leopard (q.v.). Sportsmen use the term rather loosely, although some attempt to distinguish the large, more uniformly colored specimens by this name. (2) In the United States, the puma. The name was more common in early days than at present, and more often heard in the dialect corruption, 'painter,' than in its true form. See PUMA.

PANTHER-CAT. The ocelot (q.v.).

PANTHER-COWRY. An Oriental cowry (*Cypræa pantherina*), red-brown, densely spotted with blackish. See COWRY; and Colored Plate of GASTROPODS.

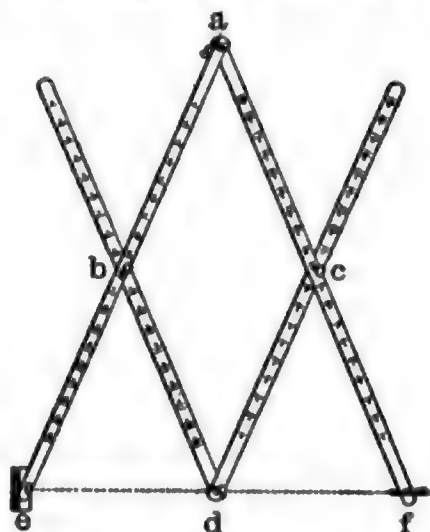
PANTHER-TOAD. A large smooth-skinned toad of Northwestern Africa, which has the upper parts adorned with a pattern of dark-edged, reddish-brown patches upon a yellowish ground, and the under parts white. This beautiful species is noted for the ease with which it may be tamed. A very similar species is to be found all over Central and Southern Africa. The former is *Bufo pantherina*, and the latter *Bufo regularis*.

PANTICAPÆUM. The ancient name of Kertch (q.v.).

PANTIN, pān'tān'. A town of France in the Department of Seine, situated northeast of Paris just outside the fortifications. It has sugar refineries and manufactures glass and oilcloth. Population, in 1901, 29,716.

PANTOGRAPH (from Gk. *πᾶς*, *pas*, all + *γράφειν*, *graphein*, to write). An instrument used to make an outline copy of a map, design, drawing, or other picture either at the same scale or larger or smaller. It consists of four rods so joined as to form a parallelogram. One of the rods is pivoted about a fixed axis, while the apparatus is supplied with a tracer or point which is moved over the original drawing and a pencil which makes the line of the copy. A form of the

pantograph which is extensively used is shown in the illustration. The rods are jointed at *a*, *b*, *c*, and *d*, so that *ab* is equal to *cd* and *ac* to *bd*, thus making the figure *abcd* a parallelogram. At *d* and *f* are the tracing point and pencil respectively, while at *e* the rod is pivoted so as to move freely. The points *e*, *d*, and *f* are in a straight line which is maintained no matter how the framework is moved about *e*. The triangles *bed* and *acf* are similar and the distance traversed by the point *f* with respect to that traversed by *d* will depend on the ratio of *ac* to *af*. It is of course



SIMPLE PANTOGRAPH.

possible to interchange *f* and *d*, and in that case there will be a reduced drawing made. By means of screws or pins at *b* and *c* the ratio of the sides of the parallelogram and the scale of reduction may be altered to suit the artist, the appropriate scale being marked on the arms. There are several forms of pantographs and instruments in which numerous refinements in the way of rollers, pivots, suspenders, etc., are introduced, but all operate on the principle just described. The invention of the pantograph is ascribed to Christopher Scheiner, a Jesuit priest, in 1603, and a description of the instrument was published at Rome in 1631.

PANTOJA DE LA CRUZ, pān-tō'ñā dā lā krōōth, JUAN (1551-c.1609). A Spanish painter, born in Madrid. He was a pupil of Coello, whom he succeeded as Court painter to Philip II. He continued in that position under Philip III., and repeatedly painted the portraits of both these monarchs, besides those of many other members of the royal family. Although he executed several fine altarpieces and excelled also in painting animals, he is chiefly famous as one of the great portrait painters of Spain. His style resembles that of his master, but is more remarkable for care and finish than for vigor and freedom. In the Madrid Museum may be seen a "Birth of the Virgin," a "Nativity," besides portraits of Charles V. (2), Philip II., Queen Isabel de Valois (2), and others; in the Pinakothek at Munich the portraits of Archduke Albrecht (1600) and his consort Isabella (1599), and in the Vienna Museum two portraits of a child (one dated 1604).

PANTOMIME (Lat. *pantomimus*, from Gk. *παντόμιμος*, one who acts by dancing and dumb show, all-imitating, from *πᾶς*, *pas*, all + *μιμος*,

mimos, imitator, from *μιμῖσθαι*, *mimēsthai*, to imitate). The art of dramatic representation without words, through expression by attitudes and gestures. Among the Romans the term *pantomimus* was applied to the actor himself. Whether pantomimic performances had a distinct existence under the Republic it is hard to say, but Augustus showed great favor to this kind of entertainment, which seems to have arisen from the older custom of separating the actor and the reciter of dramatic dialogue; the fact also that in the great open theatres the Roman public could see much more easily than it could hear, probably contributed to the popularity of mute acting. As the *pantomimi* wore masks, no facial mimicry was possible; everything depended on the movements of the body. There was, however, commonly at the rear of the theatre, a choir, which sang the story by way of interlude or accompaniment; and as the subjects presented in dumb show were chiefly mythological love stories, they were consequently well known to the spectators. The earlier *pantomimi* came singly upon the stage, acting successively all the characters involved in the story; later several appeared together. The most celebrated *pantomimi* of the Augustan Age were Bathyllus (a freedman of Mæcenas) in comedy, and Py-lades and Hylas in tragedy. The class soon spread over Italy and the provinces, and became so popular with the Roman aristocracy, who used to invite male and female performers to their houses to entertain their guests, that Tiberius thought it necessary to check the vanity of the *pantomimi* by issuing a decree forbidding the senators to go to their houses and knights to be seen walking with them on the streets. Under Caligula they were again in favor, and Nero even went the length of acting in a pantomime. From this period the *pantomimi* enjoyed unbroken popularity so long as paganism held sway in the Empire.

Pantomimic elements have always been found in the popular theatres, notably in the early Italian *commedia dell' arte*, in which were developed the characters of Harlequin, Pantaloon, Columbine, and the rest of their familiar troupe. In France in the seventeenth and eighteenth centuries the word pantomime was applied to a kind of mythological spectacle at the Opera, in which allegorical characters appeared in appropriate costumes. The great *ballets d'action* of Noverre were really pantomimic in character. In the first half of the nineteenth century, at the famous little Théâtre des Funambules in Paris, pantomime enjoyed for some years a remarkable revival under the genius of Deburau and his associates.

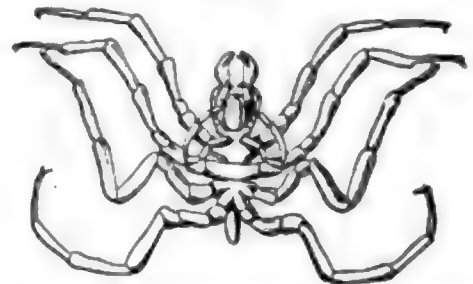
In England the first pantomime is said to have been produced at Drury Lane in 1702. It was *The Tavern Bilkers*, by a dancing-master named John Weaver, another of whose pantomimes, *The Loves of Mars and Venus*, had a remarkable success. But it is to the noted harlequin John Rich that the establishment of the familiar Christmas pantomime is generally credited. In December, 1723, he brought out at Lincoln's Inn Fields *The Necromancer, or the History of Dr. Faustus*, by way of rivalry to *Harlequin Dr. Faustus*, which had been produced at Drury Lane not long before. Pantomimes were not then, however, limited to the Christmas season, but were regarded, as they have some-

times been since then, as a means for filling the theatre's treasury and supplementing the attractions of the legitimate drama. English pantomime was further developed by the coming in 1758 of the Grimaldi family. Joseph Grimaldi (q.v.), who was born in 1778, was especially clever at inventing tricks and devising machinery. *Mother Goose* and others of his harlequinades were long popular. A special feature in the early part of the last century was the 'transformation scene,' in which was made the change of characters to the harlequinade proper, or latter part of the programme. The subjects of these pantomimes have been generally found in popular tales like those of Aladdin, Blue Beard, Cinderella, or Little Red Riding Hood.

In the United States pantomime has for the most part been little more than an occasional importation, though such a show as *Humpty Dumpty*, with George L. Fox as clown, about 1870, had an enormous and long-continued popularity.

Consult: Broadbent, *A History of Pantomime* (London, 1901); Friedländer, *Sittengeschichte Roms* (Leipzig, 1890); Champfleury, *Souvenirs des Funambules* (Paris, 1859); Disraeli, "The Pantomimical Characters," in *Curiosities of Literature* (12th ed., London, 1841); Broadbent, *History of Pantomime* (London, 1901). See BALLET; HARLEQUIN; MIME, etc.

PANTOPODA (Neo-Lat. nom. pl., from Gk. *πᾶς*, *pas*, all + *πούς*, *pous*, foot). An aberrant group of arthropods, which seem to stand nearer the Arachnida than any other class. They are spider-like in form, with very long slender limbs arising from a remarkably small body, whence they have been called 'no-body crabs.' Each of the four pairs of legs contain a long cæcal prolongation of the stomach. The body consists of a cephalothorax, consisting of an anterior proboscis, succeeded by three segments, and one thoracic segment, behind which are three free thoracic segments and a minute rudimentary abdomen. To the cephalothorax are attached



A TYPICAL PANTOPOD, OR 'NO-BODY CRAB.'

four pairs of appendages, one or both of the first two of which may end in a forceps. These are succeeded in the male alone, by a pair of vigorous legs, and the first pair of thoracic legs, while each of the three free thoracic segments bear a pair of very long legs; there are thus in all seven pairs of appendages. The animal breathes through the walls of the body, and, as in all marine arthropods, there are no urinary tubes. In most of the forms there is a slight metamorphosis, the larva having three pairs of appendages. In one form the larvæ are internal parasites in certain hydroids. These sea-spiders live at various depths from between tide-marks to deep water. The group was formerly named *Pycnogonida*. By some authors they are sup-

posed to be allied rather to Crustacea than to Arachnida, having one more pair of limbs than any arachnidan.

PÁNUCO, pá'nōō-kō. A river in Mexico, rising by several headstreams on the Mexican Plateau, and flowing northeastward to the Gulf of Mexico, on the boundary between the States of Tamaulipas and Vera Cruz. With the construction of the jetties, the bar at its mouth has been removed, and it is now accessible to steamers of 24 feet draught. Tampico, at its mouth, is now one of the most important ports in Mexico.

PANURGE, pá'nŭrz'h'. An important character in Rabelais's *Gargantua et Pantagruel*. He is discovered by Pantagruel at Paris and becomes his friend. Panurge is given to practical jokes, and is gifted, handsome, and always without money. His desire for enlightenment on the subject of his marriage leads to the voyage to the oracle of the Dive Bouteille.

PANY'ASIS, or **PANY'ASSIS** (Lat., from Gk. Πανύσις) (?-c.454 B.C.). A Greek epic poet of Halicarnassus; a relative, probably an uncle, of Herodotus, the historian. He was put to death by Lygdamis, the tyrant of Halicarnassus, for assisting his native town in a fight for freedom. He was the author of a poem in 14 books and 9000 verses, entitled *Heraclea* (*Exploits of Hercules*), which led the critics of the Alexandrian school to rank him among the five great epic poets. There are extant a few elegantly written fragments on the use and abuse of wine-drinking, which are said to resemble the elegies on the same subject by Xenophanes and Theognis. According to Suidas he was also the author of *Ionica* (*Ionian*), an elegiac poem of 7000 lines on the history of Neleus, Codrus, and the Ionian colonies. The fragments have been edited by Tzschirner (1842), and by Kinkel in the *Epicorum Græcorum Fragmenta* (1877).

PANZER, pân'tsēr, GEORG WOLFGANG (1729-1805). A German bibliographer. He was born at Sulzbach, studied theology at Altdorf, and lived at Etzelwang, a suburb of Nuremberg, and in that city as pastor and author. He was for several years director of the city library, and wrote: *Geschichte der römisch-katholischen deutschen Bibelübersetzung* (1781); *Geschichte der deutschen Bibelübersetzung M. Luthers von 1517-81* (1783); *Annalen der ältern deutschen Litteratur* (1788); *Älteste Buchdruckergeschichte Nürnbergs* (1789); and *Annales Typographici* (1793-1803), a valuable catalogue of the old prints of all countries, in 11 volumes.

PAOAY, pá'ō-ī'. A town of Northern Luzon, Philippines, in the Province of Ilocos Norte. It lies near the western coast, 11 miles south of Laoag (Map: Philippine Islands, E 1). Population, 11,848.

PAOLA, pá'ō-lā. A city and the county-seat of Miami County, Kan., 43 miles south by west of Kansas City; on the Saint Louis and San Francisco, the Missouri Pacific, and the Missouri, Kansas and Texas railroads (Map: Kansas, H 3). It has a public library with more than 5500 volumes. The city is in a productive farming and stock-raising country, rich also in natural gas and coal. There are grain elevators and wagon shops. Paola was first settled in

1855, and in 1869 was chartered as a city. Population, in 1890, 2943; in 1900, 3144.

PAOLI, pä'ō-lē, PASQUALE (1725-1807). A Corsican patriot, born at Morosaglia. His father, having taken a leading part in the insurrection against the Genoese, was obliged to flee to Naples in 1739. There Paoli received an excellent education. In July, 1755, he was summoned to Corsica, and elected Captain-General of the island, and the chief of a democratic government. He energetically and successfully applied himself to the reformation of the barbarous laws and customs of the island, and at the same time to the expulsion of the Genoese, who lost, in a short time, nearly all their strongholds. The fleet of the Genoese was also defeated and they were obliged to seek help from France. Finally, in 1768, Genoa ceded the island to France. Paoli refused all offers of the French Government, and continued to struggle for the independence of his country, but was defeated by the superior force of the Count de Vaux, and the French became masters of the island. After continuing the vain struggle for a year, Paoli was compelled to take refuge on board a British frigate, in which he sailed for England, where he was well received and granted a pension by the King (1769). Twenty years afterwards the French Revolution of 1789 recalled him to Corsica as lieutenant-general and military governor. Subsequently, when the island became a department, he was made president of the administration and commander of the National Guard. After the execution of Louis XVI. Paoli's attitude toward the Convention changed. With the active sympathy of England, he organized in 1793 a revolt against the Convention. He was proscribed by that body and made general-in-chief and president of the Council by a *Consulta* which assembled at Corte. He now openly allied himself with Great Britain, and favored the landing of 2000 British troops on the island in 1794, with whose aid he drove out the French. He was forced, however, to surrender the island to the English. Disappointed in his hope of being made Viceroy, and finding his influence over the Corsicans gone, he retired from the island in 1796, and spent the remainder of his life in England, where he died near London, February 5, 1807. In 1889 his body was removed to Corsica and there buried with great honor and solemnity. The earliest account of Paoli is found in Boswell's *Account of Corsica* (Glasgow, 1768). Consult also: Arrighi, *Histoire de Pascal Paoli* (Paris, 1843); Bartoli, *Histoire de Pascal Paoli* (new ed., Bastia, 1891).

PAOLO VERONESE, pä'ō-lō vā'rō-nā'zā. See VERONESE, PAOLO.

PAOMBONG, pä'ōm-bōng'. A town of Luzon, Philippines, in the Province of Bulacán (Map: Luzon, E 7). It is situated on the Pampanga River two miles west of Malolos, and has a population of 10,297.

PAO-TING FU, pä'ō-tīng' fōō' (locally abbreviated into *Pao-fu*). A walled departmental city of China, capital of the Province of Chi-li. It lies about 80 miles southwest of Peking and 76 to the west of Tien-tsin, and is connected by rail with both cities, being an important station on the Lu-Han Railway from Peking to Hankow (Map: China, E 4). The city contains several old temples, a Mohammedan mosque, several very good streets with well-filled shops, including a

very large number of curio and book shops. The city was occupied by the allied troops during the Boxer rebellion on October 19, 1900.

PÁPA, pá'pö. A town in the County of Veszprém, Hungary, situated on the Tapolca, about 60 miles south-southeast of Pressburg (Map: Hungary, E 3). It has an extensive palace of the Counts of Eszterházy, a house in which Matthias Corvinus lived, three monasteries, and a Protestant gymnasium. The manufactures include pottery, tobacco, and textiles. Population, in 1890, 14,417; in 1900, 17,426, chiefly Roman Catholic Magyars.

PAPACY (OF. *papacie*, from ML. *papatia*, Papal office, from Lat. *papa*, pope, bishop, father; reduplication of *pa*, an early infantile utterance, supposed to apply to the child's father). The See of Rome considered as an historic institution, claiming to be the head of and centre of unity for the whole Christian Church. The origin of the primacy of Rome is, according to the Roman tradition, to be found (1) in the leading part played by the Apostle Peter in the New Testament records, and (2) in the alleged historic fact of a residence of Peter at Rome as head or bishop of the Christian community there. On the first basis is constructed a theory of a divine commission given to Peter by Jesus Christ, in virtue of which Peter was invested with the three attributes of king, priest, and teacher over all the followers of his master. On the second basis the Roman Church has built up its practical earthly structure of influence and power. The identification of the Petrine idea with Rome was needed to localize and make concrete the abstract claims of a divine commission. Whatever powers were conveyed to Peter by Jesus Christ were now held to be continued in full measure to his duly appointed successors in the Roman bishopric. Although a majority of Christians reject both the Roman interpretation of the Petrine commission and the historical proof of a 'bishopric' of Peter in Rome, and still more emphatically deny any connection whatever between these two sets of ideas, the historian finds abundant explanations of the origin and growth of the Roman supremacy without resorting to these sources. Doubtless the tradition of an Apostolic origin was a powerful aid to the bishops of Rome in enforcing their claims to superiority.

The Roman community was certainly one of the earliest Christian foundations. It enjoyed the prestige of the work and of the martyrdom of the great Apostles, Peter and Paul. It was the centre of life of the vast Roman Empire, and the focal point toward which all ideas streamed in and from which they were redistributed in effective form. Rome, however, had never been an important source of ancient culture. Her gifts to the world were law and administration, her culture was always a borrowed one. This same tradition of practical administrative skill was now to be continued by the Church. The authentic records of Roman church life during the first two centuries are few, and many instances of the exercise of Papal power at this time are not to be found.

The evidences of an aggressive, dominating jurisdiction appear very clearly in the administration of Victor I. (193-203). This active and zealous churchman was bent upon securing uniformity in the outward practices of the Church,

and he made the existing variations in the time of celebrating Easter a test question. He demanded of the Eastern churches agreement with the Roman Easter period and threatened them with excommunication if they refused. Excommunication, as the refusal to share Christian fellowship with an offending brother, was the right of every church, but we distinctly see here the Roman practice of treating it as a punishment to be inflicted by a superior upon an inferior. Irenæus, Bishop of Lyons, himself a Syrian, but in agreement with Victor on the Easter question, admitted the '*potentior principatus*' of Rome, a phrase naturally quoted by Roman controversialists to support their claims of right. They also cite, as justification of these claims, a letter of Clement I. to the Corinthians (A.D. 95 or 96), the epistles of Saint Ignatius, and passages of Tertullian, Origen, and other Christian writers of the second and third centuries. Whatsoever may be the value of these testimonies, as cited to sustain the claims of Papal supremacy in these early ages, the subsequent fact of a Papal domination is outlined distinctly in historical perspective by the end of the fourth century.

The Western world turned as naturally to Rome in religious as in secular matters, partly as the result of the habit of centuries, partly because there was no other resort. Papal Rome met the demand with a steadiness and prudence worthy of the great political tradition to which she was succeeding. In matters both of faith and practice she was always to be found on the side of a staunch but liberal orthodoxy. While Gnostics on the one hand and Montanists on the other were trying to make of the Church a select esoteric community of the specially initiated, Rome steered carefully between the extremes and lent all her weight to the 'Catholic' or inclusive idea of the Church, as the medium of salvation for all men. On the vexed questions of heretical baptism and ordination and the treatment of the 'lapsed' her position was always moderate and liberal. While the theologians of the Eastern world were speculating with philosophical refinements over the great Christian problems, the Roman Church quietly but persistently held fast to the idea of a mystery of redemption not to be solved by any human philosophy, but to be accepted once for all by an act of faith. When, in the storms of the Germanic invasions, the weak and cowardly emperors deserted Rome, the Roman bishops repeatedly stood forward in their place and dealt with the invaders in the name of a power greater than their own.

The earliest point at which we can clearly discern the existence of a well-developed machinery of Papal power is in the administration of Leo I. (440-461). He grasped, as none of his predecessors had done, the vast range of his opportunity. He aimed to establish, both in the East and in the West, a system of Papal vicariates through which the Roman jurisdiction could be enforced and the Roman forms of faith and practice maintained. Eastward from the Adriatic his success was only partial and temporary. The pressure of Greek Christianity backed by the forces of the Greek Empire was too great, and we may from this point practically dismiss the East from our view. At the Coun-

cil of Chalcedon (451), the formula of faith presented by Leo was accepted as a sufficient statement of the Christological problem. In Gaul the rising metropolitan power received a serious check in Leo's severe treatment of Hilary of Arles, who had on insufficient evidence deposed Chelidonius, Bishop of Besançon. In 452 Leo went out, armed with none but spiritual weapons, to meet the terrible Attila, and actually turned him back in the full tide of victory. In 455 he again faced a Vandal invasion from the south and succeeded in gaining at least milder terms for the doomed capital.

Especially clear does this Roman leadership appear in the dealings with those Germanic peoples who for a longer or shorter time occupied the soil of Italy and organized there an actual administration of government. The popes of this period, nominally subject to the emperors at Constantinople, never really questioned the *de facto* sovereignty of the barbarian rulers in Italy. With Odoacer (476-493), and then with Theodoric the Ostrogoth (493-526), we find them in relations of friendly temporal subjection. Many cases of Papal privilege and several disputed elections were referred to these barbarous and heretical chiefs of tribes, and their decisions were accepted. It was the wise policy of Rome, at this early stage, to conform itself to actual conditions and make its profit out of them. This *de facto* allegiance was readily transferred to Constantinople when, after the death of Theodoric, the armies of Justinian under Belisarius and Narses finally drove the Ostrogoths out of Italy (535-53). This revival of Byzantine sovereignty was, however, the most serious disaster that could have happened to the Papal idea. Again and again popes were made to feel the rough hand of the Empire if they ventured to act against its will, even on a matter of doctrine. The prestige of Rome was in danger of disappearing, if she were to become merely one among the numerous patriarchates under the fitful dictation of Constantinople. It was really an advantage when the dreaded Lombards swarmed over into the Po Valley (568) and rapidly drove the Byzantine garrisons from most of the country east of the Apennines. The Lombard terror forms the background of the Papal history for nearly two hundred years, but it was one of the means through which the importance of the Papal institution was recognized and justified.

These were the conditions under which Gregory I., the Great (590-604), came to power. From his correspondence we gain for the first time a clear impression of the economic side of the Papal administration. We find a considerable total of landed properties scattered from Africa, through Sicily and Italy, to Gaul, managed directly by Papal agents and serving as the chief financial basis of the Roman bishopric. Gregory, a prudent manager and astute politician, knew how to keep on good terms with the Empire, and even succeeded in making some impression on the Arian Lombards in the direction of their ultimate conversion to Catholicism. He kept up an active correspondence with the Catholic Merovingian princes of the Franks, and was the originator of the conversion of the heathen Anglo-Saxons to Roman Catholic Christianity. In a spirit of wise charity for all human diversities, Gregory I. laid the foundations for a Papal system which would have made the

Roman bishop the guide and harmonizer of Western Christendom. As time went on, the hold of the Eastern Empire upon Italy became weaker and weaker. In vain popes implored emperors for help against the Lombards. The Mohammedan conquest absorbed all the energies of the declining Empire, and Rome must turn elsewhere for the material support it needed. Gregory's relations with the Franks gave the clue for the future. So long as the Merovingian dynasty lasted nothing could be done; but when the new and vigorous House of Pepin began to displace the Merovingian princes, the opportunity came. Papal appeals to Charles Martel (Major Domus, 714-741) were flatly refused, but his son, Pepin, needing a sanction for his usurpation of the kingdom, found it worth while to win this of Rome as the price of deliverance from the Lombard terror. More than this, he guaranteed to the Papacy the temporal sovereignty over an ill-defined stretch of territory including Rome and a considerable surrounding country. See PAPAL STATES for the subsequent history of the temporal sovereignty.

With the coronation of Charles the Great as Roman Emperor by Pope Leo III. (800) a new phase of the Papal power begins. The revival of the Imperial name was doubtless intended to connect the actual domination of the Frankish people with the traditions of the ancient Roman world. It was, however, to be several generations yet before the importance of this new connection was to be evident. No emperor from Charles to Otho the Saxon held a position that could in any sense be called 'Imperial.' Even the title disappeared for more than a generation before Otho. Meanwhile the Papacy kept on quietly developing the constitution under which it was to do its great work. The administration of Nicholas I. (858-867), coincident with the notable rise of intellectual culture in West Francia, serves to indicate this progress. Nicholas I. was keen to seize every occasion to assert Papal right of supreme jurisdiction. (1) As defender of a sound Christian morality he took up eagerly the cause of Theutberga, the rejected wife of King Lothair II. of Lorraine, and carried it against the support of the fighting men and the whole clergy of Lorraine to a complete triumph. (2) He assailed the metropolitan power in the person of the great Archbishop Hincmar, the most important prelate in the North, on the old question of the right of a subordinate clergyman disciplined by his local superior to appeal directly to Rome.

With the tenth century we find the Papacy in a phase which seemed at times to imperil all it had gained. Its three functions—the bishopric of Rome, the government of a Roman State, and the headship of Latin Christianity—were often in hopeless conflict, but never more than now. In the furious strife of local parties in which Rome, like every other Italian city, was involved, the Papacy came to be hardly more than the spoil of party victory. Popes of every variety of incapacity and unsuitableness were set up by rivals in politics, and, even if they succeeded in maintaining their hold upon the bishopric and the Roman territory, there was little question of any influence upon the movement of affairs outside this field. It is the most convincing proof of the need in that age of some such central religious authority in Europe that men con-

tinued to pay deference to an institution so careless of its own credit and its own future.

Two causes were destined to bring the Papacy once again into the great currents of European Christianity. The first of these was the renewal of the Empire on a German basis. The entrance of the Saxon people into the Latin-Christian culture (c.830) resulted in a great strengthening of the purely German as distinguished from the half-Romantic elements of the Western world. In 919 the German kingship passed with Henry I. into Saxon hands. His son Otto I. (937-973) took up the kingdom, no longer as a Saxon thane, but as the born King of all Germans, and after twenty-five years of varying success saw his idea of kingship fairly realized. For nearly forty years the Empire had gone begging for a power strong enough to come and take it. In 961 Otto crossed the Alps as of right, and in 962 was crowned Emperor at Rome by Pope John XII., whom he soon uncanonically deposed on accusations of every possible iniquity. He then caused the 'election' of a capable Roman layman, Leo VIII., and maintained him with his sword. He bound the clergy and nobility of Rome by solemn oaths to elect their popes in future 'canonically' and to seek for such election the approval of the Emperor. Thus it was thought to establish a formal balance of rights between these two branches of the highest earthly power. If the Papal sanction was needed to make the Emperor, no less should Imperial approval be necessary to a valid Papal election. But no sooner was the Imperial camp removed from Rome than all the evils of local factional strife broke out again. To end the perpetual conflict, Otto III. (983-1002), a youth of generous enthusiasms, tried the experiment of a Roman residence in conjunction with a German pope, Gregory V., of his own making. For a moment the problem seemed solved, but a new outbreak of Roman fury drove him from the city to his death.

Meanwhile the Church was developing a new energy through the force of its monastic principle, the second cause alluded to above. The Monastery of Cluny in Burgundy began from its foundation about 910 to exercise an influence upon clerical life quite without precedent. This took the form of a purification of the priestly office by ridding it of the frequent vice of simony and by strictly enforcing the rule of priestly celibacy. The reaction of this movement upon society at large is seen in the efforts to bring about the peace of the land known as the 'Peace of God' and the 'Truce of God.' In all this great activity the Papacy as such took no part, but the time came when these ideas took possession of it and made it do their bidding.

The two processes we have noticed—the rise of the Empire and the purification of the Church—come together in the middle of the eleventh century. Another period of Papal depression had followed the work of the Otthos, and once more the Papacy became the prey of contending local factions. The office was tossed about in shameful 'deals' or by open violence. In the year 1046 three persons were claiming the Papal power on different grounds. The scandal was too great, and the 'Romans' appealed to the Emperor Henry III. In the synod of Sutri (1046), held on the borders of the Roman territory, Henry brought about the removal of all three

claimants and nominated a worthy German prelate who was accepted by the Romans. Two other Germans, also nominated by the Emperor, followed in rapid succession. The last of these was Bruno, Bishop of Toul in Lorraine, who as Pope Leo IX. (1049-54), and under the guidance of the monk Hildebrand, began the aggressive policy of Church reform through Papal action, which is the most important feature of Papal history for the next century. Though nominated by the Emperor, Leo saw plainly that to succeed he must be free from all outside control and rely upon the old Roman traditions. He began his administration by a journey to France and Germany, where in two synods, at Rheims and at Mainz, he proclaimed the articles of the Cluny programme, especially that against simony, and demanded the allegiance of the northern prelates in his crusade against these evils. The conscience of Europe, roused already by the work of the monastic reformers, responded with satisfactory readiness. At Rome Leo IX. found himself involved in an entirely new political situation. The Norman conquerors of Southern Italy had reached a point in their expansion where it was important for them to have a definite legal status. They threatened to encroach upon the Papal territory and actually routed the Pope's army in the battle of Civitate (1053). But the wisdom of Leo turned this rout into a victory by persuading the Normans to become the vassals of the Holy See on condition that their power, within certain limits, should be recognized as a legitimate sovereignty.

The sense of Papal right as paramount is seen still more plainly in the action of Nicholas II. (1058-61). To check the disorders consequent upon the Papal elections and to establish the electoral process on a firm and permanent basis, he procured the passage at the synod of 1059 of a decree whereby the election of the Pope was henceforth to be in charge of the Roman 'cardinals,' including members from all three clerical orders. The initiative was to lie with these, but they were then to procure the assent of the 'Roman people,' and a certain undefined right of participation was reserved to the Emperor. On these three elements—the Roman cardinals, the Roman people, and the Roman Emperor—rested the Papal constitution for the next two hundred years. The greatest conflicts of this period arose from attempts to define more precisely the limits of each element. On the whole, the cardinalate gained steadily upon the other factors, and succeeded ultimately in winning exclusive control, not, however, without decisive modifications in its own make-up.

The Papacy was now definitely committed to the work of reform. The influence of Hildebrand grows more and more perceptible. Under his far-seeing direction what had been started as a purely moral movement becomes in the clearest sense a political one as well. Adding to the two articles of the Cluny programme a third—the prohibition of lay investiture—he combined all three under the one general demand for the 'freedom of the Church' from all external control. (1) The celibacy of the secular clergy was to be the guarantee that the clergy should be free from all the obligations arising from marriage and the social and economic duties that attend it. (2) The abolition of simony was to make the clergy free from all the complications of worldly

interest that must arise if clerical office were to be bought and sold for any valuable consideration whatever. (3) The prohibition of lay investiture was to free the clergy from any relation toward the State which might interfere with the exclusive control of all clerical interests by the supreme ecclesiastical authority, the Papacy itself. The effect of the first was to separate the priest from the family; of the second, to separate him from the temporal interests of the society about him; of the third, to cut him off from any secular service to the State. It was 'freedom' in the sense of a separation that must tend to place a gulf between the clergy and all purely secular interests. On the other hand, it is doubtful if any other process could have stayed the progress of a fatal secularization of the Church that threatened to absorb it entirely in the life of the society of the full feudal period.

As to the question of simony, all thinking men were agreed that it was an evil. The celibacy of the clergy in the major orders was already well established in the habits of most of the European populations, and the sympathy of the masses was decidedly setting toward its extension to the minor orders as well. It was, therefore, a well-considered policy that led Hildebrand from the moment of his accession as Pope Gregory VII. (1073-85) to throw his whole energy into the fight against the lay investiture.

The moment chosen for the conflict with Germany was most favorable. Henry III., the vigorous champion of Imperial right and duty as the guardian of Papal honor, died in 1056, leaving a son, Henry IV., six years old, who was accepted as King under the regency of his pious mother, Agnes of Poitou. In 1073 this son was a clever, headstrong youth of twenty-three, already at odds with many parts of his kingdom, but prepared to press to the utmost all his royal rights. The first proclamation against lay investiture was in 1075, and, though couched in general terms, was plainly aimed at Germany. To give up the right of investiture would have meant for the German King the loss of the most important means of political control, and Henry threw himself upon the loyalty of his clerical subjects. A German synod at Worms (1076) denounced the Pope in unmeasured terms, and threatened him with deposition. He replied by excommunicating the King, whose political enemies utilized the excommunication as a weapon to keep him in a semi-imprisonment until Gregory could carry out his purpose of settling the whole German question in person at a German assembly. Gregory was on his way to this meeting at Augsburg when Henry IV., leaving Germany, hurried over the Alps, met the Pope in the famous interview at Canossa, and won from him the absolution which reinstated him in the allegiance of his subjects, and thus averted the grave political danger of a settlement of German affairs by a Papal council on German soil. Through the long reign of Henry IV., under Gregory and his successors, the fight went on. The Pope repeatedly excommunicated the King and sanctioned the election of anti-kings. The King replied in virtue of his Imperial rights, actual or to be, by 'deposing' popes and causing the election of a series of anti-popes. The immediate question of the investiture was lost sight of in the larger issue—whether Church or State

was to control. Henry V. (1106-25) had joined the Papacy against his father, but was no sooner King himself than he was forced into an opposition as much more dangerous as he was more powerful. In 1111 he was able to force the Papacy into a momentary agreement that the clergy of the Empire should be exempt from the Imperial investiture on condition that they should surrender all their temporal property. This agreement was promptly rejected by those most interested on both sides, and led to the final settlement in the Concordat of Worms (1122), whereby the dual nature of the clerical office as at once temporal and spiritual was recognized. The investiture with the spiritualities (ring and staff) was left to the Papacy, while that with the temporalities (sceptre) was held by the Emperor. Similar but less violent conflicts in France and England led to a similar result.

A new phase of the conflict between Church and State begins with the accession of the emperors of the House of Hohenstaufen. The Hohenstaufen (Ghibelline) policy was to extend the German kingdom, under the disguise of the Empire, over Italy. In this ambition it was checked at every turn by the rising power of the Italian city republics. Frederick Barbarossa (1152-90) sought to incorporate these communities into his administration by placing governors (podestà) over them and utilizing their growing wealth for his larger plans. Led by Milan, the Lombard communes steadily resisted. Milan, destroyed in 1162, was rebuilt by her neighbors, and at the head of the great Lombard League gave the Emperor such a defeat at Legnano (1176) that in the Peace of Constance (1183) he conceded practically all the claims of the cities to independence. Throughout this fight the communes were steadily supported by the Papacy. Their party (the Guelph) was also the Papal party; and though outside the cities there were many territorial nobles and inside there was always a noble faction that looked toward the Emperor, the great masses of the rising industrial population, organized in their craft and merchant guilds, were sturdily Guelph and in every crisis expected the support of the Pope. Henry VI., son of Frederick I. (1190-97), had elaborate plans for refeudalizing Italy and sinking the communes in greater territorial units. Through his marriage with the heiress of the Norman kingdom in the south and the birth of a son in 1194, he seemed to see the realization of the Hohenstaufen policy. His death, the consequent confusion in Germany, and the accession of the great Pope Innocent III. (1198-1216) saved Italy for the time and gave to the Papal power one of its greatest moments of triumph.

Innocent III. realized more completely than any pope before or after him the Hildebrandine ideal. He was able to bring King John of England to surrender the overlordship of the land to him for his support against his nobles. He compelled Philip Augustus of France to take back his rejected wife. In the struggle for the German crown he championed Otho the Guelph against Philip of Hohenstaufen (1198-1208), but when Otho as King (1208-14) proved that no Emperor could be a Guelph, as no Pope could be a Ghibelline, Innocent turned against him at once. He gave his support to France against Germany and England in the battle of Bouvines (1214), by

which his ward the young King Frederick of Sicily gained the Empire. At a Lateran council in 1215 Innocent displayed as it had never been displayed before the legal system on which the working of the Papal idea depended.

The prestige of the Papacy had been greatly increased by its leadership in the Crusades. The Crusade had been commended by Gregory VII. Events in the East had roused attention to it soon afterwards, and Urban II. (1088-99) had made it the chief object of his administration. Throughout the long and not always creditable history of the Crusades (1096-1270), it was the Papacy that gave to it whatever of unity and dignity it had. From Innocent III. we may begin to note the gradual decline of the mediæval Papacy. It had thriven upon the absence of strong national governments in Europe, and the rapid rise of the new nations closed up one by one the channels through which the Papal power had made itself felt. The reign of Frederick II. (1215-50) is one long conflict between the Imperial and Papal schemes in Italy. On the whole, the Emperor was beaten, but the prestige of the Papacy as a universal power was injured. The attempt of the Hohenstaufen to maintain a government in Italy was frustrated, but the Papacy, by bringing in the Angevin rulers from France into the South, sowed the seeds of new disaster. Rudolph of Hapsburg (1273-91) began a new policy for the Empire: to leave Italy out of the question in return for a free hand in Germany; and every deviation from this wise policy by his successors only showed again how completely the mediæval ideals of public life were passing over into those of the modern world. The attempts of Henry VII. (1308-13) and Louis the Bavarian (1314-47) to affect the balance of Italian politics proved utter failures.

On the other hand, the same thing is true of Papal attempts to enforce discipline on the rulers of Europe. Boniface VIII. (1294-1303) came to the Papacy as the leader of the cardinalate in an unprecedented crisis. His predecessor, Celestine V., a pious recluse, had so completely fallen into the hands of the Neapolitan Angevins that he had raised to the cardinalate a number of French and Neapolitan prelates. He had then, largely under pressure from Boniface, resigned the Papacy, and now the cardinals found themselves under the domination of such a will as had not been seen in the Papal office since Innocent III. His violent attempts to break down the faction of the Colonna drove his enemies to the Court of Philip IV. of France, and there they found a fertile soil for their complaints. Philip, a completely modern ruler, needing all the money there was to spare in France, laid a tax upon the clergy. Boniface, in a series of able documents, laid down again the Hildebrandine doctrine of the freedom of the Church. Philip appealed to the national sentiment as expressed for the first time in the States-General and won his fight. Boniface, defeated and abused by the personal enemies he had made, died, the last great exponent of the mediæval Papacy.

The wreck of the mediæval scheme of a Papacy and an Empire working in a harmony that was never attained threw the Papacy upon a new alliance. The influence of France now replaces that of Germany. The result of the second conclave after the death of Boniface was the election of a Frenchman, Clement V. (1305-14). The

new Pope was met at Lyons by King Philip in person, and as a result of this interview he never left France. The cardinals summoned across the Alps obeyed, and thus began the French residence of the Papacy, the 'Babylonian Captivity' at Avignon (1309-76). This 'exile' came about naturally through the working of the cardinal system. The French influence had secured certain cardinals from Celestine V.; these decided the choice of Clement, and now he in turn was free to appoint enough more French cardinals to decide the character of the college for a generation to come. The close relation of the Papacy to France withdrew from it the sympathies of the other nations, notably of England. It seemed in danger of losing entirely that Roman character which was its only source of authority. Pressure was continually brought to induce the popes to return to Rome; several attempts to do so were made, but were hindered by the French interests of the cardinals. Finally, Pope Gregory XI. did return and died at Rome (1378). The new election, held under fear of violence from the 'Roman people,' resulted in the choice of an Italian, Urban VI., but within a few months the French influence succeeded in raising sufficient doubts as to the validity of this election to justify the cardinals in choosing another Pope, Clement VII. Thus, still by the regular working of the Papal machinery, the Church found itself, for the first time in its history, involved in a schism in which both claimants rested upon the same basis, a lawful election by cardinals.

Both parties appealed to the nations for support. In general, the northern peoples sympathized with the Roman Pope, France and Spain with the French one; but the really important result of the Great Schism (1378-1418) was the discussion it aroused as to the nature of the Papacy and its relations to the Church at large. The feeling was constantly gaining force that the Church as a whole was misrepresented by a system which threw all the weight of the Papal authority into the hands of a small body of persons at Rome. To change these persons to Frenchmen was no relief. What was demanded was a larger share to the nations in the Church constitution. These opinions gained in clearness as the difficulty of breaking the schism through the action of the cardinals became more apparent. The remedy was that most feared by the curial party at all times, a general council, but years passed before a way could be found for calling a council that would be respected. Finally, in 1409, the 'union cardinals' on both sides united in this work, and the Council of Pisa supported them in making a new election. The Pope chosen, Alexander V., lived but a few months, and the same interests succeeded in putting forward John XXIII., who failed utterly to maintain the respect of the Church as against the two claimants set aside at Pisa, who now renewed their claims.

The Church thus found itself in a triple schism, honeycombed with the heresy of Wiclif and Huss and burdened with ecclesiastical abuses which every one saw, but which no one knew how to remedy without danger to the system itself. The Council of Constance (1414-18) met under these conditions. It first attacked heresy by examining and burning John Huss, who, relying upon the safe conduct of the Emperor Sigismund, had voluntarily put himself into its power. It

then proceeded to endless discussions of abuses and the means of relief, only at last to express a series of pious wishes and leave their execution to the Pope, whose election was accomplished by a joint commission of the cardinals and the Council. Naturally, the new Pope, Martin V., of the Roman family of the Colonna, failed to consider himself bound by the action of a council that could not agree within itself upon vital questions, and his 'reforms' were of the most superficial kind. The Papacy had come out of the trial of schism and opposition unchanged in its quality. It could not avert the assembling of the Council of Basel (1431-48), but it steadily opposed it. So long as the Council could keep the respect of Europe it could maintain its existence, and at least succeeded in demonstrating its capacity to do things that the Papal administration had failed to accomplish; but the longer it lasted the more apparent it became that Europe was not ready to exchange the traditional authority of Rome for the novel tyranny of an irresponsible council. Especially when the Council proceeded of its own right to choose a pope, without reference to the Roman tradition, it became clear that such a pope could not be supported. What the Council of Basel really accomplished was to furnish to the nations a pretext for asserting their rights over their own local churches more firmly than ever, as, for example, in the case of France, through the Pragmatic Sanction of Bourges (1438). When this was done the governments were comparatively indifferent to the general question of the Papal constitution itself, and Nicholas V. (1447-55) stands at the beginning of a period more splendid than any other in the Papal annals. The Papacy now entered into the politics of Europe as one among the temporal powers (see PAPAL STATES), fell in with the prevailing enthusiasm for art and letters, and sought to direct the course of the Renaissance movement. In the meantime opposition was slowly and silently gathering in the North, which culminated in the Reformation movement, and directly challenged the traditional supremacy of the Papacy. The Protestant Reformation affirmed as the ground of its justification the financial tyranny, the spiritual indifference, and the anti-national propaganda of the Papacy. It formulated as its programme a return to what it claimed to be the early principles of a private interpretation of Scripture and a personal approach of every Christian man to his God without other mediation than that of his personal faith. Against this demand the Papacy set itself with all the resources of its past. Between the two ideas there was no compromise, and the result was secession. As late as 1541 it was hoped by many sanguine persons on both sides that some common ground might be discovered, but the Council of Trent (1543-63) reaffirmed in unmistakable terms the existing principles of the Papacy as it had come to be. Recognizing the need of 'reform' in many details, the Council carefully avoided any action that might seem like compromise with rebellion. While not admitting in theory the fact of schism, the Papacy henceforth was obliged to recognize it in practice and to devote all its energy to maintaining its hold upon what it had left and extending its sway over new lands. For later history, see ROMAN CATHOLIC CHURCH; PAPAL STATES.

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The following list is taken from Wetzer and Welte's *Kirchenlexikon*, and may be assumed to represent the conclusions of the best modern Roman Catholic scholarship. Down to Pius II. it follows in general the results reached in Duchesne's learned edition of the *Liber Pontificalis* (Paris, 1886); for the later dates, use has been made of Gams, *Series Episcoporum*, and of Reumont, *Geschichte der Stadt Rom* (Berlin, 1870).

Peter	d. 67 ?	Calixtus	283-296
Linus	67-79 ?	Marcellinus	296-304
Anacletus	79-90 ?	Marcellus	308-309
Clement I.	90-99 ?	Eusebius	309 (310)
Evaristus	99-107 ?	Miltiades	311-314
Alexander	107-116 ?	Sylvester I.	314-335
Xystus (Sixtus) ..	116-125 ?	Marcus	336
Telesphorus	125-136 ?	Julius I.	337-352
Hyginus	136-140 ?	Liberius	352-366
Pius I.	140-154 ?	Damasus I.	366-384
Anicetus	154-165	Strictus	384-399
Soter	165-174	Anastasius I.	399-401
Eleutherus	174-189	Innocent I.	401-417
Victor	189-198	Zosimus	417-418
Zephyrinus	198-217	Boniface I.	418-422
Callistus	217-222	Celestine I.	422-432
Urbanus	222-230	Xystus III.	432-440
Pontianus	230-235	Leo I.	440-461
Anterus	235-236	Hilarius	461-468
Fabianus	236-250	Simplicius	468-483
Cornelius	251-253	Felix II.	483-492
Lucius I.	253-254	Gelasius I.	492-496
Stephen I.	254-257	Anastasius II.	496-498
Xystus II.	257-258	Symmachus	498-514
Dionysius	259-268	Hormisdas	514-523
Felix I.	269-274	John I.	523-526
Eutychianus	275-283	Felix III.	526-530

Boniface II.....	530-532	Stephen IX.....	1057-58	Clement XIV.....	1769-74	Gregory XVI.....	1831-46
John II.....	533-535	Benedict X.....	1058-59	Pius VI.....	1775-99	Pius IX.....	1846-78
Agapetus I.....	535-536	Nicholas II.....	1058-61	Pius VII.....	1800-23	Leo XIII.....	1878-1903
Silverius.....	536-537	Alexander II.....	1061-73	Leo XII.....	1823-29	Pius X.....	1903-
Vigilius.....	537-555	Gregory VII.....	1073-85	Pius VIII.....	1829-30		
Pelagius I.....	556-561	Victor III.....	1087				
John III.....	561-574	Urban II.....	1088-99				
Benedict I.....	575-579	Paschal II.....	1099-1118				
Pelagius II.....	579-590	Gelasius II.....	1118-19				
Gregory I.....	590-604	Calixtus II.....	1119-24				
Sabinianus.....	604-606	Honorius II.....	1124-30				
Boniface III.....	607	Innocent II.....	1130-43				
Boniface IV.....	608-615	Celestine II.....	1143-44				
Deusdedit.....	615-618	Lucius II.....	1144-45				
Boniface V.....	619-625	Eugenius III.....	1145-53				
Honorius I.....	625-638	Anastasius IV.....	1153-54				
Severinus.....	640	Adrian IV.....	1154-59				
John IV.....	640-642	Alexander III.....	1159-81				
Theodore I.....	642-649	Lucius III.....	1181-85				
Martin I.....	649-653	Urban III.....	1185-87				
Eugenius I.....	654-657	Gregory VIII.....	1187				
Vitalian.....	657-672	Clement III.....	1187-91				
Adcodatus.....	672-676	Celestine III.....	1191-98				
Donus.....	676-678	Innocent III.....	1198-1216				
Agatho.....	678-681	Honorius III.....	1216-27				
Leo II.....	682-683	Gregory IX.....	1227-41				
Benedict II.....	684-685	Celestine IV.....	1241				
John V.....	685-686	Innocent IV.....	1243-54				
Conon.....	686-687	Alexander IV.....	1254-61				
Sergius.....	687-701	Urban IV.....	1261-64				
John VI.....	701-705	Clement IV.....	1265-68				
John VII.....	706-707	Gregory X.....	1271-76				
Sisinnius.....	708	Innocent V.....	1276				
Constantine.....	708-716	Adrian V.....	1276				
Gregory II.....	715-731	John XXI.....	1276-77				
Gregory III.....	731-741	Nicholas III.....	1277-80				
Zacharias.....	741-752	Martin IV.....	1281-85				
Stephen II.....	752-757	Honorius IV.....	1285-87				
Paul I.....	757-767	Nicholas IV.....	1288-92				
Stephen III.....	768-772	Celestine V.....	1294				
Adrian I.....	772-795	Boniface VIII.....	1294-1303				
Leo III.....	795-816	Benedict XI.....	1303-04				
Stephen IV.....	816-817	Clement V.....	1305-14				
Paschal I.....	817-824	John XXII.....	1316-34				
Eugenius II.....	824-827	Benedict XII.....	1334-42				
Valentine.....	827	Clement VI.....	1342-52				
Gregory IV.....	827-844	Innocent VI.....	1352-62				
Sergius II.....	844-847	Urban V.....	1362-70				
Leo IV.....	847-855	Gregory XI.....	1370-78				
Benedict III.....	855-858	Urban VI.....	1378-89				
Nicholas I.....	858-867	Boniface IX.....	1389-1404				
Adrian II.....	867-872	Innocent VII.....	1404-06				
John VIII.....	872-882	Gregory XII.....	1406-09				
Marinus I.....	882-884	Alexander V.....	1409-10				
Adrian III.....	884-885	John XXIII.....	1410-15				
Stephen V.....	885-891	Martin V.....	1417-31				
Formosus.....	891-896	Eugenius IV.....	1431-47				
Boniface VI.....	896	Nicholas V.....	1447-55				
Stephen VI.....	896-897	Calixtus III.....	1455-58				
Romanus.....	897	Pius II.....	1458-64				
Theodore II.....	897	Paul II.....	1464-71				
John IX.....	898-900	Sixtus IV.....	1471-84				
Benedict IV.....	900-903	Innocent VIII.....	1484-92				
Leo V.....	903	Alexander VI.....	1492-1503				
Christopher.....	903-904	Pius III.....	1503				
Sergius III.....	904-911	Julius II.....	1503-13				
Anastasius III.....	911-913	Leo X.....	1513-21				
Lando.....	913-914	Adrian VI.....	1522-23				
John X.....	914-928	Clement VII.....	1523-34				
Leo VI.....	928	Paul III.....	1534-49				
Stephen VII.....	928-931	Julius III.....	1550-55				
John XI.....	931-935	Marcellus II.....	1555				
Leo VII.....	936-939	Paul IV.....	1555-59				
Stephen VIII.....	939-942	Pius IV.....	1559-65				
Marinus II.....	942-946	Pius V.....	1566-72				
Agapetus II.....	946-955	Gregory XIII.....	1572-85				
John XII.....	955-964	Sixtus V.....	1585-90				
Leo VIII.....	963-965	Urban VII.....	1590				
Benedict V.....	964	Gregory XIV.....	1590-91				
John XIII.....	965-972	Innocent IX.....	1591				
Benedict VI.....	973-974	Clement VIII.....	1592-1605				
Benedict VII.....	974-983	Leo XI.....	1605				
John XIV.....	983-984	Paul V.....	1605-21				
Boniface VII.....	984-985	Gregory XV.....	1621-23				
John XV.....	985-996	Urban VIII.....	1623-44				
Gregory V.....	996-999	Innocent X.....	1644-55				
Sylvester II.....	999-1003	Alexander VII.....	1655-67				
John XVII.....	1003	Clement IX.....	1667-69				
John XVIII.....	1003-09	Clement X.....	1670-76				
Sergius IV.....	1009-12	Innocent XI.....	1676-89				
Benedict VIII.....	1012-24	Alexander VIII.....	1689-91				
John XIX.....	1021-32	Innocent XII.....	1691-1700				
Benedict IX.....	1032-44	Clement XI.....	1700-21				
Gregory VI.....	1045-46	Innocent XIII.....	1721-24				
Clement II.....	1046-47	Benedict XIII.....	1724-30				
Damasus II.....	1048	Clement XII.....	1730-40				
Leo IX.....	1049-54	Benedict XIV.....	1740-58				
Victor II.....	1055-57	Clement XIII.....	1758-69				

PAPAIN. A digestive ferment derived from the juice of *Carica Papaya*, a South American fruit tree belonging to the order *Papayaceæ*. This ferment is a mixture containing vegetable globulin, albumoses, and peptone. It digests all forms of proteid or albuminous matter, whether coagulated or not, and whether the medium in which it works is acid, alkaline, or neutral. It is a rapid solvent of false membrane. Papoid, derived from papain, is serviceable in gastro-enteritis, gastritis, infantile diarrhoea, and fermentative dyspepsia. It has been used locally on diphtheritic membrane, and has been injected into neoplasms with success. It is found in the shops in powder and tablet form, and a glycerole is also made. Papain is not official.

PAPAJO, pã'pã-hô. An important tribe of Piman stock (q.v.), originally occupying a large portion of Arizona, south of the Gila, and extending across the border into northern Sonora, Mexico. They were missionized by the early Jesuits and Franciscans, and are now practically all Catholic. They are agricultural, industrious, and peaceable toward the whites, but have been compelled to wage constant war with the Apache until a recent period. They carry on an extensive trade in salt, collected from the salt lakes of the region. They were recognized as citizens under the Mexican Government, but their rights were disregarded on the annexation of the territory to the United States, and by the seizure of the best lands and water supplies by the American settlers and land companies, the majority have been rendered homeless nomads. Hundreds of them earn good wages as railroad laborers. They number about 3900, of whom 520 are on San Xavier reservation and 100 at Gila Bend, most of the others being nomadic. The number in Sonora is unknown.

PAPAL GUARANTEES, LAW OF. A law passed by the Italian Parliament at Florence in 1871, which aimed at making the Papacy and the Italian Government mutually independent. It guaranteed to the Pope the diplomatic privileges of a sovereign power with its own ambassadors and its own court in the midst of Rome; separate postal and telegraphic communications with foreign countries; and an allowance of 3,225,000 francs a year. It allowed further to him and his successors the use of the Vatican and Lateran palaces, and certain other buildings, and precluded all Government officials from entering any of these buildings without permission. It relinquished the royal *exequatur* and *placet*, or the necessity of the King's assent to the publication and execution of acts of the ecclesiastical authority; it exempted the bishops from any oath of allegiance to the Crown, and gave the clergy complete freedom of meeting. It put an end to appeals to the civil courts against acts of spiritual discipline, but, on the other hand, it denied to the Church courts the aid of the civil tribunals in enforcing their decisions. This plan, of which a draft had been found among the papers of Cavour, and which attempted to realize his ideal of 'a free Church in a free State,' was opposed by the Liberals as

leaving the Pope in far too independent a position. It was submitted to the Powers with the view of obtaining international sanction; but this failed through the refusal of England. Partly, perhaps, owing to French influence, the Pope decided to refuse these offers and to ignore the Italian Government completely while remaining in Rome. See PAPAL STATES; ITALY.

PAPAL STATES, or **STATES OF THE CHURCH**. The name applied to the territory in Central Italy, varying in extent, which until the last half of the nineteenth century was under the temporal sovereignty of the Pope. The earliest origin of this dominion is difficult to assign to a definite year. Although the so-called Donation of Constantine is now known to have been a later invention, there is no doubt that he made many rich gifts to the Church, especially after his victory over Maxentius; the Lateran Palace, for a thousand years the residence of the popes, seems to have been given to them during his reign. Like other bishops, the bishops of Rome acquired by degrees not unimportant political rights; and when the seat of the Empire was removed to Byzantium, it was partly their rich possessions that gave them their great influence in the affairs of Italy. By the time of Gregory the Great (590-604) the Roman See possessed at least twenty-three estates with a total area of some 1800 square miles in various parts of Italy and the adjacent islands, in Southern France, and even in Northern Africa. The beginning of full sovereignty in the modern sense may, however, be said to have come from the presentation of the town of Sutri by the Lombards to the Apostles Peter and Paul in the person of Gregory II. (727). The Lombards were uncertain friends, however, and the popes were obliged to appeal to the Frankish kingdom for aid against them. In 754 Pepin transferred considerable and definite territories to Pope Gregory III., and in the following year, brushing aside by conquest any claims which either the Lombards or the Byzantine Emperor made to these lands, placed the Pope in undisputed possession of them. Charlemagne increased them, until they extended from Luna, near the present Lucca, to Capua, including the Duchy of Rome, the Pentapolis, Emilia, and the Exarchate of Ravenna, or nearly the whole of Central Italy.

This sovereignty, though attacked during the troubles of the tenth century by the Italian factions, increased gradually during the eleventh and twelfth. In 1014 the Emperor Henry II. resigned half of Tuscany into the Pope's hands; Leo IX. received the overlordship of Benevento from Henry III. in 1052, and the principality came into the full possession of the Holy See in 1077, on the extinction of the family which had ruled it. In 1115 the Countess Matilda of Tuscany left the Pope her fiefs of Parma, Modena, Reggio, and Garfagnana, and part of Mantua. They were, however, seized by the Emperor, and only a part of Southern Tuscany actually came into the Pope's hands. In these times, in any case, the power of the Pope was little more than a feudal suzerainty over a number of petty princes or over cities with their own government, who paid tribute to the popes and were bound to assist them with a military force in case of need. In France, Gregory X. gained the Comtat Venaissin from Philip III. in 1274, and Clement VI. bought

the town of Avignon in 1348. During the Avignon period, however (1309-76), the temporal sovereignty of the popes over their Italian territories was menaced or weakened by the ambition of the great families, and Cola di Rienzi even succeeded for a time in shaking it off from Rome itself. In the sixteenth century the popes entered so largely into the political movements of Europe, and were of such importance to the maintenance of the balance of power, that prudent statesmanship was able to increase their territory largely. Sixtus IV. at the end of the fifteenth century established his jurisdiction over Romagna; additions were made of Bologna in 1512, Ancona in 1532, Camerino in 1545, Ferrara and Comacchio, the possessions of the House of Este, in 1598, Urbino in 1631, Castro and Ronciglione, the last additions, in 1649.

Great changes began with the end of the eighteenth century. In 1768 the Bourbon rulers of Naples seized Benevento and Pontecorvo, and in 1783 dissolved altogether the connection with the Roman See which had existed for more than seven centuries. Avignon and Venaissin were occupied from 1768 to 1774, as they had been twice in the preceding century, by the French Bourbons, and in 1791 passed under the jurisdiction of the French Republic. By the Treaty of Tolentino (1797) Pius VI. was obliged to resign the three legations of Bologna, Ferrara, and Romagna into Napoleon's hands, and a year later the remaining territory was seized and erected into the Roman Republic. This was overthrown by the Second Coalition in June, 1799; on July 3, 1800, Pius VII. entered Rome, which had been held by the Neapolitans, and reestablished the old constitution in his States, now deprived of Romagna, Bologna, and Ferrara. The French again took possession of them, and in 1809 incorporated them with the Empire, Rome being reckoned as its second city. The Congress of Vienna restored the States of the Church, now embracing the marches of Ancona and Camerino, the duchies of Benevento and Pontecorvo, and the legations, except a part of Ferrara, which Austria retained. In 1831 and 1848 there were risings against the Government. The former was suppressed by the aid of an Austrian army; the latter assumed such proportions, even in Rome itself, that Pope Pius IX. was forced to flee to Gaeta, while Rome was proclaimed a republic. He was restored by the arms of France in 1849. The Austrians held the legations for the Pope until 1859, and the French occupied Rome in his behalf (except for a part of 1867) until 1870. In July, 1859, on the withdrawal of the Austrian troops, the Romagna threw off the Papal authority and declared its annexation to the Kingdom of Sardinia, or, as it was to become a few months later, of Italy. After the defeat of Lamoricière, the Papal general (1859), Umbria, Urbino, and the Marches were annexed by Victor Emmanuel; and the isolated possessions of Benevento and Pontecorvo shared the same fate. In October, 1870, the French army having been withdrawn in July, the remnant of the Papal States voted for union with the Kingdom of Italy. It was the original intention of Victor Emmanuel's Government to leave the part of Rome known as the Leonine city under the Pope's control as a compromise; but it was rejected equally by the Pope and by the inhabitants, and the Pope's jurisdiction was re-

stricted within the limits of the Vatican, outside of which, as a protest against the legality of the Italian occupation, he has never set foot since 1870. Roman Catholics generally, while of course not considering the temporal power as in any way essential, yet regard it as very expedient for the proper exercise by the Pope of his high functions that he should be independent and not the subject of any temporal ruler. This is maintained not only on theoretical grounds, but as demonstrated historically by the events of the Avignon captivity and by more than one incident of the period since 1870. Consult: Manning, *The Temporal Power of the Pope* (London, 1871); Hagelüken, *Die weltliche Macht des Papstes* (Frankfort, 1868); Döllinger, *Papstthum und Kirchenstaat* (Munich, 1861); Hergenröther, *Der Kirchenstaat seit der französischen Revolution* (Freiburg, 1860); Stillman, *The Union of Italy* (Cambridge, 1898). See PAPACY; ITALY; PAPAL GUARANTEES, LAW OF.

PAPAV'ERA'CEÆ (Neo-Lat. nom. pl., from Lat. *papaver*, poppy), THE POPPY FAMILY. A natural order of dicotyledonous plants, mostly herbs or half shrubs, and usually with a milky or colored juice. The leaves are alternate, without stipules; the flowers solitary on long stalks; the fruit pod-shaped or capsular; the seeds numerous. In several the fruit is a capsule opening by small pores just under the expansion formed by the stigmas. In this way the seeds are well protected and only escape when shaken by the wind or other agencies. The order is distinguished for narcotic properties. Opium (q.v.) is its most important product. The juice of celandine (q.v.) is very acrid. A number of species are used in their native countries for medicinal purposes. The seeds yield fixed oil, which, with the exception of that obtained from *Argemone Mexicana*, is bland. The flowers of many species are large and showy, most frequently white or yellow, sometimes red. Several kinds of poppy and *Eschscholtzia* are frequent in gardens. There are in all about 200 species, natives of tropical and temperate climates. The chief genera are *Hypecoum*, *Eschscholtzia*, *Chelidonium*, *Glaucium*, *Papaver*, *Dicentra*, *Corydalis*, and *Fumaria*. See POPPY.

PAPAW' (from Sp. Port. *papaya*, from Malabar *papaïamaram*, the native name), *Asimina triloba*. A small American tree or shrub of the natural order Anonaceæ, with alternate entire leaves and lateral or axillary nodding flowers. The fruits are variable in size, ranging from two to six inches in length and from one to two inches in diameter; flesh soft, sweet, and buttery; rind thin and adherent; seeds large, kidney-shaped, and numerous. While the papaw abounds in clearings and pastures from Pennsylvania southward, it is seldom met with in cultivation outside of parks and ornamental grounds. The fruits are found in season in several American markets, where they meet with ready sale. The tropical papaw, or melon tree, is a species of *Papaya*.

PAPÉITI, pá'pá'é'té'. The capital of the French possessions in the eastern Pacific. See TAHITI.

PAPER (OF., Fr. *papier*, from Lat. *papyrus*, from Gk. *πάπυρος*, *papyrus*). Although the word 'paper' is derived from 'papyrus' (q.v.), papyrus

is not a paper at all, and the beginnings of the paper industry are not traced back to it, but to the genuine paper made by the Chinese from very early times. From the Chinese it spread to other races, and was probably brought into Europe during the twelfth century through the Moors into Spain, and at the time of the Second Crusade into Italy. About the year 1150 a paper mill was started at Fabriano, Italy, which became the principal centre for paper-making, and this region continues the manufacture to the present day. From Italy the art spread to France and Germany, somewhat later to England, where it was not well established until the Revocation of the Edict of Nantes in 1685 sent many French paper-makers into exile to England and America. In 1690 the first paper mill in America was built by William Rittenhouse at Roxborough, near Philadelphia. The first paper mill in New England was built by a company which was granted by the Governor and Legislature in 1728 the sole privilege of making paper in the Province of Massachusetts for ten years. In 1730 the manufacture of paper was begun by this company, and specimens of paper were shown to the Legislature.



PAPAW.

Up to the beginning of the nineteenth century, while machinery was used to reduce the rag to a pulp, the formation of the sheet of paper was done entirely by hand, sheet by sheet, as described below. About 1798 Louis Robert, a workman in the mill of Didot at Essonne, France, patented an invention for making paper in an endless web, but it was not put to practical use till developed in England by Henry and Sealy Fourdrinier, who spent and lost a fortune perfecting the machine. They are properly considered the founders of modern paper-making, and their machine is universally known as the Fourdrinier machine. So well was their develop-

PAPAW AND PERSIMMON



PERSIMMON (*Diospyros Virginiana*).



PAPAW OR MELON TREE (*Carica Papaya*).

ment work done that the early machines differ in minor details only from the most modern machine running to-day.

EARLIEST PROCESS OF MANUFACTURE. The method of manufacturing paper by hand from the inner bark of the paper mulberry, as practiced to-day by the Japanese, probably represents the method in vogue from the very earliest times. It is of interest not only on account of its antiquity, but because it presents in outline all other methods, which merely are adaptations of the processes here described. A sheet of paper is an artificially felted web of vegetable fibre, purified of perishable materials, that is, fibres of more or less pure cellulose (q.v.). The process may be described as collecting the raw material, cleaning it by boiling with lye, macerating it to a fine pulp, diluting with water, forming a sheet on a porous surface (that the water may drain off), and drying the sheet of paper thus formed. The Japanese strip the paper mulberry of its bark, soak it in water till soft enough to strip the outer bark, then separate the inner bark, dry in the sun, and boil with lye obtained by leaching wood ashes. After being well washed, the bark is now beaten into pulp by four men seated around a board of hard wood on which the bark is placed. The men pound with long wooden mallets and turn out each day about 80 pounds of pulp per man. The fibre is now mixed with sufficient water, and the sheet of paper formed on a sieve made of fine strips of bamboo. A wooden frame is fitted on the sieve to hold the right amount of liquid pulp. This elevated border is called in Europe the 'deckel,' and prevents the pulp from spreading beyond the limits of the sheet. After dipping the sieve into the vat of pulp, the paper-maker dexterously shakes the mold in all directions as the water drains off, thus felting the fibres in all directions and making a strong sheet. The sheets are then spread out on a board and dried in the sun.

The European method of making paper by hand differs in several respects from the Japanese. The raw material used (originally linen rags) is too tenacious to be reduced to pulp by hand power, and the earliest European mills used a sort of trip-hammer or pestle driven by a water wheel. This in turn was superseded by the modern beating engine or Hollander, invented by the Dutch in the latter part of the seventeenth century, as described below. The sieve used, instead of being made of bamboo, is of wire cloth, with a movable edge or deckel. The workman after forming the sheet removes the deckel, turning the damp sheet onto a sheet of woollen felt. A pile of these sheets, alternate paper and felt, is called a 'post,' and is placed in a press to remove the water. The sheets are afterwards hung up in a loft to dry, and finished by sizing with glue or gelatin, and smoothed by pressure or calender rolls. Hand-made paper always has four rough edges, while machine-made paper has only two. These are usually trimmed off unless an imitation of hand-made paper is wanted.

RAW MATERIALS. The preparation of any raw material for use as paper stock consists essentially in isolating the cellulose in the form of fibres of as great length as possible. As cellulose is the structural base of all plants, theoretically any plant might furnish the paper-

maker with material for his mill. It becomes, therefore, a question of cost of producing the pure cellulose, and quality of the product. The earliest plant used was the paper mulberry, whose fibres are very easily separated, and a fairly pure cellulose obtained by simply boiling with lye. As this plant does not grow in Europe, it is not used in modern paper-making. The chief material used up to the middle of the nineteenth century was cotton and linen rags. These are already reduced to nearly pure cellulose by the processes of textile manufacture, and cleaning and boiling with an alkali is all that is needed to prepare the stock for pulp. Wood is the raw material of most importance to the paper-maker to-day, and esparto grass (alfa) is used in England on a large scale. Straw, waste paper, old rope, jute butts, hemp, etc., are also used. The different processes of reducing the material to a suitable fibre will be considered later.

PROCESS OF MANUFACTURE BY MACHINERY. Whether for hand-made or machine-made paper, the preparation of rags for pulp may be divided as follows: (1) Cleaning; (2) boiling; (3) washing; (4) bleaching; (5) beating or reducing to pulp. The preparation of substitutes for rags is practically the same except that the boiling process is more drastic, varying with the substance used.

(1) *Cleaning.*—Rags are received at the mill in bales more or less sorted into white, colored, linen, cotton, canvas, etc., but need, for the finer sorts of paper (in which alone rags are now used at all), a thorough dusting and further sorting by hand. The duster may be of various forms, and removes dust and foreign substances by vigorous mechanical methods. The sorting is done by girls who stand before tables covered with wire screens through which dust and dirt sifts. The girls cut off buttons, rubber (a great curse to the modern paper-maker, as it does not bleach and appears in the paper as black specks, besides sticking to rolls and clogging the straining screens), and other foreign substances, and sort the rags accurately into different grades. A further dusting and chopping into pieces a couple of inches long make the rags ready for boiling.

(2) *Boiling.*—The rags are packed in a large horizontal boiler, called the 'rotary.' This is provided with manholes for the admission and discharge of the rags and lime, and is mounted on hollow trunnions through which steam is admitted. To clean the rags from all fatty, colored, and non-cellulose impurities, a solution of lime is used, and the rags cooked and slowly rotated under steam pressure for several hours, the amount of lime, pressure, and time of boiling varying according to circumstances. When sufficiently cooked, the steam and liquor are blown off and the rags dumped out by slowly revolving the rotary with the manholes opened. The rags are now of a brown color, and most of the impurities have been saponified, combining with the lime to form insoluble compounds which can be washed away, or, in the case of colors, reduced to simple colorless compounds.

(3) *Washing.*—The washing or beating engine is shown in the cut. It is also called the Hollander. It consists of a wooden or metal tub 10 to 15 feet long, with rounded ends (see cut), in the centre of which is a partition (E)

called the 'mid-feather,' a roll (C) is provided with knives, and revolves rapidly over a bed plate (B) of similar knives. The distance between the bed plate and the roll is regulated by raising or lowering the supports of the roll with a wheel and screw. The rags after passing between the bed plate and the roll flow down

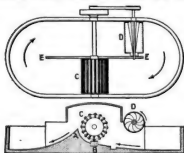


FIG. 1. PULP-BEATING ENGINE.

the 'backfall' (A) and around the mid-feather back to the starting point, as indicated by arrows. The washing engine is provided with a washing cylinder (D), which is so made that as it revolves it scoops up the water, which flows out through its axis, the rags being kept out by a fine wire cloth surrounding the cylinder. The rags to be washed are put into the washing engine with enough water, the roll being raised so that the rags pass around freely without being beaten into pulp, as otherwise the dirt would be ground into the fibre. A large quantity of water is admitted, which is removed by the drum washer, as described above, and the rags are in this manner rapidly cleaned. The roll is now lowered gradually, and the rags slowly macerated, losing their characteristics of textiles, and being finally resolved into single fibres

tub is often used. In place of chloride of lime, a solution much used in France is prepared by electrolysis of magnesium chloride. After bleaching, the pulp is emptied into the drainers, large chambers with floors of porous tiles, where the moisture and surplus bleach drain off. The pulp is left some days in the drainers, till it is nearly dry. In Europe, in place of drainers, the pulp is usually dried by making up into thick sheets of paper on a machine similar to the wire of the Fourdrinier machine called a *presse-pâte*.

(5) *Beating*.—The half-stuff is next put into the beating engines, which are similar to the washers, but have no washing-drum, and the knives are arranged to macerate the pulp faster. At this point the loading materials, color, and sizing are added, and if various fibres are used, such as rag, wood fibre, or esparto, they are mixed here, while the half-stuff is being reduced to the very fine condition required for making into paper. Most papers contain a filler, usually china clay (kaolin, q.v.) or sulphate of lime ('pearl hardening'). This fills the pores, giving a more even printing surface, besides adding to the weight. As paper is usually sold by the pound, the latter consideration is not without its influence, the loading sometimes amounting to 33½ per cent. An addition of 10 per cent. of mineral is not considered an adulteration. Bleached pulp has a yellowish cast, and to obtain a pure white a little blue is added, and papers that are colored in the pulp are prepared at this point. Sizing is added to prevent the absorption of ink. Unsized (or 'water leaf') papers absorb water readily and cannot be used for writing with a pen. The sizing is of two kinds, vegetable (rosin) size, added at this stage of manufacture, and animal (glue) size, which is applied externally after the paper is made. The accompanying plate (Fig. 2) shows the beating engines in a 'news' mill at Rumford Falls, Maine. A boy is 'furnishing' the second engine, putting in chemical fibre, while the

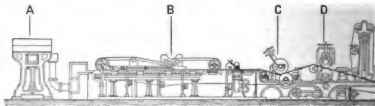


FIG. 2. FOURDRINIER MACHINE IN SECTION.

of varying lengths. When the washing is completed, the washing cylinder is raised out of the beater and the supply of water cut off. The beating process is then continued a little longer till the pulp reaches the stage called half-stuff, the practice varying in different mills.

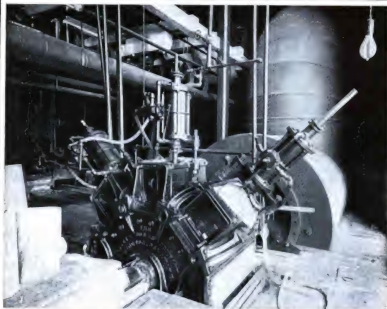
(4) *Bleaching*.—The pulp is now as white as it can be made without bleaching, and is a light gray if medium grade white and colored rags were used. The addition of a solution of chloride of lime (bleaching powder), decomposed by sulphuric acid, bleaches the pulp to a creamy whiteness. In America the bleaching is done in the washing engines, but in Europe a separate

ground wood is run in from the large pipe above. On the other side is seen a man getting out china clay from a cask.

Rosin size is prepared as follows: A rosin soap is made by dissolving rosin with caustic soda or potash; this is added to the pulp in the beating engine and precipitated on the fibres by the addition of a solution of alum or sulphate of alumina. Paper thus sized is called engine-sized or rosin-sized paper, as distinguished from 'tub-sized' or animal-sized, which will be described later.

The pulp may be beaten fine enough in the beating engine, but the practice in this country

PAPER-MAKING MACHINERY



1. WOOD-PULP GRINDER AT RUMFORD FALLS MILL OF INTERNATIONAL PAPER CO.
2. BEATING ENGINES IN RUMFORD FALLS MILL

is to dump it into a 'stuff chest,' a large circular receptacle, with a horizontal agitator to keep it from settling, and then to pump it through a so-called 'Jordan' or refining engine, into a second stuff chest, whence it is pumped to the Fourdrinier machine.

THE JORDAN ENGINE is a most successful American invention, in universal use in the paper mills of America, but practically unknown in Europe, in spite of its large saving of time, space, and power. It was invented in 1862 by Joseph Jordan of Paterson, N. J., who never benefited financially from the invention, and is now supported in poverty by the paper-makers of America. The 'Jordan' consists of a stationary hollow cone mounted with knives on the inside which fits over a solid rapidly revolving cone mounted with similar knives on the outside. The pulp passes between these cones, and the knives can be brought close together or separated with great accuracy, so that the degree of fineness of the pulp can be adjusted.

THE FOURDRINIER MACHINE consists of the following parts: A, The screens; B, the wire, with dandy roll, deckel straps, and suction boxes; C, the couch rolls; D, the first press; E, the second press; F, the driers; G, the calenders; H, the reel; and I, the slitter.

A. The Screens.—From the second stuff chest the pulp, which is now diluted with a large amount of water, flows through sand settlers and regulating gates to the screens. These consist of brass plates with a large number of longitudinal V-shaped slits cut in them, the opening being very small, only a few thousandths of an inch. A continuous jarring is given to these plates, which forces the fine pulp through the slits, but the lumps and impurities are retained. In some forms of screen a vacuum pump is used combined with an oscillating motion of the screens, which keeps the pulp flowing back and forth, preventing the clogging of the slits.

wire is given a lateral motion which greatly assists in the felting of the fibres into a strong sheet. The forward motion of the wire tends to arrange the fibres in the same direction, and the side shake is necessary to offset this tendency, giving strength in both directions. Notwithstanding, it is easy to tell by tearing which way a sheet of paper was made on the machine. The water drains rapidly away from the pulp, assisted by two or three 'suction boxes' under the wire, which are connected with an air pump and exhaust the water much faster than would otherwise be possible. At this point, between the first and second suction boxes, is situated the 'dandy roll,' a light cylinder covered with wire, which rests on the upper surface of the moist paper, giving it the impression of whatever design is on it. 'Wove' paper has both sides impressed with the fine woven wire; that is, the dandy roll is covered with the same wire as the paper is formed on. In *laid* paper, on the other hand, the dandy is covered with parallel wires, with a cross wire at intervals. Water marks are impressed in the paper by affixing the required design on the dandy roll. A false water mark is sometimes made after the paper is partly dried by passing between rolls engraved with a design.

C. Couch Rolls.—At the end of the wire (that is, where it turns down over a roll to return to the starting point) are the 'couch' rolls, covered with felt, through which the wire passes bearing the web of paper. These rolls press the water out still more, and consolidate the fibre, giving it strength to cross alone the gap between the wire and the felt of the first press roll. These rolls correspond in function to the pressure applied to the 'post' of alternate sheets of damp paper and felts in hand-made paper.

D and E. The Press Rolls.—An endless woolen blanket (the 'felt') supports the tender web of paper through a pair of highly polished brass rolls under considerable pressure, giving the upper side of the sheet a smooth surface, and

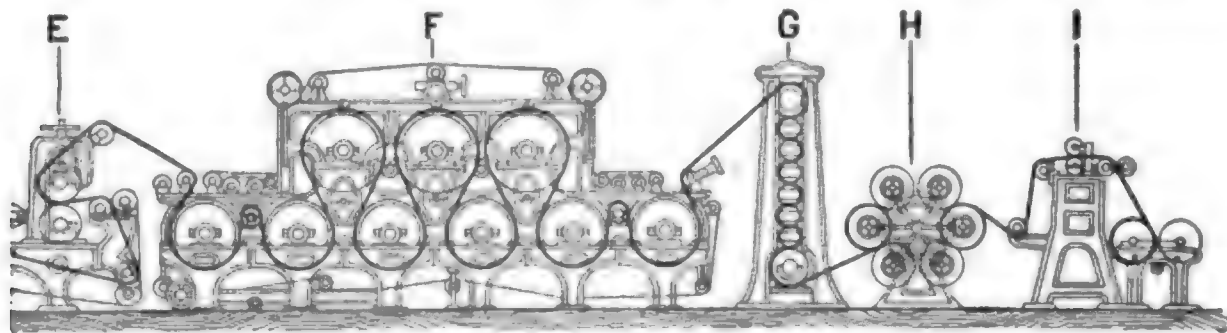


FIG. 2. FOURDRINIER MACHINE IN SECTION.

B. The Wire.—The strained and purified pulp flows over an apron onto an endless traveling wire cloth, the mesh of which is 60 to 90 threads to an inch. The wire is supported perfectly level on a great many small rollers (the 'table rolls'), under which is a shallow wooden box, the 'save-all,' into which much of the water runs, leaving the pulp on the wire. The water in the 'save-all' contains much pulp and is used over again. The boundary of the flow of pulp on the sides is made by endless rubber bands, called deckel straps, which travel with the wire. These are adjustable so that varying widths of paper may be made. The frame supporting the

leaving the impress of the felt on the upper side. From the first press, D, the sheet runs under the second pair of rolls, E, and back through them in the *reverse* direction, thus smoothing the *other* side of the sheet and giving as even-sided results as possible.

F. The Driers.—The paper is now formed and it only remains to dry it. The driers are a series of steam-heated metal cylinders, two to four feet in diameter, arranged in one, two, or three tiers. The paper is carried nearly round each in turn, and on to the next, being held to the hot surfaces by an endless blanket, usually of cotton. Sometimes there are smoothing rolls

when the paper is partly dried. The size and number of driers determine how fast a paper can be run. With a given machine thin papers can be run (and dried) very fast; thick ones slowly.

G. *The Calenders.*—After being thoroughly dried the web of paper is passed through a 'stack' of smooth chilled iron rolls, which by their own weight, and pressure applied by screws or weights, smooths the paper and produces what is called 'machine finished' paper, as contrasted with 'supercalendered' paper, described farther on. It is now wound on a reel.

H and I. *The Reel and Slitter.*—After being wound on a reel the paper is passed through the slitter, the rough outside edges trimmed, and if necessary the single web slit into any required widths. It is then rewound and is ready for shipment, if intended for printing in the roll or for coating; or for supercalendering, sheeting, and packing.

The Fourdrinier machine makes automatically an endless web of paper from 60 to 160 inches wide at a speed of 10 to 400 feet per minute. The plate shows the reels, calenders, and driers of one of the largest machines in the world, 160 inches wide, belonging to the International Paper Company at Rumford Falls, Maine. It can run at a speed of 300 feet per minute and produces 64,000 pounds of paper in 24 hours.

SUPERCALENDERS. Much book paper requires a high finish, that is, a very smooth surface, and this is given by passing it between alternate iron and compressed paper rolls under great pressure. These machines are called the supercalenders. It is then sheeted, counted into reams of 480 or 500 sheets, and packed in cases or bundles.

ANIMAL SIZING AND LOFT DRYING. The finer grades of writing papers are not finished as here described, but when partly dried are passed through a vat of gelatin (glue) in solution, the excess squeezed off by rollers, and either slowly dried by passing over a large number of hollow drums with fans inside, or cut in sheets, and hung in lofts to dry in the manner employed for hand-made paper.

The following are the main differences in the preparation of rag substitutes from that given above:

Esparto grass comes from Spain and Africa, and is very largely used in England. The grass is cleaned, dusted, and boiled with caustic soda under pressure, a so-called vomiting boiler being usually used; it is then washed and bleached in much the same manner as rags. It gives a white fibre of fair strength.

Straw is used largely in the United States, chiefly for strawboard, and not reduced to a pure fibre. Its characteristics are similar to esparto, but it is more difficult to reduce to pure cellulose, owing to the silica it contains, requiring a stronger alkali and higher pressure in boiling.

WOOD PULP. There are two kinds of wood pulp used in paper-making, *mechanical pulp* or ground wood, and *chemical fibre*. Of the latter there are three processes of manufacture, the soda process, the sulphite, and the sulphate.

Ground wood is made by pressing blocks of wood obliquely (across the grain) against rapidly revolving grindstones, a stream of water

carrying off the product, which is not chemically changed, and has very little fibre or strength. It is used very largely, however, for cheap newspaper, chiefly in connection with chemical fibre to impart greater strength. The plate (Fig. 1) shows a pulp-grinder at Rumford Falls, Maine, the stone being coupled directly to a turbine water wheel. It will be seen that there are three 'pockets,' in which blocks of wood are placed and pressed simultaneously against the stone. The pulp is then screened to remove lumps, bleached if necessary, and either run directly into the beaters if made into paper at the same mill (as at Rumford Falls; see plate, Fig. 2), or made into thick sheets by a machine similar to the cylinder paper machine described below. It is usually sold in a moist state. Paper containing ground wood turns yellow when exposed to the light, and becomes brittle. A solution of sulphate of aniline turns ground wood fibre a bright yellow, the intensity of the color giving a rough guide to the percentage of ground wood in the paper.

CHEMICAL WOOD PULP. The oldest process of freeing cellulose from the incrusting woody matter, producing a material for making white paper, is the soda process, patented by Watt & Burgess in England in 1854. A soft wood, usually poplar in America, pine in Europe, is barked, chipped across the grain into small pieces, and cooked under steam pressure with a solution of caustic soda. The alkali dissolves everything but the cellulose, and after washing and bleaching a soft white fibre of good quality is produced, of little strength, but very useful to supplement other fibres.

The *sulphite process* is apparently an American invention, the first patent being granted in 1867 to B. C. Tilghmann. He used sulphurous acid to produce pure cellulose, and while this is the base of the modern process, it was not brought to a practical success till bisulphite of magnesium or calcium was used instead. Mitscherlich in Germany brought the process to a commercial basis, and of late years it has developed to very large proportions. Various modifications of the process are used, but in all of them the wood, properly barked, chipped, and dusted, is digested under steam pressure in a solution of the bisulphite, washed, and bleached if necessary. 'Sulphite' fibre has good strength and color, and much of it is used unbleached.

The *sulphate process* is not used in America, but produces a very good pulp at a higher cost than sulphite. It is similar to the soda process in theory, but sulphate of soda is used. An objection to it consists in the offensive odor of the by-products.

In the different processes of treating wood various forms of boilers are used, stationary, rotary, cylindrical, and spherical. They have to be lined to resist the action of the chemicals, and lead or cement is commonly used for this purpose. A large factor in the successful conduct of pulp manufacture lies in recovering the chemicals from the spent liquor. In the soda process the liquor is evaporated and finally incinerated in a furnace from which nearly all the caustic soda used is recovered. There are similar economies practiced in the other processes which not only save valuable chemicals, but prevent the pollution of streams.

THE CYLINDER MACHINE. While almost all pa-

PAPER-MAKING MACHINERY



PAPER MACHINE AT MILL OF INTERNATIONAL PAPER CO., RUMFORD FALLS, MAINE

Little, *The Chemistry of Paper Making* (New York, 1894); section on "Paper and Pulp," in *Twelfth Census of the United States*, vol. ix., Manufactures, part iii. (Washington, 1902); Mierzinski, *Handbuch der Papierfabrikation* (Vienna, 1886); Hofmann, *id.*, (2d ed., Berlin, 1886-98; English trans., New York, 1894); Kirchner, *Das Papier* (Biberach, 1897-99); Schubert, *Die Praxis der Papierfabrikation* (Berlin, 1898); *id.*, *Die Papiervorarbeitung* (*ib.*, 1900-02); and Blanchet, *Essai sur l'histoire du papier et de sa fabrication* (Paris, 1900).

PAPER-BOOK. In the English law, a book containing copies of all the pleadings and an abstract of all the facts necessary to a complete understanding of a case. A paper-book is only required to be filed with the court where the facts are agreed upon or have been determined and the question is one of law only. Where the argument is before a court of original jurisdiction the facts must have been agreed upon or admitted by the pleadings. Where a case is appealed the paper-book corresponds to what in the United States is usually called the 'case and exceptions.' See APPEAL; CASE; PLEADING; PRACTICE.

PAPER-HANGINGS, or WALL PAPER. A name applied to the webs of paper, *papiers peints* of the French, usually decorated, with which interior walls are often covered. Paper-hangings appear to have been used by the Chinese at an early period, but were not introduced into Europe, to any extent, before the eighteenth century. Hangings of canvas, painted to imitate tapestry, were extensively used during the fifteenth and sixteenth centuries. The well-known "Triumph of Julius Cæsar," by Mantegna, at Hampton Court, England, is simply a consecutive set of such hangings. During the sixteenth and seventeenth centuries a thriving business was done in Italy and Spain (particularly at Cordova) in the manufacture of hangings of leather variously stamped and embossed, and from these countries the art was carried into France and England. At first the wall papers produced were imitations of the tapestries, velvets, and leather hangings that for many centuries had been used as wall decorations. But gradually independent designs and effects have been introduced, especially in America. In Europe the costliest wall papers are still those that counterfeit most successfully some other fabric.

In the early days wall paper, like all other kinds, was made in sheets instead of webs. (See PAPER.) These, of the size called *elephant* (22 × 32 inches), were pasted together to make a length of 12 yards before the pattern was applied. In those days the patterns were put in with stencils and the background with a brush. The first improvement was the introduction of block printing. In this process the pattern was engraved on wooden blocks, a separate block for each color, and each block applied to the paper by hand as many times as the pattern is repeated. The colored background was painted in with a brush.

The next advance was the application of the Fourdrinier machine, by which wall paper, instead of being made in sheets, was produced in continuous webs. Then came the cylindrical rollers, a roller for each pattern, similar to that employed for the printing of textile fabrics.

(See TEXTILE PRINTING.) Later, grounding machines, for laying on the background color; bronzing machines, which apply bronze powders (popularly called gold); embossing machines, and a number of other inventions have been applied to this art. About 1870 the continuous process was introduced, by which the paper passes automatically from one step to another, without a stop and without handling. Great improvements in design and in blending of colors have also been made in recent years. An important phase of the subject is the sanitary one, serious results having followed the use of poisonous coloring materials, like arsenic.

In the United States the manufacture of wall paper was introduced by two Frenchmen, Bouler and Charden, in 1790, and only three or four more firms undertook the business before 1844. In that year the first machine for printing paper was put up in the Howell factory at Philadelphia. About the same time continuous rolls of paper came into general use, instead of sheets. From that time the business rapidly increased in importance.

The accompanying table, taken from the chapter on "Wall Papers," in *One Hundred Years of American Commerce* (New York, 1895), shows the growth of this industry:

GROWTH OF THE WALL PAPER INDUSTRY IN THE UNITED STATES

YEAR	Number of factories	Capital employed	Number of employees	Value of product
1793.....	1	nominal	nominal	nominal
1810.....	2	\$30,000	75	\$25,000
1844.....	5	150,000	500	250,000
1880.....	25	3,500,000	2,500	6,500,000
1890.....	30	9,000,000	5,500	9,500,000
1895.....	35	12,000,000	7,000	12,000,000

PAPER NAUTILUS, or PAPER SAILOR. The shell of the argonaut (q.v.).

PAPER WEDDING. See WEDDING ANNIVERSARIES.

PAPHLAGONIA (Lat., from Gk. Παφλαγονία). In ancient geography, a district of Northern Asia Minor, bounded on the north by the Black Sea, on the east by Pontus, from which it was separated by the river Halys, on the south by Galatia, and on the west by Bithynia. The inhabitants were akin to the Phrygians and Thracians, and seem to have preserved a large degree of independence, though recognizing the suzerainty of Lydians, Persians, and Macedonians. Later the country was joined to Pontus, and after the Roman conquest was divided between the provinces of Bithynia and Galatia. It was organized into a separate province toward the end of the third century of the Christian Era. The cavalry of the country was famous, and the mountains furnished abundant timber and some metals. The chief city was the Milesian colony of Sinope, on the Black Sea.

PAPHO, or PAPHOS (Lat., from Gk. Πάφος). The ancient name of two cities on the southwest coast of the island of Cyprus (Map: Turkey in Asia, E 5). The older city, sometimes called Palapaphos (now Kuklia), was situated about a mile and a quarter from the coast. It was probably founded by the Phœnicians, and was the centre from which the worship of Aphrodite spread over the island. Remains of the wall surround-

ing the temple of the goddess still exist. In Greek legend, the goddess was said to have risen from the sea at this point, and even in the Homeric poems it is mentioned as her favorite abode. The form of the shrine of the goddess on Roman coins is strongly reminiscent of the Mycenæan period, and points also to the early date of the sanctuary, which was a place of pilgrimage until the overthrow of paganism. The other Papho, called Neopaphos (now Baffo), was on the seacoast, about seven or eight miles northwest of the older city, and was said to have been an Arcadian colony. Under the Romans it was the capital of the island and the official residence of the Governor.

PAPIAS (Lat., from Gk. Πάππας). Bishop of Hierapolis in Phrygia. He flourished during the first half of the second Christian century, but the dates of his birth and death are unknown. He is said to have been a companion of Polycarp (q.v.), and to have known personally some of the Lord's disciples, but this is uncertain. He wrote in Greek an important work, in five books, entitled *Expositions of the Oracles of the Lord*, which unfortunately has been lost. A few fragments, preserved chiefly by Irenæus and Eusebius, indicate that the work was not itself a gospel, but a sort of running commentary on the sayings (and deeds?) of Christ. They also prove that written gospels already existed. Papias diligently gathered up the primitive Christian traditions, setting a high value upon every direct line of testimony concerning the Lord's teaching.

Eusebius credits Papias with more learning than judgment, which probably means that he disliked his crude and materialistic notions of the approaching millennium, with its alleged miraculous vintages and crops. (Cf. Irenæus, *Against Heresies*, v. 33.) These conceptions, however, were not displeasing to Irenæus and other early Christians, although they were generally discarded before the fourth century. In any event, Papias's reputation does not depend upon his millenarian views. He stands as a connecting link between the Apostolic Age and that of the Apologists, a period where our sources at best are scanty, and each one correspondingly valuable.

The fragments of the *Expositions* may be consulted in Lightfoot's *Apostolic Fathers*, ed. by Harmer (London, 1893), or in Funk, *Patres Apostolici* (Tübingen, 1901). Consult, also: Zahn, *Forschungen*, part vi. (Leipzig, 1900); Lightfoot, *Essays on Supernatural Religion* (2d ed., London, 1893); Cruttwell, *Literary History of Early Christianity* (ib., 1893); Westcott, *History of the Canon of the New Testament* (7th ed., ib., 1896).

PAPIER-MACHÉ, pá'pyá'-má'shá' (Fr., pulped paper). A tough, plastic material, made from paper-pulp, or from paper that has been reduced to a pulp, mixed with glue, paste, oil, resin, or other sizing. It has been in use for more than a century in Europe, and it is not improbable that it was first suggested by some of the beautiful productions of Sindh and other parts of India, where it is employed in making boxes, trays, etc., as well as in China and Japan. Its first application, as far as we know, was to the manufacture of snuff-boxes by a German named Martin, in 1740. Properly speaking,

papier-maché is paper-pulp molded into shape, and it has been used, not only to make small articles, such as boxes, trays, etc., but in the interior decoration of houses for cornices, ceilings, etc. From the extension of the application of papier-maché to the manufacture of a number of light and useful articles, modifications have taken place in its composition, and it is now of three kinds—first, the true kind, made of paper-pulp; second, sheets of paper pasted together after the manner of pasteboard, but submitted to far greater pressure; and third, sheets of thick millboard cast from the pulp, which are also heavily pressed. The term papier-maché is in the trade held to apply rather to the articles made of the pulp than to the pulp itself; and a vast manufacture sprang up during the last century. Some articles are coated with successive layers of asphalt varnish, which is acted upon by heat in ovens until its volatile parts are dissipated, and it becomes hard and capable of receiving a high polish. Mother-of-pearl is sometimes used in its decoration, and the fine surface which can be given to asphalt varnish also permits of burnished gilding and other decorative applications with excellent effect.

PAPILLA (Lat., nipple). A term applied by anatomists to one of several minute, elongated, conical processes, projecting from the surface of the true skin into the epidermis, highly vascular and nervous in their character, and taking an active part in the sense of touch. Their form and structure are described in the article SKIN. The term papilla is also used to designate the optic disk or nerve-head as observed through the ophthalmoscope. See EYE; OPHTHALMOSCOPE.

PAPILIONIDÆ. A family of large butterflies. See SWALLOW-TAIL.

PAPIN, pá'pān', DENIS (1647-c.1714). A French physicist. He was born at Blois, where, after studying medicine, he practiced for some time as a physician. His devotion to study and research in physical science dates from his acquaintance with Huygens, and he soon after became the pupil and assistant of this famous physicist, contributing substantial improvements to the air pump. He rapidly acquired a wide reputation and visited England, where he was received with open arms by the philosophers of that country, and became a member of the Royal Society in 1680. While in England, Papin and Robert Boyle (q.v.) worked together and performed many experiments, Papin inventing the double air pump and the air gun during this period. To him is also due the idea of pneumatic transmission of power, but he was not able to make a practical use of his method. In 1687 Papin was called to the chair of mathematics in the University of Marburg in Hesse-Cassel, the duties of which office he discharged with zeal and success for many years. He died in extreme poverty. To Papin belongs the high honor of having first constructed a steam-engine with a piston (1690) and he also used the simple method of condensing the steam to produce a vacuum beneath the raised piston. He is also the inventor of the 'safety-valve,' which was an essential part of his 'digester' (q.v.). With this latter machine Papin showed that liquids under produced atmospheric pressure would be made

to boil at a much lower temperature than when freely exposed to the air. Papin discovered the principle of action of the siphon, improved the air pump of Otto von Guericke (q.v.), and took part in philosophical discussions with Leibnitz. In 1690 he constructed a paddle-wheel boat in which his pumping engine was used to raise water which turned a water wheel connected with the paddle. It was destroyed by a mob on account of its interfering with the business of the boatmen. Many of Papin's numerous writings will be found in the *Philosophical Transactions*, *Acta Eruditorum*, and the *Recueil de diverses pièces* (1695). He published an explanation of the construction and uses of his 'digester' (London, 1681), afterwards (1682) translated into French, and his experiments entitled *Nouvelles expériences du Vuide* (Paris, 1674). It was not for nearly a century after his death that the great value of Papin's experiments and researches was perceived. For Papin's work connected with the steam-engine, see Thurston, *Growth of the Steam Engine* (New York, 1878). See his *Life*, by Gerland, which includes his correspondence with Leibnitz and Huygens (Berlin, 1881).

PAPINEAU, pâ'pé'nô', LOUIS JOSEPH (1789-1871). A Canadian orator and political agitator. He was born at Montreal, and received his education at the Seminary of Quebec, and then entered upon the study of law. In 1809 he was elected to represent the constituency of Kent in the Legislative Assembly of Lower Canada, and in 1811 was chosen to sit for one of the districts of Montreal. During the War of 1812 he was the commander of a company of militia, but saw little active service. In 1817, as the leader of the French-Canadian Party, he was chosen Speaker, and continued to hold that position until 1837. He had frequent conflicts with the royal Governors, and in 1827 Lord Dalhousie refused to accept him as Speaker, but the Assembly insisted and Dalhousie resigned. In an effort to force the home Government to make the Provincial Council elective instead of appointive, the Assembly under his lead refused to grant supplies to the Governor, and in 1834 transmitted to England the famous 'Ninety-two Resolutions.' Affairs now became more and more critical, and in 1835 Papineau arranged with William Mackenzie, the leader of the Revolutionary Party in Upper Canada, for coöperation between their followers. In March, 1837, the English Government finally declared that an elective Council could not be granted, and authorized the Governor, since the Assembly still refused to vote supplies, to use the money in the treasury. A proclamation was issued warning the people against agitators, and, because of Papineau's violent harangues to the people, he was deprived of his captaincy in the militia. In October, 1837, he attended a meeting which decided upon revolution, though there has been much dispute as to whether he favored this action. Certain it is, however, that when the rebellion, the way for which he had prepared, broke out, he fled to the United States, where he remained for two years. He then went to France, but in 1847 took advantage of a general amnesty and returned to Canada. He was soon afterwards elected to a seat in the Lower House of the now united Canadian Parliament, but

found that his old influence had departed. He retired from the public service in 1854, and spent the remainder of his life in seclusion at his residence of Montebello on the Ottawa River. Consult: Kingsford, *History of Canada* (Toronto, 1887-98); Christie, *History of the Late Province of Lower Canada* (Quebec, 1848-55); and Read, *The Canadian Rebellion of 1837* (Toronto, 1896).

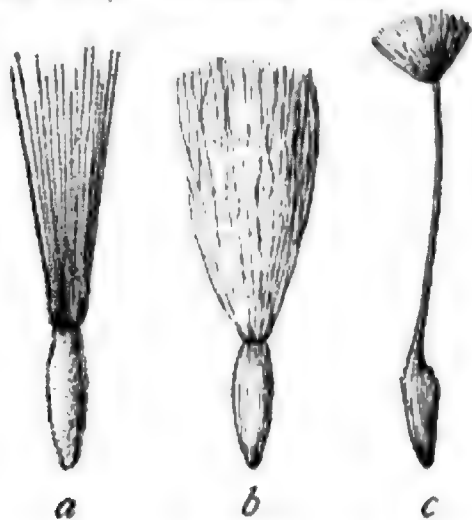
PAPINIANUS, ÆMILIANUS. A distinguished Roman jurist, a contemporary, friend, and trusted adviser of the Emperor Septimius Severus. He was probably of Syrian-Greek origin: was born about 146 A.D.; became pretorian prefect or Chief Justice of the Empire in 203, and was put to death in 212 because (it is said) he refused to justify Caracalla's murder of Geta. He was regarded by the later Romans and is still generally regarded as the greatest of the Roman jurists. More than any other, he strove to keep law in harmony with ethics. In Valentinian's Law of Citations (426) that Emperor directed that if an equal number of authorities were produced on either side of a disputed question the opinion supported in Papinianus's writings should prevail. Both before and after Justinian's time the works of Papinianus formed an important part of the third year of legal study, and the students of that year were called Papinianistæ. His principal published works were digests of decisions: 37 books of 'questions' and 19 of 'responses.' Because he left no systematic commentaries, Justinian's codifiers drew less largely on his writings than on those of Ulpian and Paul; but excerpts from his works constitute an important part of the Digest. Outside of the Digest we have a passage from Papinianus which was included in the Breviary of Alarie (q.v.) and a few fragments of his responses found in Egypt in 1877 and 1882. These have been printed by Husehke. Consult Otto, *Papinianus* (2d ed., 1743) and the article by Bruns in Pauly, *Realencyclopædic*.

PAPIST PLOT. See OATES, TITUS.

PAPPENHEIM, päp'pen-him, GOTTFRIED HEINRICH, Count (1594-1632). One of the leading Imperialist generals in the Thirty Years' War. He was born at Pappenheim, Bavaria, May 29, 1594, of an old and distinguished Saxon family. He studied at Altdorf and Tübingen and early identified himself with the Catholic cause. He served under the Poles against the Russians and Turks; was in the service of the Catholic League in 1620, and at the battle of the White Hill in the same year contributed greatly to the victory over the Bohemian forces. He was in 1623 made commander of the mounted regiment which became famous as Pappenheim's cuirassiers. He was a cavalry commander in the Spanish service in Lombardy in 1625-26, but rejoined the Imperialist army in the following year, suppressed a revolt of the Protestant peasants of Upper Austria, and then was engaged under Tilly (q.v.) in the campaigns against the Danes, Swedes, and Saxons. He took a prominent part in the storming of Magdeburg (1631), was engaged at Breitenfeld (1632) and covered the retreat of the defeated army. He served under Wallenstein (q.v.) in the final campaign against Gustavus Adolphus. Just before the fateful battle of Lützen he had been detached with eight regiments for an independent movement, but a recall was sent after him when the rapid ad-

vance of the Protestant leader became known to Wallenstein. His splendid charge on the left wing of the Swedish army had almost changed the result when he was mortally wounded in the last charge. He died a few hours afterwards at Leipzig, November 17, 1632. Consult Hess, *Gottfried Heinrich, Graf zu Pappenheim* (Leipzig, 1855).

PAPPUS (Neo-Lat., from Gk. πάππος, down, from πάππος, pappos, grandfather, from πάππας, pappas, father, papa). The peculiar calyx of the Compositæ. The flowers are placed close together in the flower-head. As a consequence, the sepals are not necessary for protection, and for mechanical reasons are probably prevented from developing in a normal way. Moreover, the flowers are epigynous, so that the sepals are developed from the top of the seed-like fruit (achene, q.v.). In many cases the sepals



ACHENES.

a, Arnica; b, Sonchus, or sow thistle; c, Taraxacum, or dandelion.

(pappus) are entirely obsolete, in others they form a shallow cup or crown, in others they are arranged as teeth or scales, while in still others they constitute a tuft of bristles (a) or hairs (b). It is this last form of pappus which, as in the dandelions, thistles, etc., is a conspicuous character of the family. The hair-like pappus is exceedingly diverse in details of structure, in some cases being coarse and bristly, others soft and silky, and others beautifully plumose. In the dandelion (c) the achene develops a long beak at the summit of which the tuft of soft pappus hairs occurs. In case the pappus has any special development it is associated with the dispersal of the seeds. For example, the hairy pappus of thistles and dandelions enables the fruit to be carried by currents of air; while the toothed and even barbed pappus of Spanish needles serves as a grappling appendage by which the fruit may lay hold of animals brushing past.

PAPPUS, or **PAPPUS** (Lat., from Gk. Πάππος) (c.300 A.D.). An Alexandrian mathematician. He is said to have written on geography and astrology, to have composed a commentary on the *Almagest* of Ptolemy, and to have been the head of a school. His principal work, however, was a mathematical *Synagoge* (collection) in eight books, the first and half of the second of which are lost. To this work we owe much of our knowledge of Greek mathematics, and its translation by Commandin (1588) had a power-

ful influence on the Renaissance of geometry in the seventeenth century. In particular, the geometry of Descartes had for one of its principal objects the solution of a problem of Pappus, viz. Given $2n$ straight lines, to find the locus of points such that the product of the distances of each of these to n of the lines (or more generally of straight lines at given angles to the n lines) shall have a given ratio to the product of the distances (or lines at given angles) to the other n . Pappus was the last of the great Greek mathematicians, but the value of his work is largely due to the fact that it gives to us numerous extracts from the lost writings of his predecessors. The most important theorem due to him is the one often called by Guldin's name, viz. The volume of a solid of revolution is equal to the product of the area of the revolving plane figure and the length of the path of its centre of gravity. Numerous minor propositions bear his name, such as the Pythagorean theorem as generalized for an oblique-angled triangle, in which the squares on the sides are replaced by parallelograms. The text of Pappus has been edited by Hultsch (3 vols., Berlin, 1876-78, Greek and Latin).

PAP'UA. An island north of Australia. See **NEW GUINEA**.

PAP'UAN or **AUSTRO-MALAYAN SUB-REGION**. In zoogeography, a northern sub-division of the Australian Region, formed of the islands eastward of 'Wallace's Line' to San Cristoval, embracing Celebes, Lombok, the Gilolo group, Ceram, New Guinea, and the Solomons. All are mountainous, well forested, hot and damp, excepting the small arid group from Lombok to Timor. Considering the proximity and physical resemblance of these islands to those west of them, and their dissimilarity to the continent of Australia, it is surprising to find that their affinities are Australian rather than Oriental. The mammals are almost wholly marsupials, with one monotreme (see **ECHIDNA**) in New Guinea. A long list of peculiar genera of birds may be made, and this subregion is the special home of the birds of paradise, honey-suckers, some peculiar fly-catchers, and a host of most brilliant parrots, kingfishers, and pigeons. The extraordinary tendency toward ornamentation which characterizes the birds of these islands extends also to the insects, and has been the object of much speculation. Consult: Wallace, *Geographical Distribution of Animals*, vol. i. (New York, 1876); id., *Malay Archipelago* (ib., 1869); Forbes, *A Naturalist's Wanderings in the Eastern Archipelago* (ib., 1885).

PAP'ULE (Lat. *papula*, pimple, pustule). A medical term meaning a pimple; a small elevation of the surface of the skin containing no fluid. Papules are either of the normal skin color or red. If they become filled with fluid they are called vesicles. If pus develops in a vesicle it is called a pustule. Papules appear in the early stage of many skin diseases and form the eruption in certain other diseases, as scarlet fever, chickenpox, and smallpox. Papular skin diseases include lichen, prurigo, and pityriasis (qq.v.).

PAPYR'OGRAPH. See **COPYING MACHINES**.

PAPY'RUS (Lat., from Gk. πάπυρος, papyrus). A genus of plants of the natural order

Cyperaceæ. Egyptian Papyrus (*Cyperus Papyrus*) is a kind of sedge 3 to 10 feet high, with a very strong, woody, aromatic, creeping root, long, sharp-keeled leaves, and naked, leafless, triangular, soft, and cellular stems, as thick as a man's arm at the lower part, and at their upper extremity bearing a compound umbel of extremely numerous drooping spikelets with a general involucre of eight long filiform leaves. The plant is represented in the oldest Egyptian monuments as reaching the height of about 10 feet. The papyrus was used for many purposes. The more slender stalks were woven into baskets and boxes, while bundles of the thicker stalks formed the material of which light boats were constructed. The fibre was used for making cordage, sails, awnings, and matting. The



EGYPTIAN PAPYRUS.

pith was boiled and eaten by the poorer classes, and the root was dried and used as fuel. The most important use of the plant, however, was in the manufacture of a species of paper. For this purpose the pith was cut into strips which were placed side by side on a flat surface, and over the layer thus formed was laid a second layer of strips at right angles to the first. The whole was then pressed or rolled into a sheet, to which the natural gum of the plant gave a homogeneous character, and the sheet when dried was ready for use. It is possible that artificial paste was sometimes used to bind the fibres. When newly prepared the sheet was white or brownish white; but in the process of time those papyri which have reached the present day have become of a light or dark brown color, and exceedingly brittle. The papyrus or paper of the Egyptians had a great reputation in antiquity, and it appears on the earliest monuments in the shape of long rectangular sheets, which were rolled up and tied with a string. At a very late period the papyrus was no longer rolled, but was cut into square pages which were bound together as are the leaves of a modern book. The papyrus sheets and rolls are of very different heights. The tallest specimen is said to be 15½ inches high, but most literary manuscripts are from 8 to 12 inches, with a tendency toward the lower limit. The sheets are far narrower, however, rarely exceeding 9 inches, while widths of from 5 to 7 inches are common. The strips seem to have been sold in lengths of about 20 sheets, but there is no limit to the length of the rolls, though for literary purposes the Greeks seem rarely to have exceeded 30 feet. The ancient Egyptians made up huge rolls—one is said to be 144 feet long—for burial with the dead, though there is little likelihood that such unwieldy volumes were used by the living. The writing is regularly in columns, parallel to the length of the roll, and of varying width, in lit-

erary prose rarely exceeding three inches, though in verse they are often wider to accommodate the longer lines of the hexameter. Public documents and private papers are of course bound by no such rules. The use of papyrus paper, or at least of some similar manufacture from vegetable fibre, must have arisen at an early date in Egypt, and the oldest datable specimen can be but little later than B.C. 3600. (For a description of the Egyptian papyrus and their contents, see the paragraph on *Literature and Science* under EGYPT.) The Greeks seem to have known a paper as early as the beginning of the fifth century B.C., though the oldest extant Greek papyrus is perhaps the *Persians* of Timotheus, belonging to the end of the fourth century. With the growth of the Alexandrian Library and the spread of Greek learning the use of papyrus largely increased, and the manufacture of the paper seems to have developed greatly under the patronage of the Ptolemies. It is only in comparatively recent years that the attention of scholars and explorers has been drawn toward the Greek papyri of Egypt, and that systematic search has been made for them. The great bulk of the enormous mass of papyri brought to light consists of non-literary documents, partly public, such as official correspondence, laws, petitions, and tax-receipts, and partly private, including wills, contracts, letters, and notes, school exercises, and accounts. These documents are of immense value as enabling us to reconstruct the life and language of the common people in the towns and villages of Egypt under Greek and Roman rule. Though the literary papyri are relatively few, they are often of great importance as restoring to us works formerly lost. Among the more important are the *Orations* of Hyperides, the *Mimes* of Herondas, the *Odes* of Bacchylides, the treatises of Aristotle on the Constitution of Athens, and the *Persians* of Timotheus. Of Christian writings the yield has not been large, nor of very striking value. There are a few fragments from the New Testament and the Septuagint, some scraps of apocryphal or heretical writings, and especially the interesting leaf from Oxyrhynchus containing some Logia or sayings attributed to Jesus. The first great discovery of papyri in Egypt was made near Arsinoë in the Fayum in 1877. Fifteen years later at Socrnopæi Nesos, also in the Fayum, another rubbish heap was opened, most of whose contents went to Berlin. While the first mass was chiefly Byzantine, these were Roman and on the whole in fair preservation. An earlier period, extending well into the third century B.C., was revealed by the discovery by Flinders Petrie of a series of mummy cases made of old papyri pasted together. Patient labor separated these fragments and brought to light remnants of the lost *Antiope* of Euripides, as well as bits of the *Gorgias* and *Phædo* of Plato, and many non-literary fragments. All previous discoveries were surpassed by the work of Grenfell and Hunt at Oxyrhynchus in 1896-97, and to their continued labors at other points in the Fayum, and especially at Tebtunis a large part of the increase since then is due. Outside of Egypt discoveries of papyri have been almost unknown. In 1753 a great mass of charred rolls were found in the Villa Suburbana at Herculaneum, and a few of these have been unrolled by means of a very delicate apparatus, but their contents have been a disappointment, as they have proved to be philosophical treatises of the Epicu-

rean school, though the fragments of Philodemus have added somewhat to our knowledge of the history of ancient philosophy. For the handwriting on papyri, see EGYPTOLOGY; PALEOGRAPHY.

As a matter of scientific interest experiments in the manufacture of paper from the papyrus have been made in modern times by Landolina, Seyffarth, and others, and a small quantity is made at Syracuse in Sicily, though of course merely as a curiosity.

Other species of papyrus (*Cyperus Corymbosus*, *Cyperus tefetum*) are much used in India for mats. *Cyperus alternifolius*, the umbrella plant or umbrella palm, is a common house plant. It grows to a height of one to three feet, with drooping involueral rays six to eight inches long and less than one-half inch broad.

BIBLIOGRAPHY. On the general subject, consult: Wilcken, *Die griechischen Papyrusurkunden* (Berlin, 1897); Kenyon, *Palaography of Greek Papyri* (Oxford, 1899); Dziatzko, *Untersuchungen über ausgewählte Kapitel des antiken Buchwesens* (Leipzig, 1900); on the results for Biblical study, Deissmann, *Bible Studies*, trans. by Grieve (Edinburgh, 1901). A periodical devoted to this subject is the *Archiv für Papyrusforschung und verwandte Gebiete* (Leipzig, 1900, et. seq.); and a brief review of the more important publications of each year may be found in the *Annual Archaeological Reports* of the Egypt Exploration Fund (London, 1869 et seq.).

PARÁ, pá-rá'. An estuary indenting the northeastern coast of Brazil and forming the southern boundary of Marajo Island (q.v.), of which the true mouth of the Amazon is the northern boundary (Map: Brazil, H 4). The Rio Pará is 40 miles wide at its mouth and has, in general, a width of 5 to 10 miles for a distance of 200 miles inland. Formerly it was probably one of the principal mouths of the Amazon, but is now connected with that river only by a network of channels and backwaters, which, however, form the principal steamship routes to the Amazon, since the true mouth is obstructed by islands and strong currents. The Pará has become the almost independent estuary of the Tocantins (q.v.).

PARÁ. One of the largest and commercially most important States of Brazil, occupying the northeastern part of the Republic, and bounded by the Guianas on the north, the Atlantic Ocean on the northeast, the Brazilian States of Maranhão and Goyaz on the east, Matto Grosso on the south, and Amazonas on the west (Map: Brazil, H 4). Its area is 443,653 square miles, excluding the disputed portion of Guiana. The surface consists of plateaus rising from the here narrow Amazonian valley to a height of 2500 feet in the north and south. The Amazon River with its extensive estuary takes in a large portion of the State, and the adjoining low lands are inundated during the rainy season. Its two large tributaries, the Tapajos and the Xingu, and the system of the Tocantins, give the State a network of navigable waterways, and thus remove one of the greatest obstacles in the way of industrial development in South American countries—lack of transportation facilities. The climate is tempered by the trade winds, and is on the whole not unhealthful. Most of the low lands are covered with dense forests, which yield

the most important product, as well as the chief source of revenue, of Pará—rubber. Agriculture is as yet undeveloped on account of the scarcity of population. Some foodstuffs have to be imported. Besides rubber, the annual export of which exceeds 22,000 tons, Pará exports yearly large quantities of cacao, cinchona, coumarin, glue, and hides. Most of the exports go to New York and Liverpool. The mineral deposits of Pará are believed to be extensive, but so far very little has been done toward their exploitation. Pará has no railways with the exception of a short line from the capital (Pará) to the coast. The population of Pará was only 328,455 in 1890. The Indians are mostly civilized. The capital is Pará.

PARÁ, or BELEM. The capital of the State of Pará, Brazil, situated on the southeast shore of the Pará estuary (q.v.), 85 miles from the ocean, and 1° 27' south of the equator (Map: Brazil, H 4). Viewed from the harbor it presents a picturesque appearance with its numerous churches and white houses half hidden amid luxuriant tropical foliage. The streets are in general narrow and ill-paved, but some of them are wide and straight, and there are several spacious avenues lined with trees. The principal building is the cathedral, dating from 1720. There are a lyceum and other schools, a public library, a museum, a large botanical garden, and many scientific, literary, and charitable institutions. The Government buildings are plain structures. The harbor has 20 feet of water, and, being situated at the principal entrance for ships into the Amazon and in the northern part of the country, where it is comparatively near to the commercial countries of Europe, Pará has become an important trade centre. Its chief exports are rubber, cacao, and colonial wares. The rubber export exceeds that of any other part of the world, having in 1898 amounted to 31,882,883 pounds, with a value of about \$68,850,000. The total value of the exports in the same year was about \$72,000,000, which shows an increase of 100 per cent. during the preceding five years. The population has increased six-fold during the last half century, the inhabitants numbering 90,122 in 1896. Pará is the seat of a United States consul.

Pará was founded in 1615, but was an unimportant place until the middle of the nineteenth century. During the disastrous racial and social strifes of 1835-48 the population fell from 25,000 to 15,000, and it was still further reduced by the epidemic of yellow fever in 1850. Since that year, however, it has grown rapidly.

PARA (Pers. *pāra*, piece, portion). A coin of copper, silver, or mixed metal, though most generally of copper, in use in Turkey and Egypt; it is the fortieth part of a piastre, is divided into three aspers, and varies much in value, owing to the debased and complicated condition of the Turkish coinage. Pieces of five paras are also in use. The para is equal to about one mill (American) in Turkey, and a little more in Egypt.

PARABLE (OF. *parable*, *parabole*, Fr. *parabole*, from Lat. *parabola*, *parabole*, from Gk. *παράβολη*, comparison, juxtaposition, parable, parabola, from *παράβαλλειν*, *paraballein*, to throw beside, to compare, from *παρά*, para, beside, beyond + *βάλλειν*, *ballein*, to throw). A short nar-

rative, founded upon any real event in nature or human experience, intended to convey a moral or religious meaning. The parable is best known from its use in the Bible. In the Old Testament it is not of very common occurrence. The five examples which admit of the least question are: (1) The prophet Nathan's parable of the poor man with the one ewe lamb, told to King David (II. Sam. xii. 1-4); (2) the story of the woman of Tekoa concerning her sons (II. Sam. xiv. 5-7); (3) the tale of the prophet regarding the escaped captive, told to King Ahab (I. Kings xx. 39-40); (4) Jehovah's rebuking song of the vineyard (Is. v. 1-6); and (5) the parable of planting and threshing (Is. xxviii. 24-28). Ancient Jewish writings outside the Bible abound in parables. Jesus of Nazareth was the great master in their use. In the New Testament the word parable occurs 48 times in the Synoptic Gospels, but nowhere else except twice in the Epistle to the Hebrews. It designates either a short narrative designed to convey spiritual truth, such as the parable of the sower (Matt. xiii. 8 sqq.), or, more rarely, a popular proverb, such as 'Physician, heal thyself' (Luke iv. 23). Hence many of the utterances of Jesus, which are commonly regarded as proverbs ('consider the lilies,' 'salt of the earth,' 'light under a bushel') might be classified as parables. The well-known parables of Jesus were taken from the natural scenes and events of common life with which He and His disciples were familiar. In the art with which He seized upon and illustrated the supreme point in a parable He never has been surpassed. He made both nature and history a parable of which the Kingdom of God is the spiritual interpretation. For definition of the parable and a study of those spoken by Jesus, consult: French, *Notes on the Parables of Our Lord* (New York, 1851); also Guthrie, *The Parables* (London, 1866); Bruce, *The Parabolic Teaching of Christ* (1892); Jülicher, *Die Gleichnisreden Jesu* (Freiburg, 1899).

PARABOLA (Neo-Lat., from Gk. *παράβολή*, *parabolē*, comparison, juxtaposition, parable, parabola). A conic section cut by a plane parallel to the element of the cone. When the plane

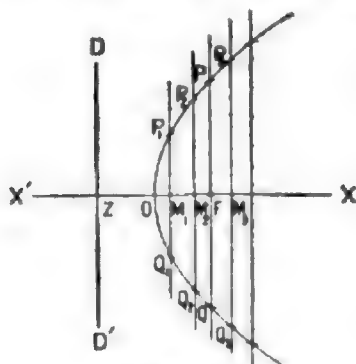


FIG. 1.

coincides with its parallel element, the parabola assumes the limiting form of a straight line. The parabola may also be defined as the locus of a point whose distance from a fixed point (the focus) is equal to its distance from a fixed straight line (the directrix), i.e. its eccentricity (q.v.) is 1. From this definition its construction readily follows. Let DD' (Fig. 1) be the fixed straight line or directrix, and F the fixed point or focus. Draw a perpendicular to the directrix, passing through the focus, and this will be the axis of the curve. The point O on the axis, half way between F and DD', will evidently be a point on the curve. To find other points on the curve draw a series of lines parallel to the

directrix and cutting the axis XX' in M₁, M₂, F, M₃, ... With F as a centre and ZM₁ as a radius, describe an arc cutting the perpendicular through M₁ in P₁ and Q₁; with F as a centre and ZM₂ as a radius, describe a circle cutting the perpendicular through M₂ in P₂ and Q₂; and so on. The points P₁, P₂, ..., Q₁, Q₂, ... are then points on a parabola. PQ is called the latus rectum or parameter, and, as is evident from the construction, equals twice the distance between the focus and directrix. The curve may be described mechanically in the following manner: Move a right-angled triangle with one perpendicular side coinciding with the directrix; a string equal in length to the other perpendicular side has one end fastened to the outer vertex of the triangle and the other to the focus; a pencil resting against the lower side of the triangle and holding the string taut will trace a parabola.

The Cartesian equation of the parabola, its axis being taken as the X-axis and its vertex as the origin, is $y^2 = 4px$, where p is the distance between the focus and the vertex. Its polar equation, the focus being the pole, is

$$r = \frac{2p}{1 - \cos \theta}; \text{ or } r = \frac{4p \cos \theta}{\sin^2 \theta}$$

when the vertex is taken as pole. The following are some of the most important properties of the parabola: (1) Any line RH (Fig. 2) parallel to the X-axis is a diameter, i.e. bisects a sys-

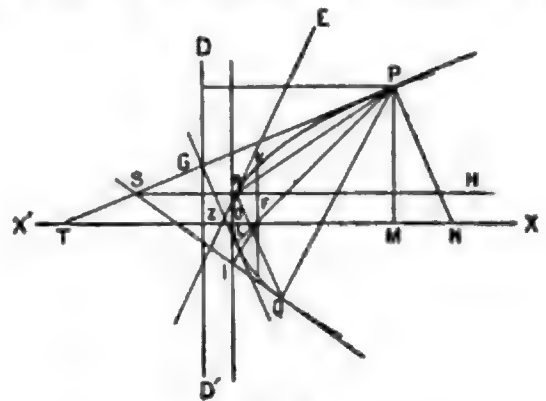


FIG. 2.

tem of parallel chords, as those parallel to PQ; (2) the subnormal MN is constant and equal to the semi-latus rectum FK; (3) if the tangent through P cuts the X-axis in T, and if the normal at P cuts the X-axis in N, the focus F is equidistant from P, T, and N; (4) the angle DPT = angle XTP is equal to the angle TPF, or the tangent at any point makes equal angles with the axis of the curve and the focal radius to the point of contact (these last two properties furnish simple methods for drawing tangents to the parabola); (5) through any point in the plane, three normals can be drawn to the parabola; (6) the tangents at the extremities of any focal chord PL intersect at a point G on the directrix, and at right angles; (7) a perpendicular from the focus F upon a tangent SQ meets this tangent at a point I on the tangent through the vertex; (8) a tangent RE at the end of a diameter RH is parallel to the chords bisected by that diameter, of which PQ is one and the tangents at the extremities of PQ intersect upon the corresponding diameter SH; (9) the area of a parabolic segment ORPQ is $\frac{4}{3}$ of the triangle RPQ on the same base and

having the same height; (10) the parabola has no real finite asymptotes.

Concave reflecting mirrors are often formed so that all axial sections are equal parabolas. In such a mirror, all parallel rays of light are reflected to the focus; and, conversely, if a light be placed at the focus of such a mirror, its rays will be reflected in a parallel pencil. If a body were projected upward and obliquely to the direction of gravity, it would, if undisturbed by any other force except gravity, accurately describe a parabola whose axis is vertical and whose vertex is the highest point reached by the body. The term parabola is used in analysis, more generally, to denote that class of curves in which some power of the ordinate is proportional to a lower power of the corresponding abscissa. Thus the common parabola above given has the equation $y^2 = kx$, the cubical parabola has the equation $y = a + bx + cx^2 + dx^3$, the simplest form being $y = kx^2$ and the semi-cubical parabola, $y = kx^{\frac{3}{2}}$ or $y^2 = kx^3$. The last mentioned curve is also known as the Neilean parabola, because it was rectified by William Neil (1657).

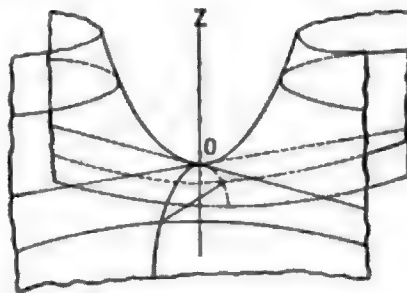
For the various curves bearing the name parabola, consult: Brocard, *Notes de Bibliographie des courbes géométriques* (Bar-le-Duc, 1897; partie complémentaire, 1899).

PAR'ABOLA'NI (Lat. nom. pl., from Gk. *παράβολος*, *parabolos*, reckless, from *παράβαλλειν*, *paraballein*, to throw beside, to compare). A class of functionaries in the early Church by some writers reckoned as members of the clergy, and included in the minor orders, but more probably religious associations, whose chief duty was to tend the sick, whether in ordinary diseases or in times of pestilence. They received their name from the boldness with which they exposed themselves to danger of contagion. By some, the association is believed to have originated at Alexandria in the time of a great pestilence under the Bishop Dionysius in the third century. They were certainly very numerous at Alexandria, amounting to some 500 or 600, but were also enrolled in other churches. We find them at Ephesus, at the time of the council in 449, and at Constantinople under Justinian. The parabolani are made the subject of formal legislation by Theodosius the Younger. At first they were subject to the *Præfectus Augustalis*, but a later decree placed them directly under the authority of the bishop. They seem to have been mainly from the lower classes and with a tendency to disorder. After the time of Justinian they are not mentioned.

PARABOLOID (from Gk. *παράβολή*, *parabolē*, parabola + *εἶδος*, *eidos*, form). A solid whose surface has the equation $Ax^2 + By^2 - 2Cz = 0$, or $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 2cz$. (See COÖRDINATES.)

If B is positive, the surface is called an *elliptic* paraboloid; if B is negative, a *hyperbolic* paraboloid. The sections of the former made by the coördinate planes, $x = 0$, $y = 0$, are parabolas having a common axis. The section by any plane parallel to $z = 0$ on the positive side is a real ellipse; on the negative side the section is imaginary. The sections of the hyperbolic paraboloid made by the planes $x = 0$, $y = 0$ are parabolas, but the sections made by planes parallel to $z = 0$ are hyperbolas. The section made by the plane $z = 0$ is two intersecting straight lines, the limit-

ing form of the other hyperbolas. The hyperbolic paraboloid is a special case of the hyperboloid of one sheet, and hence is a ruled surface (q.v.). A paraboloid of revolution is formed by revolving a parabola about its principal axis. Its



HYPERBOLIC PARABOLOID.

equation is $x^2 + y^2 = 4pz$. Sections of such a figure perpendicular to the axis of revolution are circles. The term *paraboloidal* is applied to bodies having the general form of a paraboloid, a form commonly found in concave reflecting mirrors. See PARABOLA.

PARACATU, pã'rã-kã-tõõ'. A town of the State of Minas Geraes, Brazil, near the borders of the State of Goyaz, situated 450 miles north-west of Rio de Janeiro (Map: Brazil, H 7). The town was founded near the middle of the eighteenth century, and was formerly famous for its rich gold washings. Now its chief industries are stock-raising and the cultivation of sugarcane and coffee. Its population is about 10,000.

PARACEL'SUS. The assumed name of Philippus Aureolus Paracelsus Theophrastus Bombastus von Hohenheim (1490 or 93-1541). A German physician and chemist. He was born at Einsiedeln, Switzerland, the son of a physician and chemist, Wilhelm Bombast von Hohenheim; he received his early education from his father, and at sixteen he went to Basel University, but soon abandoned it for the study of chemistry and alchemy under Wihemina, Bishop of Würzburg. He traveled widely, sustaining himself by irregular practice, and collecting a vast amount of miscellaneous medical knowledge. He served some time as a military surgeon in the Low Countries, Denmark, and Italy, and learned practical metallurgy at the mines in Tyrol belonging to the Fugger family, who were celebrated for their patronage of art and science. Here he appears to have studied diligently, investigating the processes of preparing metals, and making experiments as to their medicinal virtues. His cures, real or pretended, became voiced abroad, and he was called to prescribe for many of the great men of his day. Erasmus was one of his patients. At the recommendation of Ecclampadius he was, in 1526, appointed professor of physic and surgery at Basel, when he inaugurated his career as a teacher by publicly burning the works of Galen, and denouncing the Arabian masters, whose teachings were then generally followed. He also flouted tradition by lecturing in German instead of Latin. His defiance of tradition, in addition to his arrogance, vanity, and drunkenness, provoked the most bitter animosity of the regular faculty, and he was compelled to leave the university. He resumed his wanderings. Wherever he went he excited the regular faculty to a state of violent hatred, not wholly undeserved. At Salzburg he gave offense and was

thrown from a window by the servants of a physician, and had his neck broken by the fall. He was then about forty years old.

In spite of his turbulent life and charlatan methods, Paracelsus exerted a profound influence upon the medical beliefs of his time and of succeeding centuries. He struck at the weak points of the prevailing system of medicine; he destroyed the 'humoral pathology' (which was founded on the belief that diseases depended upon an excess or deficiency of bile, phlegm, or blood), and taught that diseases were actual entities, and were to be combated with specific remedies. He improved pharmacy and therapeutics, made some new chemical compounds, and strove to reduce the overdosing then practiced. A large number of medical works are attributed to him, many of which were written by his followers, and some, it is declared, by his enemies, in order to injure his reputation. Marx admits only ten as genuine, and Häser twenty-four. The earliest printed work was *Practica D. Theophrasti Paracelsus* (Augsburg, 1529). Collected editions of his writings appeared in German at Basel in 1589-91, in 1603-05, and in 1618, Latin editions in 1603-05 and 1658 (Geneva). For his life consult: M. B. Lessing (Berlin, 1839); Mook (Würzburg, 1876); Hartmann (London, 1886); Kahlbaum (Basel, 1894); and Netzhammer (Einsiedeln, 1901). Consult also Hartmann, *Grundriss der Lehren des Theophrastus Paracelsus von Hohenheim* (Leipzig, 1898), and *The Hermetics and Alchemical Writings of Paracelsus* (London, 1894).

PARACHUTE, pār'a-shōōt' (Fr. *parachute*, from ML. *parare*, to guard against, prevent, Lat. *parare*, to prepare + Fr. *chute*, fall, OF. *cheute*, *cheoite*, It. *caduta*, fall, from Lat. *cadere*, to fall). A device for the purpose of diminishing the velocity of a falling body and used by aeronauts as a means of descending from balloons. The parachute generally takes the form of a large umbrella. Its invention is accredited to Sebastian Lenormand, and the device was used by him in 1784 in making a descent from an upper window of a house in Lyons. The first descent from a balloon was made by Garnerin in Paris in 1797, in which a parachute 23 feet in diameter, composed of a number of gores of canvas, was employed. In this parachute a wicker basket was suspended from a hoop 8 feet in diameter somewhat below the top of the umbrella-shaped surface. In its usual form, the parachute is made of canvas, being attached to the balloon so as to hang loose during the ascent, and to spread out and offer a resisting surface as soon as it is separated from the balloon and begins to fall. For a weight of 220 pounds, which includes that of the passenger as well as of the apparatus, it is necessary to have a surface about 40 feet in diameter in order to reduce the velocity to a rate of about 3¼ feet per second. Under the pressure of the air such a surface would become concave and would measure about 35 feet across. The car or basket is supported by cords attached to the edge of the canvas, and sometimes there is a heavier cord or girth which passes over the top of the parachute and carries the larger part of the weight. There is generally a small opening at the top to allow some of the air to pass out, and this serves to keep the parachute steady in its proper position and prevent swinging. The concave surface has also been divided into compartments with trans-

verse partitions for this same purpose, and each compartment has a small opening to permit of the escape of the air.

PARADE (Fr. *parade*, show, halt on horseback, from Sp., Port. *parada*, halt, parade, from *parar*, to halt, prepare, from Lat. *parare*, to prepare; connected with *ἔπος*, *eporon*, I prepared). In its original sense, a prepared ground, but applied also to the courtyard of a castle or fortification, and afterwards to any inclosed and level stretch of ground. In every barracks, fort, or army post there is a parade ground upon which the regiment assembles and is formed for inspection or ceremony. Regimental parade is conducted as follows: The regiment may be formed in line, in line of platoon columns at close interval, or in line of masses. On the sounding of the assembly, companies are formed and inspected. At *adjutant's call*, battalions are formed in line; battalion adjutants, taking post in front of the centre of their respective battalions, receive the reports of the first sergeants, and present the battalions to the battalion commanders. When this is accomplished, *adjutant's call* is again sounded; the regiment is formed in line, with open ranks, each battalion at the *parade rest*. The adjutant then commands *Sound off*, and takes post six paces to the right of the colonel. The band, playing in quick time, passes in front of the adjutant and field officers, to the left of the regiment, and back to its post on the right, when it ceases. The adjutant then rides out in front of the regiment, and, bringing the regiment to *attention*, gives the commands: (1) Carry arms; (2) Present arms, after which he turns about, and reports to the colonel: "Sir, the parade is formed;" the colonel acknowledges the salute, and directs him back to his post; the staff officers and the colonel draw swords; and the latter proceeds to give such orders in the manual exercises as he may desire. After the command *order arms*, the adjutant is ordered to receive the reports, swords are returned, battalion adjutants are marched out six paces in front of company officers; commencing on the right, each adjutant salutes and reports the strength of his battalion; they are then ordered to return to their post, and the regimental adjutant reports to the colonel. After the report is acknowledged, the colonel gives the command *Publish the orders, sir*, on which the adjutant faces the regiment, and reads the orders of the day. The officers then form before the colonel, who gives whatever directions are necessary, and the ceremony is concluded. The band plays, and the various component parts are marched off to their quarters for dismissal.

Parade is also used as a term in fencing, particularly by those of the French school. It is a guard position, designed to meet or parry thrusts, the English equivalent for which is *parry*.

PARADISE (OF., Fr. *paradis*, from Lat. *paradisus*, from Gk. *παράδεισος*, *paradeisos*, park, Paradise, from Av. *pairidaēza*, inclosure). A word found in the Old Testament and in Greek writers from Xenophon on, as a term for the great hunting and pleasure parks of the Persian kings. It is the word translated 'forest' in Nehemiah ii. 8, and that rendered by 'orchard' in the Song of Songs iv. 13 and Ecclesiastes ii. 5;

this original sense of 'park' appears in English literature. The word was adopted by the Greek translators of the Old Testament for the 'garden' in Eden (Gen. ii. 8, and in other biblical references to Eden, q.v.). The later religious notion is bound up with the Jewish mystical thought concerning the Garden of Eden. This was supposed to be still in existence in some remote and mysteriously inaccessible place (Gen. iii. 24), to which the apocalyptic thought of Judaism, from the second century B.C., added the notion that it was reserved as the future abode of the righteous. This thought is first fully developed by the Book of Enoch (q.v.), which locates Paradise variously, in the west (like the classic Isles of the Blest), in the north (with the Mount of God), or in the east (with Genesis). According to this first stage of thought Paradise is a place of sensual delight. It was also the abode of the two saints who had been translated from this world, Enoch and Elijah. But the rapid development of eschatology grew impatient of waiting for the Day of Judgment for the decision of the fate of the dead, and in the first century B.C. Paradise became the intermediate abode of all the righteous. Yet a further step took place in the spiritualization of the idea. Just as Jerusalem was supposed to be mystically preserved in the heavens until the day of redemption (cf. Rev. xxi.-xxii.), so was Paradise caught up into the celestial spheres, and thither the spirits of the faithful were conveyed upon death. This view appears at length in the Book of the Secrets of Enoch (or Slavonic Enoch, q.v.), which locates Paradise in the third of the seven heavens, and is represented in the New Testament by Luke xxiii. 43 (cf. xvi. 23 sqq.) and II. Cor. xii. 2. At the same time there was uncertainty whether this was the final abode of the saints, Jewish theology requiring the Day of Judgment. In Revelations ii. 7 Paradise seems to be synonymous with heaven. Even in these spiritualized conceptions the imagery of the ancient Garden of Eden appears still in the Tree of Life and the Water of Life. The New Testament does not add to the idea of Paradise, but the Christian doctrine of the return of Christ to consummate His kingdom developed the notion of Paradise as the place of departed saints, where they are supposed to 'sleep in Jesus,' and at the same time to enjoy mystic fellowship with Him and with the saints on earth. In medieval theology these distinctions are exactly drawn, whereas in most Protestant theology the doctrine of Paradise remains indistinct, and in popular Protestantism Paradise is equivalent to heaven. In Islam the crass Jewish notion of Paradise was taken over and still further sensualized; it remains a garden full of all carnal delights. (See MOHAMMEDANISM.) It is interesting to note that this idea of a garden has always appealed to the Semitic mind, which, accustomed to the desert, takes the well-watered garden as the type of heaven; but Occidental thought has stripped the theological idea of this picturesque connotation. Consult: Gunkel, *Schöpfung und Chaos* (Göttingen, 1895); Charles, *Eschatology, Hebrew, Jewish, and Christian* (London, 1899); Hagenbach, *History of Christian Doctrines* (Eng. trans., Edinburgh, 1880); Salmond, *The Christian Doctrine of Immortality* (ib., 1897). See ESCHATOLOGY; HEAVEN.

PARADISE LOST. An epic poem by John Milton, published in 1667. The idea of a great epic had filled Milton's mind for many years; at first the legend of King Arthur attracted him, but he chose at last the story of the fall of man, attempted in English by Cædmon and Fletcher. Milton may have been influenced by Andreini's drama *Adamo*, about 1640, and Joost van Vondel's drama *Lucifer*, 1654. The poem is a state-ly creation of life and action beyond mortal scope.

PARADISE OF FOOLS, THE. One of the four divisions of Limbo, the *Limbus Fatuorum*, reserved for fools, idiots, and lunatics; but at present the term denotes the state of mind of one who indulges in vain hopes and expectations.

PARADISE REGAINED. A poem by John Milton (1671). It supplements the *Paradise Lost*, but is written in a colder, more severe style. It is in fact a paraphrase of the narrative of the Temptation in the Gospels, a dramatic dialogue between two voices, good and evil.

PARADISO, pã'rã-dẽ'zõ, IL (It., The Paradise). The last part of Dante's *Divine Comedy*.

PARADOXIDES, pã'rã-dõx'i-dẽz (Neo-Lat. nom. pl., from Gk. *παράδοξος*, *paradoxos*, incredible, from *παρά*, *para*, beside, beyond + *δόξα*, *doxa*, opinion, belief, from *δοκεῖν*, *dokein*, to seem). An important and characteristic fossil trilobite of the Middle Cambrian rocks of North America, Europe, and Australia. The animal has a flat, long, tapering shield with large arcuate head shield and sixteen to twenty thoracic segments, and a small round tail shield or pygidium. The eyes are narrow, of crescentic outline, and not prominent, and the posterior lateral angles of the head are usually furnished with long spines. The best known species, *Paradoxides harlani*, found in the sandy shales of the Cambrian in eastern Massachusetts, sometimes attains a length of 20 inches, with a width across the head of over 10 inches. Finely preserved specimens of other species of *Paradoxides* are found in the limestone nodules of the Cambrian shales of New Brunswick, Canada, and Newfoundland. See TRILOBITA.

PARADOXURE. See PALM CIVET.

PARÆSTHESIA. See FORMICATION.

PARAFFIN (Fr. *paraffine*, from Lat. *parum*, little + *affinis*, akin, from *ad*, to + *finis*, end). A hard, white, wax-like substance largely used for the manufacture of candles, a small amount of stearin being added to render the candles translucent. Paraffin is used, besides, in making matches, in preserving meat and wood, to improve the quality of timber employed as fuel, to render fabrics waterproof, etc. It occurs naturally in the mineral ozokerite, which was formerly the chief source of the substance. The manufacture of paraffin has developed into an important industry since 1851, when it was founded by James Young, a Scotch chemist. At present, considerable quantities of paraffin are made in Germany, by distilling certain varieties of brown coal. In Scotland, the chief seat of the industry, it is made from boghead coal and certain bituminous shales. When the shale is subjected to a process of destructive distillations, a green, oily liquid passes over, which contains a large amount of paraffin in solution. This crude oil is washed with sulphuric acid and with caustic soda, and is divided into more and less vola-

tile fractions by further distillation. Most of the paraffin is contained in the heavy, non-volatile fractions; and when the latter are let stand for some time, at a sufficiently low temperature, the paraffin separates out in the form of a crystalline mass. The crude product is purified by washing with benzene and decolorized by heating with waste coal. Chemically, paraffin is a mixture of the higher aliphatic hydrocarbons (see HYDROCARBONS); the relative composition of the mixture is not always the same, and the melting temperature varies with the product, being anywhere between 45° and 90° C. Paraffin has neither taste nor odor; it is insoluble in and lighter than water.

Among the useful by-products obtained in the manufacture of paraffin are: Benzene (not benzene), asphalt, and *paraffin oil*. Paraffin oil yields oil-gas, which has a very high illuminating power and is used to enrich ordinary coal-gas; it is largely used also for lighting ships, railroad cars, etc.

PARAFFINS. See HYDROCARBONS.

PAR'AGLOB'ULIN. See GLOBULINS.

PARAGUA, pá-rá'gwá. The old Spanish name of the island of Palawan, Philippines, and the present name of the province forming the northern half of the island (Map: Philippine Islands, D 9). See PALAWAN.

PARAGUARÍ, pá-rá-gwá-ré'. A town of the department of the same name, Paraguay, 30 miles southeast of Asunción, on the railway leading from that place to Encarnación. It is the centre of traffic for the surrounding region, which is chiefly engaged in tobacco culture. Paraguarí was founded in 1775. Its population has doubled since the introduction of the railroad, and now amounts to about 7000.

PARAGUAY, pá-rá-gwá or pá-rá-gwí'. An inland republic of South America, bounded on the north by Bolivia and Brazil, on the west and south by Argentina, and on the east by Argentina and Brazil. It is bisected by the Tropic of Capricorn. It has an area of 98,000 square miles, being about as large as Italy excluding Sicily. The Paraná River forms a large part of the eastern boundary. The country is divided by the Paraguay River into two sections: (1) Eastern Paraguay (Paraguay proper), between the Paraguay and Paraná rivers, which has attained considerable development; (2) west of the Paraguay, that part of the Gran Chaco belonging to the Republic. Few enterprises of the white race have yet been carried into the latter region.

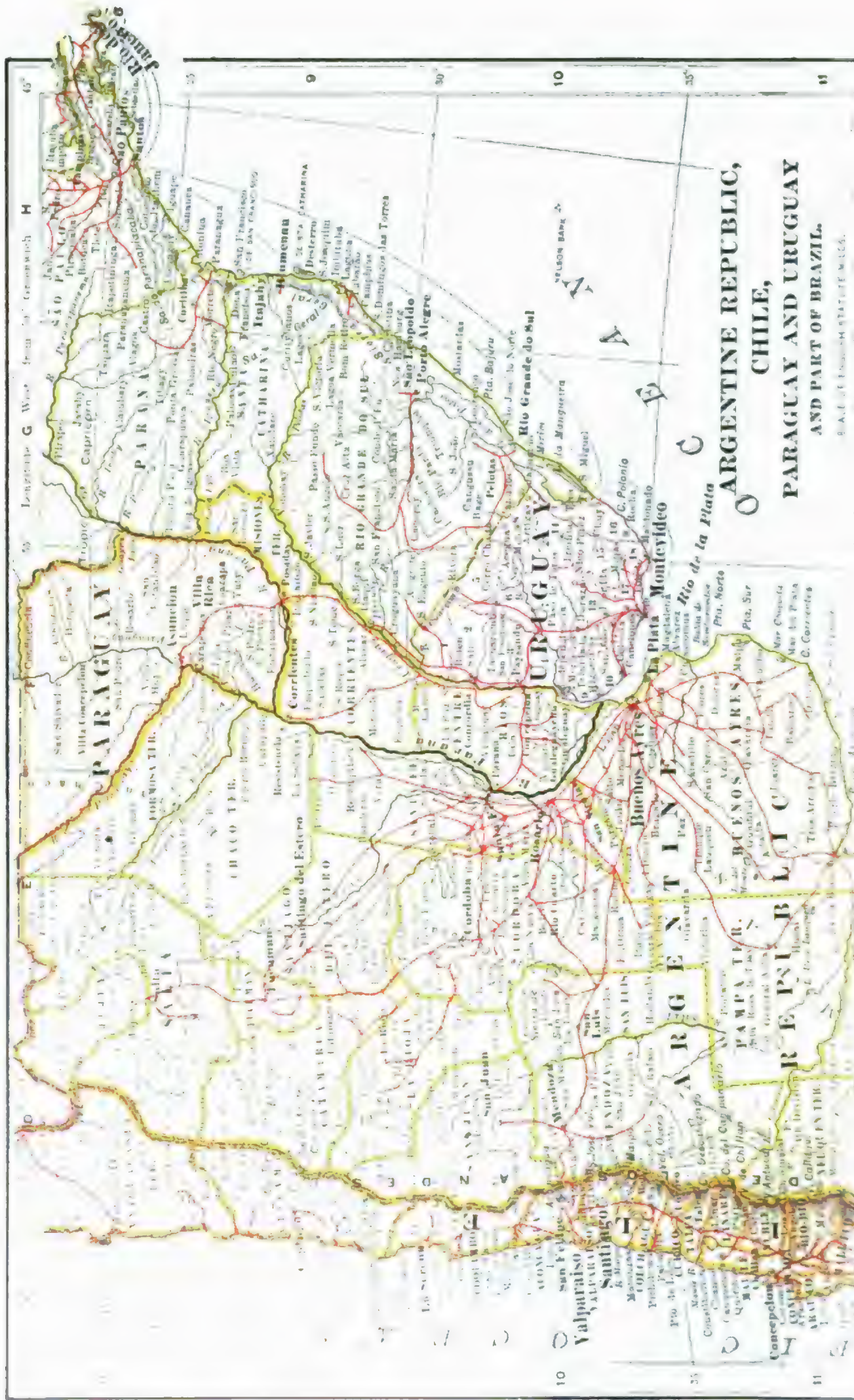
TOPOGRAPHY. Eastern Paraguay is a plateau of no great elevation surmounted by low ridges and hills and subsiding in the west and south-west to grassy tracts, morasses, and lagoons, which scarcely rise above the fluvial level. The plateau has an average altitude of less than 300 feet above sea level, and the hills and ridges rarely exceed 1600 feet in height. The name of mountains can hardly be assigned to these hills. Slightly undulating plains skirt the east bank of the Paraguay, but away from the river the hills soon become numerous and higher. Chains of low heights extend north and south through the country, and are hyperbolically called Sierras and Cordilleras, though hunters and mate-gatherers easily pass from one slope to the other. The fact that much of the in-

terior is still little known is due not to these low ridges, but to the dense tangle of vegetation covering their slopes. The Gran Chaco west of the Paraguay River is mainly an immense level plain with a very slight slope toward the river, and with large areas subject to frequent inundations.

HYDROGRAPHY. Between the low ranges flow innumerable rivulets and streams. The whole country is divided into two fluvial basins, the Paraná system to the east and the Paraguay system to the west. While the Paraná is one of the largest rivers of the world and the Paraguay is its tributary, the Paraná is of minor importance in the country's development. The Paraguay River, on the other hand, has a far greater importance in the industrial advancement of the Republic. Life, energy, and progress are chiefly centred in its valley and especially on its eastern shore. Of great depth, unvarying in current and velocity, and containing an immense volume of water, it can at all times be navigated by the largest vessels, so that it forms a highway of trade into the heart of the continent. The Pilcomayo is the chief affluent of the Paraguay, but though it is navigable on the Bolivian frontier as well as in its lower reaches, the current is too feeble in its middle course across the level plain to excavate a deep channel, and the middle river is therefore too shallow for navigation.

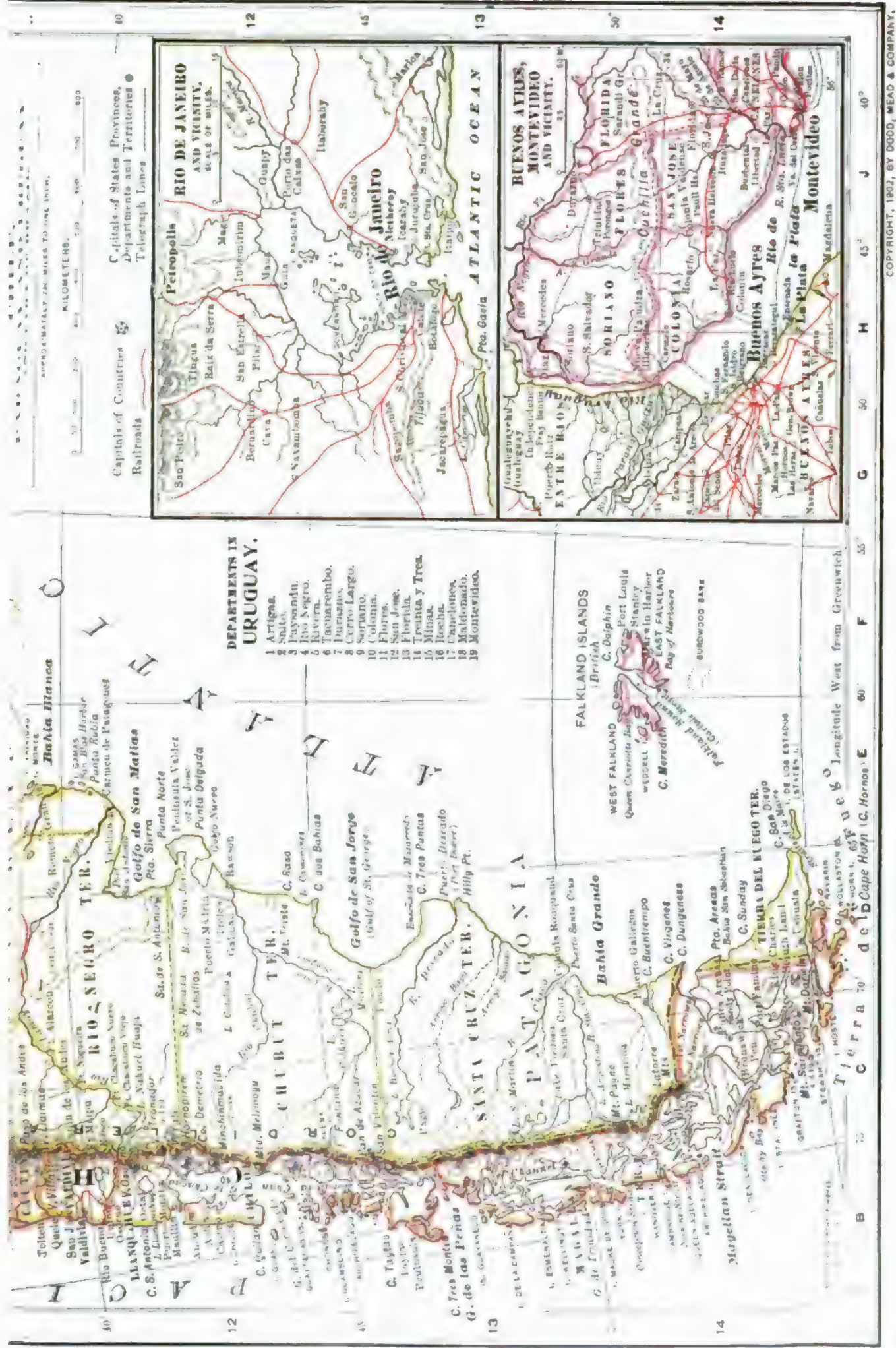
CLIMATE. The country is hot, but the heat is tempered by many refreshing breezes from the south. The temperature of the summer months (December, January, and February) ranges from about 55° F. to 100°. From May to August (winter) it occasionally falls to about 40°, but during the day is frequently 86°. Nine of the twelve months may be said to be perpetual spring, the other three months being very hot. The annual rainfall amounts to 46 inches, distributed over about one-fourth of the days of the year. The rainy season is chiefly confined to the period between August and October, and, as the amount of precipitation shows, it cannot be compared with what is usually called the rainy season in tropical countries. The climate is not unhealthful, and white immigrants, by observing ordinary hygienic rules, maintain a high degree of vigor.

FLORA. The Paraguay River divides the country into well-defined botanical regions. In Eastern Paraguay the prevailing feature of hill and valley is virgin forests with majestic trees, tangled lianas, and brilliant flowers; among the forests are interspersed wide tracts of pasture covered with tall grass, and pindo and mbocaya palms crowning many hills. There are also groves of orange trees whose fruitage never fails, clumps of bananas, and the large bush of the timbo, a leguminous plant. The Chaco, west of the river, on the other hand, presents the bare aspect of a heath occasionally marshy or dotted over with yatais palms; on rising ground thrive dense quebracho forests. The excellence of Paraguayan timber, both for building and cabinet-making, is far-famed. The density of many of these woods is so great that they will not float; but lighter woods, such as are needed for ordinary carpenter work, are not lacking. The forests also supply dyestuffs and many medicinal plants. Perhaps the most characteristic vegetable product is mate, which grows in the forests, is cultivated on plantations, and is the leading article of export.



ARGENTINE REPUBLIC,
CHILE,
PARAGUAY AND URUGUAY
AND PART OF BRAZIL.

SCALE IN ENGLISH STATUTE MILES.



FAUNA. Among the wild animals are the jaguar, the most formidable of the carnivora, the American lion or puma (which, however, is far more common in Argentina), the tiger cat, the marten, polecat, tapir, peccary, and deer. Saurians swarm throughout the country. The alligator of the Paraná is strong and large, but not so fierce as that of the Amazon. Though the venomous snakes include the rattlesnake, viper, and cobra, few cases of snake bite occur, largely because of the great caution of the Paraguayans. The boas are enormous, but singularly inoffensive. Paraguay can boast of some of the most beautiful birds in the world. No family is unrepresented, from the enormous wading birds to the tiniest of humming-birds. In the wilderness flies, gnats, and other pests are very annoying, but, strange to say, they give little trouble in the cultivated districts.

GEOLOGY. Broadly speaking, limestones predominate in Northern Paraguay as far south as latitude 22° S., while sandstones prevail in most of the hilly regions of the south, the plains being formed of argillaceous beds and sandy stones belonging to the Tertiary epoch. In some districts volcano cones are seen. The hills and ridges are due to great dislocation of the rocks occurring long before the mighty upheaval of the Andean Cordilleras; but the present elevations are only the ruins of former lofty summits which have been degraded by long denudation. Little use is yet made of the mineral resources, though iron ore is widely distributed, marble is abundant in the north, and copper and other valuable minerals are found.

AGRICULTURE. The soil in Paraguay is generally good. Farming is the chief pursuit, but is in a very backward condition. Only about 300,000 acres are under cultivation, chiefly along the rivers, where transportation is easy. Owing to the fact that the State owns the public lands and for a long period sold large areas to capitalists and syndicates, the price of the lands most favorably situated for farming or stock-raising was high, and this helped to retard the development of agriculture. Large tracts of country also have been assigned to the holders of Paraguayan bonds as security for the national debt, and many a peasant pays rent to foreign owners of land. The most important crop is mate, whose withered leaves are used as tea, the beverage being very popular in Paraguay, Brazil, Argentina, and some other South American countries. The decoction appears to act both as a stimulant and also, by retarding digestion, as a substitute for food. Half of the crop is consumed at home. The crop is gathered from the wild shrub in the forests or from the cultivated plant, and though the adjacent districts of Brazil also produce it, that of Paraguay is superior in quality. The native orange trees yield an enormous crop. Almost every house has its orange grove. Hogs are fattened on oranges, and immense quantities are exported. Maize, the great cereal crop, is the staple food. Wheat, rice, and other cereals are raised, but not in sufficient quantities to supply the home demand. Tobacco is a large crop, and is consumed in enormous quantities, but has been so poorly cured that it is only just beginning to be important in exports. Among other vegetable products are sugar-cane, coffee, cotton, and ramie. Stock-breeding has not yet attained its

proper development. The grasses are of superior quality. The number of cattle is now rapidly increasing. Good grazing lands are abundant in Eastern Paraguay, and branches are being opened by cattle men on the plains of the Gran Chaco. In 1900 it was estimated that the cattle numbered 2,743,665; horses, 182,790; mules and asses, 7626; sheep, 214,060; goats, 32,334; and hogs, 23,900. The cattle are used chiefly for meat (including jerked beef), and for hides, which are a large export. As in all Spanish countries, butter is scarcely known, but butter and cheese are now produced by foreign immigrants for their own consumption. Among the numerous forest products the *quebracho colorado*, now found only on the Chaco, is most important. It contains nearly 30 per cent. of tannin and is used chiefly for tanning, but also for railroad ties and other purposes. Large quantities of the wood are exported to Germany, and the tannin is also locally extracted. The export of forest products for Europe and other parts of the world is increasing, though the difficulty of carrying them to the Paraguay and Paraná rivers for shipment is still great. Paraguayan woods for piles in the harbor works of Argentina and Uruguay and for railroad ties are in large demand.

MANUFACTURES. The country has made little advance in general industries. In 1899 308 distilleries were making spirits from sugar-cane juice, 3 sugar factories were producing an inferior grade of sugar for home consumption, and 73 kilns were turning out brick and other clay products. Other manufacturing industries are tanning, and furniture and cigar making. There were in 1899 35 wood yards, 36 bakeries, 26 blacksmith shops, soap works, etc. Many of the Indians, under the tuition of the Jesuits, have become skilled in various trades.

COMMERCE. The following table shows the value of the imports and exports in gold dollars at Asuncion, the capital and chief town:

	1898	1899	1900	1901
Imports.....	\$2,606,487	\$2,147,838	\$1,838,710	\$3,008,658
Exports.....	2,463,294	2,021,023	2,064,290	2,529,307

As all the people dress in cotton fabrics, these textiles are the principal foreign purchases, being followed by wine and rice. About half the imports come from Great Britain and 85 per cent. of the foreign purchases are textiles. The chief exports in 1901 (gold value) were: Mate, \$774,090; hides, \$755,348; tobacco, \$193,845; timber, oranges, and hair. Other exports include leather, manioc, and ostrich feathers.

TRANSPORTATION AND COMMUNICATIONS. Four fairly good roads lead from Asuncion to various parts of the country. With these exceptions there are scarcely any roads, and land transportation is difficult and costly. A number of the tributaries of the Paraná and Paraguay are important in the transportation of forest products to those rivers, but the stage of water in them is often too low for navigation. Thus it is very difficult at times to deliver a part of the mate crop at the large rivers for shipment. In 1896 the Great Southern Railroad of Argentina purchased ties in Australia because Paraguay, with its enormous quantities of timber adapted for that purpose, could not ship the supply needed in the stipulated time. The traffic of the country

is centred on its two great rivers, the Paraguay carrying the larger part of it. In 1901 2157 steamers and sailing vessels entered and cleared at the port of Asuncion. Some of the largest and finest river steamers in the world ply between that port and Buenos Ayres. A railroad is in operation between Asuncion and Pirapo, 156 miles.

GOVERNMENT. The present Constitution was adopted by a popularly elected convention of 60 delegates which met at Asuncion on August 15, 1870. The government is that of a centralized republic. The legislative power is vested in a Congress consisting of a Senate and a Chamber of Deputies. Both Senators and Deputies are elected by universal suffrage in the proportion of one Senator for each 12,000 inhabitants, and one Deputy for each 6000. The Senators are chosen for a term of six years, one-third retiring every second year. The Deputies serve for four years, one-half of the membership of the chamber retiring biennially. The executive power is vested in a President chosen for a term of four years by an electoral college very similar to the method followed in the United States. He is eligible to reelection only after an interval of eight consecutive years. He is aided in the exercise of his functions by a Cabinet of five ministers who are responsible to the Legislature. In case of death or inability of the President he is succeeded by a Vice-President, who is *ex-officio* President of the Senate. The judicial power is vested in a Supreme Court consisting of two associate justices and one chief justice; five inferior courts; and a series of magistrates' courts, of which there is one in each town of importance. The Supreme Court is a tribunal of last resort and possesses the right to pass upon the constitutionality of acts of Congress. The justices are appointed by the President with the consent of the Senate for a term of four years. The powers of the executive and of Congress, the guarantees in behalf of civil liberty, the provision for amending the Constitution, etc., are quite similar to those in the Constitution of the United States. For purposes of local government Paraguay is divided into 83 circumscriptions called 'departments,' which are in turn subdivided into cantons. The capital is Asuncion (q.v.).

FINANCE. The revenue is almost wholly obtained from customs dues. Stamp duties, patents, harbor duties, postal charges, and the like are so moderate that they are no appreciable burden upon the people. The revenues and expenditures are small when compared with those of most other countries. The figures for four years are as follows, the value being expressed in paper dollars, which are worth only about one-tenth of the gold dollar:

	1896-97	1897-98	1898-1900	1900-01
Revenue	\$4,200,000	\$8,977,200	\$9,800,000	\$11,412,747
Expenditure	6,852,334	8,441,275	8,122,130	

Paraguay incurred a large foreign debt chiefly on account of prolonged civil wars. As a result of the country's failure at times to meet its obligations, it has been necessary to make arrangements for scaling the debt and reducing the interest. The debt in 1874 amounted to \$7,527,000 (gold), but it was agreed in 1885

that in exchange for this debt new bonds to the amount of \$4,250,000 should be issued. An arrangement was also made for the future payment of interest, and land was assigned to creditors in payment of arrears of interest up to July, 1886. The holders of these unpaid interest coupons received land warrants, and the Paraguay Land Company, later known as the Anglo-Paraguayan Land Company, was formed to deal with these warrants. Another arrangement was made with the bondholders in 1895 for the reduction of interest, refunding of interest coupons in arrears, the creation of a sinking fund, and the assignment of securities. The outstanding debt in 1902 was \$4,688,750 (gold), and the guarantee debt which the Government owed to the Paraguayan Central Railroad amounted to \$5,130,305.

There are five banks: the Agricultural Bank, with a capital of 3,025,723 pesos (for value see below), the Territorial Bank, the Mercantile Bank, the Bank of Los Rios, and the Caja de Crédito Commercial. Paper money is chiefly in circulation, the amount on December 31, 1901, being 10,566,171 pesos.

The nominal value of the peso is \$1, but as compared with the paper peso gold is at a premium of about 1000 per cent. The legal value of the gold peso is one American gold dollar. The silver peso varies in value according to the gold price of silver. The metrical system of weights and measures has nominally been obligatory since 1886, but practically the old Spanish weights and measures have remained in use.

The Paraguayan standing army has 1500 men.

POPULATION. The census of 1899 showed a population of about 630,000, of whom nearly 100,000 were Indians. The foreign population in 1895 numbered 5000 Argentines, 2500 Italians, 1500 Spaniards, 1250 Germans, 800 French, 600 Brazilians, and 1000 Swiss, Austrians, English, and other nationalities. The Paraguayans are a hospitable, well-meaning people, whose prosperity was long retarded by terrible misrule, but whose position is improving under the present favorable conditions of government.

EDUCATION AND RELIGION. The schools are supported by the State, but though education is nominally compulsory, only about one-fifth of the adult Paraguayans can read and write. In 1897 there were 390 public and private elementary schools, with 25,000 pupils and 700 teachers. A number of Protestant schools are maintained and private schools are partly supported out of the public funds. An agricultural school near Asuncion, with a model farm, is having a favorable influence upon farming. The national college, with 15 professors and 205 students, is situated at Asuncion. This city has a public library and five newspapers. The Roman Catholic is the State religion, but every one is protected in the exercise of his own religion.

IMMIGRATION. The Government encourages immigration, yet, owing to the troubled history of the country until quite recently and the nearer opportunities presented by Argentina, the incomers from foreign countries have been comparatively few. In 1897 there were seven agricultural colonies, embracing 2148 inhabitants, Italians, Germans, French, Spaniards, Swiss, and English. They cultivated 10,000 acres and possessed 235,246 fruit trees, 62,620 coffee plants, 1444 horses, and 14,615 cattle. A com-

siderable number of foreigners, also, scattered through the towns, are leaders in business affairs and a helpful, progressive element.

HISTORY. The native inhabitants of the region above the junction of the Paraná and the Paraguay rivers belong to the warlike race of the Guaraní (q.v.). The country was first explored in 1527-28 by Sebastian Cabot, who made his way for several hundred miles up the course of these two streams. In 1529-30 Diego Garcia entered the same region, and in 1536 or 1537 Juan de Ayolas laid the foundation of a town at Asuncion. He was murdered by the natives, but Martinez Yeala, who succeeded him, soon put the colony in a prosperous condition and it promised to become one of the most important in South America. His power was largely personal, however, and after his death a period of anarchy ensued, which effectually destroyed Spanish influence over the natives. The country was considered as a dependency of the Viceroyalty of Peru, which exercised, however, little more than nominal oversight. The history of Paraguay is chiefly remarkable for the long civil and religious domination of the Jesuits, extending from 1609 to 1768. The missions, or Reductions as they were called, were not only centres of education and civilization, skillfully directed to appeal to the habits and imagination of the natives, but they were refuges from the rapacity and oppression of the Spanish conquerors, and as such acquired an influence and moral ascendancy in many ways analogous to that exercised by the monasteries of Europe in the early Middle Ages. The disciplinary rule of the Jesuits was thorough. They instituted a penal code with carefully graduated penalties, and established large schools for the education of the children. The economic character of the Reductions was largely communal, in keeping with native customs and traditions. After the expulsion of the Jesuits the missions soon became deserted. At that time (1768) there were in the various Jesuit stations some 400,000 natives. In 1776 Paraguay was included in the Viceroyalty of Rio de la Plata. The Spanish Government was overthrown in 1811. The last Governor quietly resigned his office, and his place was taken by a triumvirate, one of whose members was José Gaspar Francia (q.v.), who soon made himself Dictator, upon the occasion of a war with the Argentines, and held that position until his death, in 1840. His rule was based on a policy of national isolation. He attempted to cut off all intercourse with other States, and actually closed the Paraguay River to navigation. His policy was followed by his successors—Vidal, who ruled the country from 1840 to 1844; Francia's nephew, Carlos Antonio Lopez (1844-62); and from 1862 to 1870 the latter's son, Francisco Solano Lopez (q.v.). The last named, an ambitious despot, plunged Paraguay into a five years' war with Brazil, Argentina, and Uruguay, which utterly exhausted the country. The struggle terminated with the death of Lopez at Aquidaban in 1870. The establishment of peace was followed by the adoption of a more liberal Constitution.

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PARAGUAY RIVER. A river of South America, the largest tributary of the Paraná (q.v.). It rises on the plateau of Matto Grosso and flows in a general southward direction, at first wholly in Brazil, then on the boundary between Brazil and Bolivia, then through the centre of Paraguay, and finally, below Asuncion, on the boundary between Paraguay and Argentina until it joins the Paraná near Corrientes (Map: South America, D 5). Its total length is about 1500 miles. Its sources are a series of lakes called As Sete Lagoas, which are believed to be also the source of a headstream of the Tapajoz, which flows into the Amazon. After leaving the plateau in a series of rapids the river flows for the rest of its course with a tranquil current over an almost level bed through the great plains known as the Gran Chaco and the Pampas. The upper part of this plain, above the Bolivian frontier, forms the marshes called the Laguna de los Charayes (Xarayes). This tract is converted during the annual floods into a vast lake over 100 miles wide and several hundred miles long, leaving exposed only a few islands and the rows of trees which line the banks of the permanent streams. Below the Charayes the river is again confined to its banks by spurs of the plateau, and farther south its bed is so deeply cut into the plain that the latter generally escapes inundation. Below Asuncion, however, the banks again become marshy. From the escarpment of the plateau to the confluence with the Paraná, a distance of 900 miles, the river is entirely free from obstructions, and is navigable at all seasons for small vessels, which can also ascend the São Lourenço to Cuyabá in Brazil. Steamers drawing nine feet can at all seasons reach Corumba at the southern end of the Charayes, and the river is the only commercial outlet for Matto Grosso and Paraguay. Two lines of steamers ply regularly between Asuncion and Buenos Ayres, each running one steamer weekly, and in 1898 nearly 500 ocean vessels entered the former port. The longest tributaries of the Paraguay are the Pilcomayo and the Berhejo (qq.v.). The river was discovered by Sebas-

tian Cabot, who, in 1526, ascended the Paraná as far as the confluence.

PARAGUAY TEA. A South American shrub. See **MATE**.

PAR'HELIOtropISM (from Gk. *παρά*, *para*, about + *ἥλιος*, *hēlios*, sun + *τροπή*, *trōpē*, a turning, from *τρέπω*, *trepein*, to turn). A sensitiveness of plant organs, especially of leaves, by virtue of which they take the position of least illumination when exposed to intense light. Paraheliotropic leaves may turn their tips either toward or away from the source of light. In either case the response brings the plane of the leaf parallel to the direction of the incident light rays. Thus the leaf is much less strongly illuminated than in the diheliotropic position, at right angles to this direction. Many plants of the pea family show this response on bright days in summer. See **HELIOTROPISM**.

PARAHYBA, or **PARAHIBA**, pā'rā-ē'bā. One of the smaller States of Brazil, lying in the easternmost part of the country, and bounded by the State of Rio Grande do Norte on the north, the Atlantic Ocean on the east, Pernambuco on the south, and Ceará on the west (Map: Brazil, K 5). Area, 28,850 square miles. The surface is low and marshy on the coast, but the greater part consists of an elevated plateau whose slopes are heavily forested. The climate is dry and healthful, but the soil in the interior supports only a scanty vegetation. In the coast region are raised sugar, cacao, rice, and tobacco, and some coffee is cultivated in the more elevated regions. The population in 1890 was 457,232, consisting largely of Indians and Negroes. The capital is Parahyba (q.v.).

PARAHYBA, or **PARAHIBA**. The capital of the State of Parahyba, Brazil, situated on the river of the same name, about 10 miles from the sea, and 50 miles north of Pernambuco (Map: Brazil, L 5). The town lies partly on hills and partly in a plain; the former section is the old city and has dwindled away, while the newer portion, along the river, forms, with its port of Cabadello, the business quarter. The most notable structures are the cathedral and a former Jesuit college, which contains the State offices. The harbor of Cabadello is deep enough for vessels of 15 feet draught, and from it sugar and cotton are exported. Population, in 1898, 18,000. Parahyba was founded by the Portuguese in 1579, being one of the oldest settlements of Brazil.

PARAL'DEHYDE (from Gk. *παρά*, *para*, beside + Eng. *aldehyde*, clipped form of Neo-Lat. *alcohol dehyd-rogenatum*, alcohol deprived of hydrogen). A polymeric form of aldehyde with the symbol $C_6H_{12}O_6$, occurring as a colorless or pale yellow oily liquid, soluble in about nine parts of water and miscible with the oils, ether, and alcohol. It is obtained by treating aldehyde with dilute sulphuric acid or dilute nitric acid. In medicine, it is used as a hypnotic (q.v.) principally, rarely as a diuretic and antispasmodic. Excitement follows its administration, which is succeeded by sound and refreshing sleep, without digestive or cerebral disturbance. It does not weaken the heart's action. See **ALDEHYDE**.

PAR'ALLAX (from Gk. *παράλλαξις*, *parallaxis*, alternation, from *παράλλασσεν*, *parallassein*, to make alternate, from *παρά*, *para*, beside

+ *ἀλλασσειν*, *allassein*, to alter, from *ἄλλος*, *allos*, other). The apparent displacement of an object caused by a change of place of the observer. When an object at M (Fig. 1) is looked at from



FIG. 1.

P, it appears in line with some other object, S; but after the observer has moved to E, M has apparently retrograded to a position in line with S'; this apparent retrogression is called *parallax*. The angle PME is called the *angle of parallax*, and is the measure of the amount of parallax. To astronomers the determination of the parallax of the heavenly bodies is of the greatest importance, for two reasons—first, from the necessity of referring all observations to the earth's centre, i.e. so modifying them as to make it appear as if they had been actually made at the earth's centre; and secondly, because parallax is our only means of determining the magnitude and distance of the heavenly bodies. The *geocentric parallax*, the apparent displacement of a heavenly body due to its being observed from a point on the surface of the earth instead of from its centre, may be determined as follows: Let P and P' be two stations on the surface of the earth (Fig. 2), E its centre, M the object to be ob-

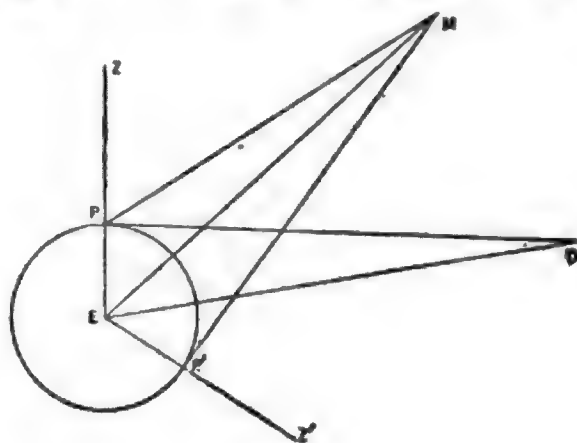


FIG. 2.

served, and Z and Z' the zeniths respectively of the observers at P and P', then at P and P' let the zenith distances, ZPM and Z'P'M, be observed simultaneously, and since the latitudes of P and P', and consequently the angle PEP', is known, from these three the angle PMP' (the sum of the parallaxes at P and P') is at once found; and then by trigonometry the separate angles or parallaxes PME and P'ME. When the parallax of M, as observed from P, is known, its distance from E, the centre of the earth, can be at once found in terms of the earth's radius as a unit. When the heavenly body is on the horizon, as at O, its geocentric parallax is a maximum, and is known as the *horizontal parallax*.

In the case of the fixed stars, which are so far away that to them the earth's radius subtends only an infinitesimal angle, it becomes necessary to make use of a much larger base-line than the earth's radius, and, as the largest we can employ is the radius of the earth's orbit, it

accordingly is made use of, and the displacement of a star, when observed from a point in the earth's orbit instead of from its centre, the sun, is called the *annual* or *heliocentric* parallax. Here the base-line, instead, as in the former case, of being 4000 miles, is about 92,800,000 miles, and the two observations necessary to determine the parallactic angle are made from two points on opposite sides of the earth's orbit, at an interval as nearly as possible of half a year. Yet, notwithstanding the enormous length of the base-line, it bears so small a proportion to the distances of the stars, that only in a few cases have they been found to exhibit any parallactic motion whatever, and in no case does the angle of parallax amount to 1". See STARS.

SOLAR PARALLAX. The extremely precise determination of this quantity is very important, since the solar parallax is our only means of determining the distance of the sun from the earth. This is the fundamental unit of distances in astronomy. Upon it depend directly all our notions as to the magnitude and distance of the other members of the solar system, and of the universe in general. The solar parallax problem is not only the most important one in fundamental astronomy, but it is also, perhaps, the one offering the greatest difficulty in solution. Astronomical instruments enable us to submit to actual measurement only the directions in space of the heavenly bodies, never their distances. These latter must be obtained by computation from measured directions or angles, and for this purpose some base-line is indispensable. The largest possible terrestrial base-line is of course a diameter of the earth. Yet so small is even this compared with the distance of the sun, that it would subtend an angle of only about eighteen seconds of arc to an imaginary observer at the sun's centre. When we reflect that an angle of one second corresponds to only three-tenths of an inch at a distance of one mile, we get some idea of the extreme minuteness of the earth's diameter as seen from the sun.

It is never possible, of course, to get a *complete* diameter of the earth for a base-line; but extraordinary efforts have been made to come as near as possible to this ideal condition. For many years observations of transits of Venus were considered the most favorable means of measuring the small angular differences of direction of the sun's centre as seen from opposite sides of the earth. No expense was spared, especially for the transits of 1874 and 1882, to secure very complete observations. Yet, although the various civilized governments of the world sent out numerous and most elaborately equipped observing expeditions, the whole operation turned out practically a failure. It was simply impossible by this method to secure observations of the requisite precision. Of late years, two other methods have been pretty generally agreed upon as the best. The first is based upon the so-called constant of the aberration of light. (See **ABERRATION OF LIGHT**). It is known that the directions in which we see the stars are apparently thrown forward toward that point on the sky to which the orbital motion of the earth is carrying the observer. It is a phenomenon analogous to the well-known fact that if a man be running in a rain-storm the falling drops seem to slant toward him though they may really be falling vertically. So their direction seems to be

thrown forward in the direction of the observer's motion. In the case of the earth's orbital motion around the sun, the observer will be moving in opposite directions in space at intervals of half a year. Consequently the effect of aberration is reversed, and the so-called 'constant' or amount of aberration admits of determination from the differences of observations made six months apart. The solar parallax can be computed from the aberration constant, since we know, with quite sufficient precision, the velocity of the transmission of light in space.

The other accredited method of determining the parallax is by observations of the planetoids. The method is extremely simple in practice, and also very accurate. It is necessary merely to await a time when one of these little bodies is favorably situated for observation, and then to fix its position telescopically with respect to the neighboring stars. Let this be done simultaneously at two observatories situated very far apart on the earth, and using, of course, the same stars in both places. Then it is clear that the position determined for the planet will not be quite the same at the two observatories. The base-line is the straight line joining the two observatories. As a result we obtain directly the distance of the planet from the earth, in terms of this base-line as a unit. But this is known in miles from existing geodetic surveys of the earth. Thus we arrive at a knowledge, in miles, of the planetoid's distance. But from the ordinary processes of astronomical observation, we know the so-called elements of the planetoid's orbit. (See **ELEMENTS**.) We can find from these, by a simple computation based on Kepler's laws, the distance of the planetoid from the earth in terms of the latter's distance from the sun. Knowing then the distance between the earth and planetoid in miles from the special parallax observations, and in terms of the distance 'earth-sun' from theory, we can at once deduce the value of 'earth-sun' in miles. This, combined with our knowledge from geodesy of the terrestrial radius in miles, enables us to compute the angle subtended by that radius to an observer in the sun—in other words, the solar parallax.

The planetoid method was put in operation by no less than twenty-five observatories, acting in coöperation. By thus increasing the number of observation stations the precision of the final result could not fail to be greatly enhanced. The entire 'campaign' was planned and managed by Gill, of the Cape of Good Hope Observatory. The observatories taking a principal part in the work, in addition to that at the Cape of Good Hope, were those at Bamberg, Leipzig, Göttingen, and, in this country, Yale University. All these observatories are provided with the modern heliometer (q.v.), the most precise apparatus for measurement on the sky at present known to science.

The parallax determinations through the constant of aberration have been made principally in connection with the study of latitude variation.

It may be of interest here to show the relative importance or 'weight' of the various parallax methods. The general work of high authority on this topic is the *Fundamental Constants of Astronomy*, by Simon Newcomb (Washington, 1895). Newcomb assigned the following 'weights,' or relative degrees of precision:

From the aberration constant.....	weight 66
From the planetoid method.....	weight 20
Six other methods combined.....	weight 35

Newcomb was already at that time in possession of preliminary results of Gill's researches, communicated to him in advance of publication. But after his writing several important series of aberration determinations were made public, and the results exhibited certain small discordances among themselves, which discredited somewhat the aberration method, and consequently enhanced the relative weight of the planetoid method. The latter method gained also from the discovery in 1898 of a new planetoid, much more favorably situated for parallax determinations than any previously known. See EROS.

The final result for the solar parallax at present accepted by astronomers in general is $8''.80$, corresponding to a distance of 92,789,000 miles between the earth and the sun.

PAR'ALLEL'EPI'PED (ML. *parallelepipedum*, from Gk. *παράλληλεπῖπεδον*, *parallēlepipedon*, from *παράλληλος*, *parallēlos*, parallel, from *παρά*, *para*, beside, beyond + *ἀλλήλων*, *allēlōn*, of each other, from *ἄλλος*, *allos*, other + *ἄλλος*, *allos*, other, + *ἐπίπεδον*, *epipedon*, plane surface, from *ἐπί*, *epi*, upon + *πέδον*, *pedon*, ground), or **PAR'ALLOPIPED**. A solid figure having six parallelograms for faces. Therefore any two opposite faces are equal and parallel. If the faces are all squares the parallelepiped is a cube. The volume of a parallelepiped is found by multiplying its base by the altitude.

PARALLEL FORCES. See MECHANICS.

PARALLELISM. A term used in philosophy to denote an hypothetical relation of matter and consciousness. In the history of philosophy Spinoza is the most thorough-going parallelist, holding that matter and ideas are both attributes of one divine subject, and that every material object, or instance of the material attribute, has its ideal counterpart. In modern times the term parallelism is used more particularly in psychology and in epistemology to denote the specific parallelism of the human (or animal) body with the concrete consciousness of man (or lower animal). In this usage, parallelism means the concomitance of brain process and mental process. It is distinguished from interactionism, which holds that mental processes may cause and precede brain processes and *vice versa*. Psychologists, however, do not accept parallelism as an explanatory theory, but only as an hypothetical statement of a relation of body and mind which may be used as a basis for formulation of psycho-physical facts. The solution of the problem is by them held in abeyance or referred to the epistemologist. See BODY AND MIND; DUALISM; KNOWLEDGE, THEORY OF; MIND-STUFF THEORY; OCCASIONALISM.

PARALLEL MOTION. See MOTION.

PAR'ALLEL'OGRAM (Lat. *parallelogrammum*, from Gk. *παράλληλογράμμοι*, *parallēlogrammos*, neu. sg. of *παράλληλογράμμοι*, *parallēlogrammos*, bounded by parallel lines, from *παράλληλος*, *parallēlos*, parallel + *γράμμα*, *gramma*, line, letter, from *γράφειν*, *graphein*, to write). A quadrilateral whose opposite sides are parallel. From this it follows that the opposite sides and angles must be equal. Therefore, if one angle of a parallelogram is a right angle, all of them are, and the figure is then called a *rectangle*; and if at

the same time all the sides are equal, the figure is a *square*. If the sides are equal, but not the angles, it is a *rhombus*. If only the opposite sides are equal, it is a *rhomboid*. The diagonals of a



RECTANGLE.



SQUARE.

parallelogram bisect each other, and each bisects the parallelogram; the sum of their squares is equal to the sum of the squares of the sides of



RHOMBUS.



RHOMBOID.

a parallelogram. All parallelograms which have equal bases and equal altitudes are equal in area, and this is found by multiplying the base by the altitude.

PARALLELOGRAM OF FORCES. See MECHANICS.

PARALLELS. See GEOMETRY.

PARALLELS (OF. *parallele*, Fr. *parallèle*, from Lat. *parallelus*, *parallēlos*, parallel). In military fortifications, trenches cut in the ground, parallel to the position under siege, and designed to protect the men and guns of the besiegers from the fire of the besieged. See SIEGE AND SIEGE WORKS; FORTIFICATIONS.

PARALLELS, or CIRCLES OF LATITUDE. Circles drawn round the surface of the earth parallel to the equator. They are the intersections with the earth's surface of planes which cut the earth at right angles to its axis. The greatest of these circles is the equator, which has the centre of the earth for its centre, the radius of the earth for its radius, and is equally distant at all points from each pole. It is evident that of the others, those next the equator are greater than those more remote, and that they become less and less till at the poles they vanish altogether. The radius of any one circle is equal to the earth's radius multiplied by the cosine of the latitude, if we regard the earth as a sphere. The rotary velocity of the earth's surface, which is about $17\frac{1}{4}$ miles per minute at the equator, is therefore about $8\frac{1}{2}$ miles in latitude 60° ; and in latitude $89\frac{1}{2}^\circ$ (within 35 miles of the pole) is not more than 267 yards per minute. The most important parallels of latitude are the *tropics of Cancer* (latitude $23^\circ 28'$ N.) and *Capricorn* (latitude $23^\circ 28'$ S.), and the *Arctic* (latitude $66^\circ 32'$ N.) and *Antarctic circles* (latitude $66^\circ 32'$ S.).

PARALLEL SAILING. See SAILINGS.

PARALYSIS (Lat., from Gk. *παράλυσις*, palsy, paralysis, from *παράλύνω*, *paralyein*, to disable the side, from *παρά*, *para*, beside, beyond + *λύειν*, *lyein*, to loose), sometimes called **PALSY**. A loss, more or less complete, of the power of motion. By some writers the term is made to include loss of sensation. When the upper and lower extremities on both sides and more or less of the trunk is involved, the affection is termed general paralysis. Frequently only one-half of the body laterally is affected, the other side remaining sound. To this condition the term hemiplegia is applied. When the paralysis is confined to all the parts below an imaginary transverse line drawn through the body, or to the two lower extremities, the condition is known as paraplegia. When one part of the body, e.g. a limb or one side of the face, is exclusively affected, the condition is known as a local palsy or local paralysis. In some cases the loss of sensation and of motion in the paralyzed part is complete, while in others there is only some loss of power. In the former case the paralysis is said to be complete, in the latter partial. In most cases, but not invariably, sensation and motion are simultaneously lost or impaired. When motion is lost but sensation remains unaffected, the condition is known as akinesia. More rarely there is a loss of sensibility while the power of motion is retained. To such a condition the term anæsthesia is applied. This latter affection occurs most frequently in the organs of special sense, as, for example, in the tongue, where the sense of taste may be lost without any impairment of motion.

Paralysis is not a disease in itself, but merely a symptom of disease usually located in some part of the body other than that affected by the paralysis. Rarely are disturbances of sensation or of motion due to changes which are primarily in the skin area or muscles affected by the paralysis. This does, however, sometimes occur, as in the paralysis of progressive muscular dystrophy, where the primary lesion is in the muscles affected. The proper appreciation of external stimulation, i.e. sensation, and the proper carrying out of voluntary movements of the muscles, are dependent upon the integrity of the parts of the nervous system which govern such sensations and movements. The nerve terminations in muscle, skin, etc., serve as means for the reception and distribution of nervous impulses. The nerves themselves carry impulses between the nerve centres in the brain, spinal cord, and ganglia, and the peripheral nerve terminations. The brain, spinal cord, and ganglia serve as centres in which nervous impulses originate, are transformed, and associated. It thus follows that paralysis is a symptom which is usually indicative of pathological changes in (1) the peripheral nerves, or (2) the nerve trunks, or (3) the nerve centres in the brain, cord, or ganglia, and it is in these organs that the lesions of paralysis must usually be sought, and not in the paralyzed parts themselves. Thus disease of the peripheral nerves may cause paralysis, e.g. the paralysis occurring in peripheral neuritis. More frequently disease of or injury to nerve trunks, or tumors, or displaced bone pressing upon nerve trunks, causes paralysis in the parts supplied by the nerve or nerves affected. The completeness of the paralysis is determined by the extent of the injury to the nerve fibres and by the completeness of the

interruption of nerve impulses. The spinal cord (see NERVOUS SYSTEM AND BRAIN) acts by means of its gray matter as a centre for automatic, reflex, and trophic impulses, also through its fibre tracts (white matter) as a pathway by means of which impulses are transmitted to and from the higher centres in the brain. After injury to the cord, such as results from dislocation or fracture of the vertebræ, with the consequent pressure upon or tearing of the tissues of the cord itself, a paralysis supervenes in the parts of the body below the seat of injury. If the paralysis results from pressure alone without an actual injury to the cord, it may be only temporary, recovery taking place when the pressure is removed. More often there is some crushing of the cord, in which case the paralysis is permanent, its extent depending upon the extent of the injury. When the cord is crushed completely across there is a complete paralysis, both motor and sensory, of all parts below the seat of injury, with the exception of such internal organs as are supplied by nerves which arise above the injury. Tumors, benign or malignant, diseased conditions extending from neighboring tissues and organs, hemorrhages into the spinal canal or into the substance of the cord, etc., determine, by the pressure upon the cord which they cause, paralysis similar to those resulting from injury. The main difference between the two is a clinical one, the paralysis from injury coming on suddenly and immediately after the injury, while the paralysis from disease has a gradual onset. Again, certain diseases of the spinal cord itself cause paralysis. Thus acute anterior poliomyelitis, often called (because of its most prominent symptom and because of its most frequent occurrence in children) acute infantile spinal paralysis, is a disease of the gray matter of the anterior horns and causes paralysis of those muscles governed by the affected cells. In the early stages of this disease the number of cells affected is large, and the paralysis is consequently extensive. Some of the cells are so severely injured that they die, and the paralysis in the muscles which these cells govern is permanent. The majority of the cells first affected usually recover, and this recovery in the cells is marked by a disappearance of the paralysis in the muscles which these cells govern. Among the other diseases of the spinal cord in which paralysis occurs or may occur may be mentioned Landry's paralysis, spastic paraplegia, or spastic spinal paralysis, amyotrophic lateral sclerosis, tabes dorsalis, ataxic paraplegia, and myelitis.

The brain serves as a centre for voluntary motion and for the perception of sensory impulses. It follows that injury to or disease of the brain is frequently followed by paralysis of greater or less extent. Thus concussion of the brain; fracture of the skull with resulting compression due to displaced bone or to hemorrhage in the cranium; hemorrhage into the substance of the brain or into its membranes independent of external injury; compression of the brain from tumors benign or malignant, from syphilitic gummata, etc.; destruction of brain tissue by extension of disease from surrounding parts, as from bone necrosis, middle ear disease, abscesses, etc.; brain-softening from cutting off blood supply, as in thrombosis or embolism—all these and other widely different lesions cause paralysis as

a symptom by interfering with the proper working of the nervous mechanism.

There remain to be described somewhat more in detail certain conditions to which the term paralysis is popularly applied.

HEMIPLEGIA is that form of paralysis popularly known as a 'paralytic stroke' or 'stroke of apoplexy.' The paralysis affects only one lateral half of the body. The parts generally affected are the upper and lower extremities, the muscles of mastication, and the muscles of the tongue on one side. In a well-marked case the patient when seized falls to the ground, all power of motion in the affected arm and leg being lost. The paralysis of the face which accompanies hemiplegia is usually quite distinct from the affection known as facial paralysis, which is an affection of the facial nerve or *portio dura*. (See **NERVOUS SYSTEM AND BRAIN**.) The motor branches of the fifth or trifacial nerve going to the muscles of mastication are generally involved in hemiplegia, and consequently the cheek is flaccid and hangs down, and the angle of the mouth is depressed on the affected side. The tongue when protruded points toward the paralyzed side, and there is often imperfect articulation, in consequence of the lesion commonly affecting the hypoglossal nerve. While paralysis of one side of the body or hemiplegia may be due to a large number of different conditions in the brain or cord, some of which have been already mentioned, it is most commonly due to one of three cerebral accidents. These, mentioned in the order of frequency of their occurrence, are (1) cerebral hemorrhage, (2) cerebral embolism (q.v.), (3) cerebral thrombosis (q.v.). Hemorrhage may occur into any portion of the brain tissue proper or between the skull and brain, i.e. into the meninges. These hemorrhages may be due to injury to the vessels or to disease of the vessel walls such as atheroma or aneurism. The most common seat of hemorrhage is in the optic thalamus and corpus striatum, from the branches of the middle cerebral artery. With the escape of blood there is usually more or less tearing and destruction of brain tissue, and this broken down brain tissue mixed with the extravasated blood constitutes what is known as the apoplectic clot.

FACIAL PARALYSIS, although locally affecting but a small part of the body, is of such frequent occurrence as to require separate description. In this affection there is more or less perfect loss of power over all the muscles supplied by the *portio dura* or facial nerve. This interference with the functions of the nerve may be due to lesions in the cortex affecting facial fibres of the corona radiata or internal capsule, to lesions in the nucleus of the nerve, or to lesions of the nerve trunk. Facial paralysis due to lesions in the cortex is commonly associated with hemiplegia. This paralysis is on the same side as that of the body, the nucleus from which the facial fibres originate being connected with the opposite side of the cortex in a manner quite similar to that by which the anterior horns are associated with the opposite hemisphere. Facial paralysis due to lesions of the facial nucleus in the medulla is uncommon. Tumors, hemorrhages, softening, the toxins of diphtheria, and the extension of an anterior poliomyelitis are the most frequent causes. Lesions of the trunk of the nerve may occur in any part of its course, due to tumors, injury, inflammation, etc. When the lesion af-

fects the nerve fibres as they pass through the lower portion of the pons, and involves also the pyramidal or main motor tracts, there results the so-called 'cross paralysis,' i.e. a paralysis of the face on the same side as the lesion and of the trunk upon the opposite side. The following graphic account of the appearance of a patient suffering from facial paralysis is condensed from Watson, *Lectures on the Practice of Physic*. From one-half of the countenance all power of expression is gone; the features are blank, still, and unmeaning; the eyelids apart and motionless. The other half retains its natural cast, except that in some cases the angle of the mouth on that side seems drawn a little awry, in consequence of want of counterpoise from the corresponding muscular fibres of the paralyzed side. The patient cannot laugh, weep, frown, or express any feeling or emotion with one side of the face, while the features of the other side may be in full play. He cannot spit or whistle properly. One half the aspect, with its unwinking eye, its fixed and solemn stare, might be that of a dead person; the other half is alive and mobile.

If the cause of the paralysis is due to conditions in the nerve external to the cranial cavity, there is little danger to life and good chances for recovery from the paralysis. If, however, the paralysis is dependent upon intra-cranial conditions, there is not only less chance of recovery from the paralysis, but great danger to life.

There yet remain to be considered certain conditions which are popularly called paralyses or palsies, but which are essentially different from those already described. Among these may be mentioned the so-called 'shaking palsy,' or paralysis agitans (q.v.), and the palsies induced by various poisons. The poisons which are the most common causes of paralysis or of tremors are alcohol, lead, tobacco, and mercury. Arsenic and opium are rare causes. It is upon the peripheral nerves that these poisons seem to have their most pronounced effect, setting up a toxic peripheral neuritis.

A specific form of paralysis of the lower extremities, consequent on the use of flour from the beans of the *Lathyrus sativus*, is common in certain parts of India and Tibet. The ripe bean is an ordinary article of food when made into flour, but it is generally used with wheat or barley flour. It is said to be injurious only when it exceeds one-twelfth part of the mixture and to cause paralysis only when it constitutes more than one-third. Other species of *Lathyrus* have been known occasionally to cause similar symptoms in European countries.

PARALYSIS AGITANS (Lat., shaking palsy), **PARKINSON'S DISEASE**, **SHAKING PALSY**. A chronic progressive nerve disease, in which the principal symptoms are tremor, muscular rigidity, restlessness, weakness, and altered sensations. It occurs more frequently in males, and generally between the ages of fifty and seventy. It is caused by exposure, hard labor, and great fatigue. Fright or injury may immediately precede an attack. The earlier symptoms are pains in one arm, with tremor of one hand, the fingers working together as if the patient were pulling or picking at something. Stiffness in the arm follows, and the process invades the leg of the same side. The neck becomes stiff and the body

bent forward. The disease lasts from three or four to twelve years. The pathological changes found consist of hypertrophy of the nerve cells of the pons, induration of the pons medulla and cord, thickening of the blood-vessel walls and of the pia, and increase of connective tissue in the motor tracts, nerves, and muscles. (Dana.)

The most successful treatment consists of rest, freedom from mental anxiety, outdoor air, warm baths, and massage. Among drugs, hyoscyne, codein, quinine, arsenic, cannabis, veratrum, salicin, nitrate of silver, conium, atropia, and phosphorus have been used to relieve various conditions and with varying results. The mental condition, which may be hysterical or emotional, sometimes delusional, is improved by strong mental influences, routine and control, and employment. Consult Dana, *Text-Book of Nervous Diseases* (New York, 1892).

PARAMARIBO, pār'a-mār'l-bō. The capital of Dutch Guiana, South America, situated on the left bank of the Surinam River, about 17 miles above its mouth, in latitude 5° 50' N. and longitude 55° 10' W. (Map: Guiana, Dutch, F 2). Its climate is very hot, the average annual temperature being over 80°. Paramaribo has the neat appearance of a Dutch town with its wide streets shaded with trees and lined with brightly-colored modern houses. The Government buildings are situated near the river, forming the so-called 'Government plain.' There are a number of churches and synagogues. The harbor is safe and commodious, and fortified by the two forts of Zeelandia and New Amsterdam. A number of wharves are situated along the river. Paramaribo receives the entire trade of Dutch Guiana and is the seat of a number of foreign consuls. Population, in 1900, 31,817, or nearly 50 per cent. of the entire population of Dutch Guiana.

PARAMATTA, pār'a-māt'a. A town of New South Wales. See PARRAMATTA.

PARAM'ETER (from Gk. παρά, *para*, beside, beyond + μέτρον, *metron*, measure). As commonly used in mathematics, any constant quantity, that is, a quantity fixed in value, entering into an equation. In analytic geometry it is used either as a constant or as a variable. Thus, the line in a conic section called by the ancient geometers *latus erectum*, and later *latus rectum*, and now the parameter, is a constant for any given curve, but a variable quantity for a family of curves of that type. E.g. in the equation of a parabola (q.v.) $y^2 = 2px$, where p is the parameter, p remains constant, while x and y vary so as to generate the curve. But if p be given a new value, while x and y pass again through the same cycle of values, a new parabola will be formed; and by repeating the process any number of curves may be generated which are said to belong to the same family. The method of variation of parameters is an important one in the treatment of differential equations. The name parameter is due to Mydorge (1585-1647).

PARAMUSHIR, pār'rā-mōō-shēr', or **PARAMUSHIRI**. The largest of the Kurile Islands (q.v.).

PARANÁ, pār'rā-nā'. The largest river of South America after the Amazon, and one of the great rivers of the world. It is formed by the confluence of the Parahyba and the Rio Grande

in Southern Brazil at the common boundary point of the States of Matto Grosso, Minas Geraes, and São Paulo (Map: Brazil, F 9). The Parahyba rises on the Serra dos Vertientes and flows southward on the boundary between Minas Geraes and Goyaz. The Rio Grande, which is the longer of the headstreams, and may be regarded as the true upper course of the ParanÁ, rises on the Serra da Mantiqueira in the Coast Range, 60 miles from the Atlantic Ocean near Rio de Janeiro. It flows northwest and westward to the confluence, whence the ParanÁ proper takes a southwest course through Brazil, then south on the boundary between Brazil and Paraguay, whence it curves westward between Paraguay and Argentina until it receives its largest tributary, the Paraguay River (q.v.). From this point the lower ParanÁ flows southwest through Argentina as far as Rosario, where it finally turns to the southeast, and enters the Atlantic Ocean through the Plata estuary, at the head of which it is joined by the Uruguay River (q.v.). The total length of the ParanÁ River from the ocean to the source of the Rio Grande is 2950 miles, and excluding the Plata 2720 miles. The length of the lower ParanÁ from the Paraguay confluence is 850 miles, and with the Plata 1080 miles. The ParanÁ is thus longer than the Mississippi proper, and the drainage area of the system is nearly equal to that of the Mississippi.

In its upper course the ParanÁ flows over the great Brazilian plateau, and most of its upper tributaries, including the two headstreams, are obstructed by falls and rapids as they descend over the successive escarpments of the higher plateaus. The main river itself has the fall of Urupunga a short distance below the confluence of the headstreams. Below this point, however, it is navigable for 600 miles over the level surface of the plateau as far as the boundary of Paraguay. Here it descends over the final great escarpment in the Falls of Guayrá, in which the river plunges through numerous rocky clefts with a total fall of 70 feet. From this point to within 150 miles of the Paraguay confluence the stream rushes through a deep gorge over a series of rocky shallows and rapids. Here the banks are heavily forested, and most of the tributaries fall into the river by cataracts, of which the Victoria Falls of the Iguassú are said to rival Niagara in height and grandeur. Below the gorge and the Paraguay confluence the river flows unobstructed through the Pampas plains, and for the last 1000 miles of its course, including the Plata, is navigable at all seasons by large vessels, while transatlantic steamers go directly to Rosario, 400 miles from the ocean. It is 3000 yards wide at Corrientes, near the Paraguay confluence, and 7000 yards wide at Diamante. It reaches its greatest volume at Corrientes, and loses considerably by evaporation in its lower course, since it here receives scarcely any permanent tributaries except the Salado (q.v.). Several hundred miles above the estuary it begins to divide into parallel channels, inclosing a long island, and has a total width of 25 to 30 miles, while some of the channels are two miles wide. The delta proper begins 100 miles from the estuary, and consists of a vast network of channels and backwaters, emptying by 14 mouths into the Plata estuary. The main channel is accessible to the largest vessels even at low water, but all the channels are constantly and

rapidly shifting, calling for great caution in their navigation. For the description of the river below the delta, see PLATA, RIO DE LA. The Paraná was first ascended as far as the Paraguay confluence in 1526 by Sebastian Cabot.

PARANÁ. A southeastern State of Brazil, bounded by the Atlantic Ocean on the east, the State of São Paulo on the north, Paraguay and Matto Grosso on the west, and Argentina and Santa Catharina on the south (Map: Brazil, G 8). Area 85,430 square miles. The low strip of coastland is followed by a mountain range reaching an altitude of nearly 5000 feet and passing into an elevated plateau lying about 3000 feet above the sea. The portion along the western frontier slopes toward the Paraná River, whose tributaries are the chief rivers of the State. Most of them, however, are unfit for navigation, owing to rapids. The climate is generally healthful in the elevated portions, but very hot and humid on the coast. Forests cover a large part of the State, especially in the western half, which is almost unknown, and inhabited by roving Indians. On the coast are cultivated cotton, coffee, and manioc, and in the more elevated regions grain and fruits are raised, but the mate industry is the most important, and mate is almost the only export. The population of the State in 1890 was 249,491, consisting to a great extent of German and Polish immigrants. Capital, Curitiba (q.v.). Consult Lange, *Süd-brasilien* (2d ed., Berlin, 1885).

PARANÁ (formerly *Bajada del Paraná*). The capital of the Province of Entre Rios, Argentina, situated on a high bluff on the Paraná River, 370 miles from its mouth and opposite the city of Santa Fé (Map: Argentina, E 10). It is a well-built town with straight streets, good public buildings, a normal school, and a national college. It has an important inter-provincial trade, has daily steamship connection with Santa Fé, and is a station for all steamers ascending the Paraná River. Population, in 1898, estimated at 24,000. From 1852 to 1861 Paraná was the capital of the Argentine Republic.

PARANAGUÁ, pã'rá-ná-gwã'. The chief seaport of the State of Paraná, Brazil, situated on the Bay of Paranaguá, 400 miles southwest of Rio de Janeiro. A regular steamship line connects the port directly with Hamberg, and it exports woods, mate, sugar, and cereals. Population about 6000.

PARANAHYBA, pã'rá-ná-é'ba, or **PARNAHYBA**, pãr'ná-é'ba. One of the headstreams of the Paraná (q.v.).

PARANAHYBA, or **PARNAHYBA**. A river of Northeastern Brazil. It rises in the Serra das Mangabeiras on the northern boundary of the State of Goyaz, flows northeast for 800 miles between the States of Piauí and Maranhão, and empties into the Atlantic Ocean at the town of Paranaíba (Map: Brazil, J 4). It is navigable for small steamers through nearly half its length.

PARANAHYBA, or **PARNAHYBA**. A seaport in the State of Piauí, Northeastern Brazil, near the mouth of the river of the same name (Map: Brazil, J 4). It is the commercial centre of Piauí, being the only harbor in the State, and the outlet for its agricultural and

cattle products. Population, in 1898, about 11,000.

PAR'ANOI'A (Neo-Lat., from Gk. παράνοια, madness, from παρανοεῖν, *paranoein*, to be deranged, from παρά, *para*, beside, beyond + νοεῖν, *noein*, to think). A chronic form of insanity in which for many years the intellect of the patient remains unimpaired, though dominated by a systematized delusion. There is almost invariably present an acquired or transmitted neuro-degenerative taint, though an attack may be based on a sudden or severe injury to the nervous system. It may follow a severe fever or an injury to the head. It may equally well be caused by great emotional strain or a constantly harassing thought.

Paranoiacs usually present somatic evidences of degeneration, such as a deformed or asymmetrical skull, badly developed teeth, strabismus, atrophy of one side of the body, and differences in size of hands or feet. In several cases examined by Spitzka anomalies of the cerebrum were found.

Mild forms of paranoia are presented by persons who exhibit perverse acts, morbid ideas, persistence in absurd notions, and who are commonly called 'cranks.' These persons become imbued with an idea and are dominated by it, and talk constantly of it. They are suspicious, consider themselves slighted or the subject of remark. They think they are neglected or martyred, fancy there is a combination against them, and are frequently melancholic. These patients are able to carry on a business or practice a profession.

The variety of paranoia demanding more attention is the ordinary type of chronic delusional lunatic who was eccentric in childhood and hypochondriac in his youth, and is excessively egotistical, whose failures are considered to be due to conspiracy, who betrays delusions of persecution and hallucinations of sight and hearing. The usual delusion of persecution may be replaced by systematized delusions of erotic, religious, or patriotic nature. The paranoiac is usually homicidal, either because of mandatory hallucinations or of persecutory delusions. Early moral control may do much for mild cases, even aborting the psychosis. The regularity of life in asylums, with their discipline, recreations, and employment, is often beneficial. Consult: Séglas, "Paranoia," translated by Noyes, in *Journal of Nervous and Mental Diseases* (New York, 1888); Ferris, "Clinical Notes on a Case of Paranoia," in *Philadelphia Medical Journal* (Philadelphia, May 26, 1900).

PARAPET. See FORTIFICATION.

PARAPH (OF., Fr. *paraphe*, *paraphe*, It. *parafo*, *paragrafo*, from ML. *paragraphus*, from Gk. παράγραφος, marginal line, from παραγράφειν, *paragraphein*, to write beside, from παρά, *para*, beside, beyond + γράφειν, *graphein*, to write). An addition to the signature formed by a flourish of the pen, which, during the Middle Ages, constituted some sort of provision against a forgery. Its use is not altogether extinct in diplomacy, and in Spain the paraph is still a usual part of a signature.

PARAPHERNALIA (ML. nom. pl., from Lat. *parapherna*, from Gk. παράφερνα, property of a bride above her dower, from παρά, *para*, beside, beyond + φέρνῃ, *phernē*, dower, from φέρω, *phero*,

phœrēn, to bear). Articles of wearing apparel and ornament suitable to a wife's station in life, and which were given to or acquired by her either before or during marriage. Both the Roman and civil law recognized a special property in the wife, as to her necessary articles of clothing and ornament, and the name and idea were adopted from the above systems into the English law. By the common law the wife's paraphernalia, except articles of absolutely necessary clothing, belonged to the husband during his lifetime and he could dispose of them at his discretion, but on his death the wife could hold them against the heirs and legatees, although not as against creditors. The husband, however, could not dispose of her paraphernalia by will.

No exact list of articles which may be included under the term paraphernalia can be given, as the rules vary in different jurisdictions. In general, it may be said that the clothing and ornaments must be such as would ordinarily be possessed by a woman in her station in life, and that jewels, etc., given by the husband in excess of his means will not be included. See HUSBAND AND WIFE; SEPARATE PROPERTY ACTS. Consult the authorities referred to under HUSBAND AND WIFE.

PARAPHRASE (Lat. *paraphrasis*, from Gk. *παραφρασις*, from *παραφράζειν*, *paraphrazein*, to repeat a statement in different words, from *παρά*, *para*, beside, beyond + *φράζειν*, *phrazein*, to say). In music, a free arrangement of a composition for some other instrument or instruments. Bülow's arrangement of *Tristan und Isolde* is merely a transcription, because he puts nothing into the piano score that Wagner has not written in the orchestral score. Liszt's arrangement of the Love-Death is more a paraphrase, because he uses rhythmic figures of his own invention. Also he begins with the motive of the Curse, which in Wagner's score does not precede the opening of the Death song. Liszt's transcriptions of the songs of Schubert, Schumann, and others are excellent examples of paraphrases.

PARAPHYSES, *pär-äf'i-sēz* (from Gk. *παράφυσις*, *paraphysis*, offshoot, from *παράφειν*, *paraphyein*, to produce offshoots, from *παρά*, *para*, beside + *φύειν*, *phyein*, to grow). Outgrowths, usually filamentous in form, which are associated with reproductive organs, either sexual or asexual. Among the fungi paraphyses occur in connection with the spore-bearing organs in the formation of hymenial layers, as in *Ascobolus*, black knot (*Sphæria morbosæ*), etc. The best known use of the term, however, is in connection with the mosses, in which the groups of sex-organs, especially the antheridia, are often intermingled with hair-like paraphyses. See MUSC.

PAR'APLE'GIA. See PARALYSIS.

PARASOL FUNGUS. See MUSHROOM.

PAR'ASANG (Lat. *parasanga*, from Gk. *παρασάγγης*, *parasangēs*, from Pers. *farsang*, *parasang*). A lineal measure still used by the Persians, and often alluded to by the Greeks. The estimate of its length given by Herodotus, Suidas, Hesychius, and Xenophon, and concurred in by modern travelers, is equivalent to about 30 Greek *stadia*, or 3¾ English miles. The word is thought to be derived from *seng* (Persian, 'a stone'), and *para* (Sanskrit, 'end'), in allusion

to milestones. Byzantine writers reckoned it at 21 *stadia*; Strabo reckoned it at 30, 40, and even 60 *stadia*. Persian authorities are divided.

PARĀŚARA, *pā-rā'shā-rā*. A Hindu sage, reputed to be the author of some of the hymns of the Rig-Veda, where he is once mentioned (vii. 18, 21) as a friend of Indra. He is said to have been the son of Vasishtha, or, according to the more usual account, of Vasishtha's son, Śakti. The story runs that King Kalmasha-pada once met Śakti in a narrow path in a thicket, and ordered him out of the way. The sage refused, whereat the King lashed him with his whip, and Śakti cursed him to become a rakshasa, or demon. In this transformation Kalmashapada killed and ate Śakti, together with the other sons of Vasishtha. Śakti, however, had left his wife, Adrishyanti, pregnant, and she gave birth to Parāśara, who was brought up by his grandfather. When he grew up, and was informed how his father died, he instituted a sacrifice for the destruction of all the Rakshasas, but was dissuaded from its completion by Vasishtha and other sages. This legend is later expanded, so that, as a reward for his forbearance, Parāśara is said to have been the compiler of the *Viṣṇu-purāṇa*. (See PURĀṆAS.) There is also attributed to him a law-code, the *Parāśara-smṛti*, and a subpurana, the *Parāśara-purāṇa*, which, like some late works, ascribed to Parāśara, may have been composed by historical personages bearing this name. The legendary Parāśara is said to have been the father of Vyasa (q.v.) by an intrigue with the Princess Satyawati.

PARASELENÆ. See HALO.

PARASITE (Lat. *parasitus*, from Gk. *παράσιτος*, one who eats at another's table, guest, parasite, from *παρά*, *para*, beside, beyond + *σιτος*, *sitos*, food), **ANIMAL**. Animals that feed on the fluids of other living animals that the latter have elaborated for their own use; also on the juices and even solid matters that they get while feeding in the interior of living plants. It is essential to the idea of parasitism that an injury is done to some other living organism within which, or fastened on to which, the parasite lives; and the organism that supports the parasite is called the 'host.'

Parasites are either 'temporary' or 'stationary.' Temporary parasites are those that seek their host only occasionally or for a short time; they may have different individuals as hosts at different times, as is the case with the leech and bed-bug. Stationary parasites are those whose parasitic life continues for a long time, perhaps as long as life, e.g. the tapeworm. Parasites may also be classified as 'ectoparasitic' or 'endoparasitic.' Ectoparasites live chiefly on the skin and are either temporary, as in the case of the mosquito, or stationary, as in the case of the itch-mite. Endoparasites live chiefly in the alimentary tract or some other intestinal organ, and are stationary.

ORIGIN OF PARASITIC LIFE. A knowledge of this subject can best be gained by a study of certain groups where all gradations occur from free-living to parasitic forms. The first example may be taken from the group Copepoda. Many of these small crustacea swim free in the sea and in ponds. They feed on all sorts of organic debris. One species, *Argulus*, travels

TABLE OF PRINCIPAL PARASITIC ANIMALS

GROUP	Species	Host	Remarks
PROTOZOA			
<i>Rhizopoda</i>	Some Amœbæ are parasitic.	Alimentary tract of man, mammals, insects.	Behavior in the body like pathogenic bacteria.
<i>Sporozoa</i>	All are parasitic.		
<i>Infusoria</i>	Numerous parasitic forms, e.g.: Balantidium coli. Trichodinæ. Opalina. Holophyra multifida. Ancistrum. Anoplophrya.	Colon of man. On gills and gill-cavity of frog. Bladder and gut of frog. Surface of fish. Mantle cavity of mussels. Intestine of various marine invertebrates.	
PORIFERA (Sponges)	No true parasites.		Cliona borea in shells of lamellibranchs.
CÉLÉNTÉRATA	A very few species: Polypodium hydriforme parasitic at one stage. Cunina, a medusa. Edwardia, an actinian. Pemmatodiscus socialis. Gastrodes, a ctenophore.	Immature ova of sturgeon (Us-sow). In other medusæ. In Ctenophora. On Rhizostoma (Monticelli, 1898). In Salpa.	
SCOLECIDA			
<i>Turbellaria</i>	A few Rhabdocœla: Graffilia muriceola. Pecania erythrocephala.	In kidney of the gastropod Murex. In gut of crab (Carcinus menas).	Called 'monogenetic.' Called 'digenetic.' Two hosts required for complete development. Complicated life history, frequently with alternation of generations.
<i>Trematoda</i> (Liver flukes)	All parasitic: Two cases. 1. Only one host; young like adult, ectoparasites. 2. Two hosts; endoparasites.	On or in gut and bladder of aquatic animals. The asexual generation in Mollusca; the sexual, usually in gut of some vertebrate. Adults in various vertebrates; young stages also in invertebrates.	
<i>Cestoda</i> (Tapeworms)	All parasitic, with or without alternation of generation.	Plants and animals, chiefly vertebrates.	
<i>Nematoda</i> (Roundworms)	Mostly parasitic.		
<i>Acanthocephala</i>	Four genera, all parasites.	Rarely in man; the young live chiefly in arthropods; the adults in vertebrates, especially fish intestines.	
<i>Nemertinea</i>	Rarely parasitic. Malacobdella.	In lamellibranchs.	Marine form much modified.
<i>Rotifera</i>	Various species; order Plolima. Order Sesonacem.	On or in fresh-water Oligochaeta. On the crustacean Nebalia.	
POLYZOA	None parasitic.		Imbedded in skin, often forming tumors.
MOLLUSCA <i>Gastropoda</i>	Eulima, Stylifer, Thyca.	Holothuria, star-fishes, echinoids.	
ECHINODERMATA	Entoconcha mirabilis. Entocholax, Entovalva. Sistrum.	Inside of Synaptidæ (Holothuroidæ). Certain corals.	Attached to blood-vessels or muscles.
ANNELIDA <i>Chætopoda</i> (Sand-worms)	No parasitic species.		
	Labrorostratus and Hemato- cleptes (Eunicidæ).	In the body cavity of other chætopoda.	Temporary parasites, some leeches are carnivorous.
	Some species of Polynœæ. Species of Mysostomidæ.	In other invertebrates, as eri-noids, on which galls are formed.	
<i>Hirudinea</i> (Leeches)	Most species are ectoparasites.	Mollusca, vertebrates.	
CRUSTACEA	Many Copepoda, e.g.: Argulus. Caligus. Lernæonema. Some Cirripedia, especially Sac-culina. A few Amphipoda, e.g.: Cyamus. Hyperia. Many Isopoda, e.g.: Anceus. Bopyridæ. Cymothoidæ.	Surface of fishes. On gills of fishes. In flesh of fishes. Crabs; beneath abdomen. Skin of whales. In the jelly of large medusæ. On the fish Cottus. On the gills of Crustacea. On fishes.	Reduced to mere sacs.
	Many plant parasites. Certain groups of animal para-sites, e.g.: Mallophaga (bird-lice) Pediculidæ (lice).	Birds and mammals.	
INSECTA (Insecta)	Membranacel (bed-bugs). Strepsiptera. Aphaniptera (fleas). Pupipara (sheep-lice). Culicidæ (mosquitoes) and many other Diptera. Chalcididæ. Ichneumon flies.	Warm-blooded vertebrates. Bees and wasps. Birds and mammals. Birds, mammals, and bees. Warm-blooded vertebrates. Other insects.	Ectoparasites. on feathers and hairs. Temporary ectopara-sites. Ectoparasites. Stationary ectopara-sites. Ectoparasites. Active in the larval stage.

GROUP	Species	Host	Remarks
ARACHNIDA (Spiders)	Many parasites among Acarina (mites) <i>Demodex folliculorum</i> ; <i>Pentastomum</i> .	Mammals, birds, and insects. Itch-mite of man; of young hare, cat, ox; of adult dog, wolf, horse. Bore into the body cavity of fishes.	A greatly modified arthropod. The only parasitic vertebrates.
VERTEBRATA.....	Myxiniidæ (hag-fishes).		

about on the surface of the body of fish and feeds on their slime. Another genus, *Caligus*, has taken a further step; it has migrated under the gill-cover of a fish and has attached itself to the gills, receiving food from the blood flowing through them. It is doubtless harmful; it is a true external parasite. Finally other Copepoda, e.g. *Lernæonema*, have penetrated between the scales and are found imbedded deep in the muscles of menhaden (q.v.) and other marine fishes; it lives entirely on the juices elaborated by them, and is a complete internal parasite. We see in this case how living or waste organic matter permits by easy gradations of living on and in living organisms.

The nematode worms are chiefly parasitic. Some of the *Anguillulidæ*, or vinegar eels, however, live in organic fluids. The *Ascaridæ*, or stomach worms, live for the most part in the organic fluid contents of the intestine, which they still have to digest somewhat, so that they are on the line between messmates (see COMMENSALISM) and true parasites. They are, however, in great danger of being indubitable parasites, and this is the fate that befalls some of their kindred; e.g. *Trichina spiralis*. (See TRICHINA.) *Anguillula*, *Ascaris*, and *Trachina* show how parasitism has arisen in a group that originally had come to live on organic fluids, and especially how those animals that live on the surface of other animals, devouring their excretions (or waste fluids), will easily come to penetrate into the flesh, devouring the vital secretions (or functional fluids). They will pass from scavengers to parasites.

The question why animals which are in a position to become parasites often do become parasites is not difficult to answer. Parasitic life brings great advantages to the parasite. First, it affords an abundant food supply; second, it diminishes the chance of direct attack from other organisms. The great disadvantage of abject parasitism is this, that the parasite is restricted in its environment, and since the body that it inhabits is mortal, it must make special provision for the continuation of the species. In mammals the capacity of infecting the embryo while attached to the mother, would be of great service in insuring this continuity, and a certain threadworm of the dog (*Flava immitis*) has been found to be transmissible from parent to fœtus, as seems to occur in few species. Most parasites depend either upon the flesh of the host being eaten by a second host, or else the young are discharged, encapsuled (to protect them from desiccation or other untoward conditions), and take their chances of being picked up by a suitable host. To increase the chances of the continuity of life from one individual to the next, the fertility of parasites has become extraordinary. Indeed, in the group of copepods, where the embryos are carried in external pouches, one may see how the parasitism becomes more complete as the embryo pouches become larger.

Van Beneden states that a single nematode produces 60,000,000 ova. The rich food supply of the parent makes this great fertility possible. In extreme cases the parasite becomes little but an egg-sac. To increase the fertility still more, fission, in the case of cestodes at least, has been added; so that the number of fertile individuals is increased. Since a species is little likely to devour the flesh of its own kind, many parasites may pass successively into two hosts, e.g. the pig and the rat. This has given rise in some cases to an obligatory alternation of hosts.

The adaptations in structures of parasites are striking. First, temporary parasites must move over the body of their hosts or go from one host to another. Hence (1) sense organs are developed to direct them in their migrations, and they are provided with locomotor apparatus, e.g. the springing legs of the flea; (2) stationary parasites gain apparatus for holding on, as suckers in cestodes and nematodes, and hooks in mites and copepods. Certain cestodes have both suckers and hooks; in still other cases, as in the degenerate cirriped *Saculina*, roots or hold-fasts are developed, which also serve as imbibitory tubes; (3) endoparasites lose their locomotor organs, for large legs would be a disadvantage to burrowing parasites, such as *Demodex*, among mites, or unnecessary, as in the copepod *Caligus*; (4) endoparasites lose also their sense organs, because no longer useful, as is the case in parasitic Copepoda; (5) the alimentary tract becomes degenerate in extreme forms, because food is gained by osmosis through the body wall (e.g. cestodes). In less extreme cases the alimentary tract is simplified on account of the absence of necessity for digestive apparatus.

ECONOMICAL CONSIDERATIONS. The number of animal parasites harbored by one host may be enormous. Thus, in a young horse Krause found 500 *Ascaris*, 190 *Oxyuris*, several millions of *Strongylus*, 214 *Sclerostomum*, 287 *Filaria*, 69 *Tænia* adult and 9 immature. The destruction wrought by these parasites is sometimes very great. It is estimated that half a million pullets die yearly in England from 'gapes,' caused by a threadworm (*Syngamus trachealis*). England in 1880 was estimated to be losing about 1,000,000 sheep annually from liver-flukes. Fortunately, the United States has been visited by no such scourges, but scores of cattle regularly die of the liver-fluke in this country. The United States Bureau of Animal Industry makes official investigations into epidemics of parasites among the higher animals.

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PARASITE, PLANT. The plant kingdom presents abundant illustrations of parasitism, from the lowly bacteria to such complicated flowering plants as the mistletoe and dodder. A member of the immense group of fungi must always be either a saprophyte (q.v.) or a parasite,



FIG. 1. DODDER (*Cuscuta*) PARASITIC ON A HOP STEM.

and some entire groups have adopted the latter habit, the most disastrous of the plant diseases being due to fungous parasites. The potato rot and grapevine mildew are caused by members of the Peronosporales. (See PHYCOMYCETES.) The Ustilaginales (q.v.) are responsible for smut, and the Uredinales (q.v.) for rusts. Some of the leaf-curls are caused by an Ascomycete, and certain important blights and wilts by Bacteria. Some very characteristic diseases of insects are the result of fungous parasites from among the Phycomycetes (q.v.) and Ascomycetes (q.v.). The adaptations developed by many of these parasites to adjust themselves to their hosts are remarkable, and lead to some very complex life histories. A life of parasitism appears to result in sexual degeneration (see FUNGI), so that, associated with remarkable specialization of vegetative regions, there is in a number of groups the entire loss of sexuality. There are also some remarkable parasites among the flowering plants, the dodder (Fig. 1) being an extreme example of complete dependence upon its host, the root disappearing, the leaves being mere scales, and the flowers much reduced. Other plants have well-developed green leaves, and yet always grow with their roots or other parts connected with some host which supplies certain of their wants. Among these may be mentioned the mistletoe (*Viscum*), *Euphrasia*, and *Pedicularis*, the first-named probably depending upon its host for almost all the water that comes to it. Parasites establish relations with their hosts generally by sucker-like structures, called haustoria (q.v.), or, as in the fungi, through delicate processes which pierce the cell walls (Fig. 2). See also SYMBIOSIS.

PARASITIC DISEASES. An important subdivision in the classification of disease. (See NOSOLOGY.) In these diseases certain morbid conditions are induced by the presence and vital

activities of various low forms of animal or vegetable life, which have found lodgment and subsistence in some tissue or organ, or upon some surface of the body of man or animals. Even plants are not exempt from disorders of this nature. See PARASITE, PLANT.

The vegetable microorganisms which cause disease are far more numerous and important than the animal, but are as yet less perfectly understood. They may be divided into three classes: (1) the *Blastomycetes* or yeast fungi; (2) the *Hyphomycetes*, or molds; and (3) the *Schizomycetes* or bacteria.

(1) The yeasts are important only as causes of fermentation. One member of the family, however, is pathogenic, and grows upon the mucous membrane of the mouth and throat. This is the *Oidium albicans*, and the disease it gives rise to is called thrush (q.v.). Yeasts are common in the stomach, being introduced with the food, and are found in diabetic urine.

(2) The pathogenic molds are found upon the surface of the body, since they require free oxygen for their growth. They are responsible for many skin diseases. *Favus* (q.v.) is caused by the *Anchorion Schönleinii*. *Pityriasis versicolor*, also called *chloasma*, is caused by the *Microsporon furfur*. *Actinomycosis* (q.v.) is due to infection by the ray fungus (*actinomyces*). *Madura foot* is a serious disease, occurring in the feet of natives of India, and was shown in 1861 by Carter to be due to a fungus—*Chionyphe Carteri*.

(3) The *Schizomycetes* or Bacteria are by far the most important and interesting of the vegetable parasites. They penetrate every tissue of the body and are known to be the cause of most of the specific febrile diseases, and are suspected to be the cause of others. The study of these organisms has almost reached the dignity of a separate science. See BACTERIA.

PARATOLOID. See TUBERCULINE.

PARAY-LE-MONIAL, pâ'rá'-le-mô'nyál'. A town in the Department of Saône-et-Loire, France, on the Bourbonne, 32 miles northwest of Macon (Map: France, L 5). Its Benedictine abbey, founded in 973, contains the tomb of Marguerite Marie Alacoque (q.v.). The revelations said to have been made to her here greatly stimulated the devotion to the Sacred Heart of Jesus (see SACRED HEART, DEVOTION TO), which has been so marked a feature of Roman Catholicism in the last two centuries. Paray-le-Monial has consequently become a popular pilgrimage centre, and large numbers, even from America, visit it annually. Population, in 1901, 4362. For an account of the apparitions, consult Bougand, *Histoire de la bienheureuse Marguerite Marie* (Paris, 1894).

PARCÆ (Lat., fates; connected with *parere*, to bring forth, hence originally *Parca*, a goddess of childbirth; later associated by popular etymology with *pars*, part, identified with the Gk. *Moira*, *Moirā*, and then tripled into three *Parcæ* to correspond to the three *Moirai*, or Fates). The name given by the Roman poets to the Greek *Moiræ*, or goddesses of fate. They have no place in Roman worship, though the name appears in Gallic territory applied to Celtic divinities, who are also called *Fati* (masculine) or *Fatæ* (feminine). In the poets they



FIG. 2. DIAGRAM OF FUNGUS PARASITIC IN THE TISSUE OF THE HOST PLANT AND FORMING SPORES ABOVE THE SURFACE.

AMERICAN PARASITIC PLANTS



1 BROOM-RAPE - APHYLLON UNIFLORA
2 CANCER-ROOT - COGNOPHUS AMERICANA
3 DODDER - CUSCUTA GRONOVII

4 MISTLETOE - RHODODENDRON FLAVESCENS
5 CLOVER BROOM-RAPE - GROBANCHE MINOR
6 BEECH-DROPS - ERIPHOGUS VIRGINIANA

play an important part as spinners of the thread of life. Among the Greeks the conception of the Moiræ is somewhat different. The name in the singular denotes the portion of life allotted to each man at his birth, with the inevitable death at the appointed moment. In Homer Moira is the goddess who allots this portion to man, though it is often hard to tell whether the word is a proper name or a common noun, destiny. Here we find, however, Moira or Aisa as a spinner of a thread of destiny for every man at his birth, or in one place associated with the *Klothes*, or spinners, who work under her direction. From this idea of the spinner of the thread of life developed the conception of two or three goddesses who begin, control, and end this thread, but the Moiræ are only once named in Homer, and their development in the cult is of a later date. In Hesiod they appear as the three daughters of Zeus and Themis—Clotho, the spinner; Lachesis, the assigner of the lot; Atropos, the inflexible, who cuts the thread. They were worshiped in Athens, Corinth, Sicyon, Sparta, Thebes, and elsewhere. They are gloomy, invisible goddesses, who know the future and at times reveal it. Their cult was in some places without images, and their offerings those appropriate to chthonic divinities. To them honors were paid not only in connection with birth and death, but at any important epoch in human life. To a later period belongs the close division of functions between the three sisters, which does not appear in art till Roman times. In the earlier art they are not distinguished as individuals, but are only represented as fully draped female figures of youthful dignity. The so-called Fates of the Parthenon pediment are not certainly identified. Later Clotho is regularly indicated by the spindle, Lachesis with a globe on which she traces the fate or little rods from which she draws the lot of man, and Atropos by a roll or tablet in which she records man's fate, or the sun-dial to which she points. The relation of the Moiræ to the gods is not always clearly defined. In Homer the decree of Moira is in accord with the will of Zeus, and once determined cannot be altered. Later writers, while keeping the connection with Zeus, seem at times to regard the Moiræ as binding even the gods. Later philosophical speculation naturally gave much attention to the Fates, and even in popular belief they held a high place among the gods.

PARCELS. See BAGGAGE; CARRIER, COMMON.

PARCENARY (OF. *parcenerie*, from *parcener*, partner, from ML. *partitionarius*, having a share, from Lat. *partitio*, share, from *pars*, portion). In law, the state or estate of two or more persons, called *parceners*, who hold title to lands that have descended to them as equal heirs, so that though the estate is undivided each has a right to a separate share of it, and, therefore, with no benefit of survivorship. See COPARCENARY.

PARCHE, pār'shā'. One of the small, beautiful coral-fishes or butterfly-fishes (*Chatodon capistratus*) common in West Indian waters. The name 'parche' is sometimes applied to all the butterfly-fishes. See PLATE OF CORAL-FISHES.

PARCHIM, pärk'īm. A town in the Grand Duchy of Mecklenburg-Schwerin, Germany, situated on the Elde, about 20 miles southeast of Schwerin (Map: Germany, D 2). It has a monument to Field-Marshal Von Moltke, a native of

the town, a gymnasium, and manufactures of cloth, chicory, celluloid, etc. Parchim is one of the richest cities of Mecklenburg, owning a good deal of the surrounding land. Population, in 1900, 10,242, chiefly Protestants.

PARCHMENT (OF., Fr. *parchemin*, from Lat. *pergamina*, *pergamena*, from Gk. *περγαμινή*, parchment, from *Περγαμνός*, *Pergamēnos*, relating to Pergamus, from *Πέργαμος*, *Pergamos*, *Πέργαμον*, *Pergamon*, a city of Mysia in Asia Minor, whence parchment was originally brought), and VELLUM (from OF. *velin*, Fr. *vélin*, *vellum*, from ML. *vitulinus*, relating to a calf, from Lat. *vitulus*, calf; connected with Gk. *ἰταλός*, *italos*, Skt. *vatsa*, calf, from *vatsa*, Gk. *ἔτος*, *etos*, year). Parchment is one of the oldest of writing materials, known at least as early as B.C. 500. Herodotus speaks of books written upon skins in his time. Pliny, without good grounds, places the invention as late as B.C. 196, stating that it was made at Pergamum in the reign of Eumenes II., in consequence of Ptolemy of Egypt having prohibited the exportation of papyrus. Possibly the Pergamian invention was an improvement in the preparation of skins, which had certainly been used centuries before. The manufacture rose to great importance in Rome about the first century B.C., and its use spread over all Europe, and retained its preëminence until the invention of paper from rags.

Parchment is prepared from the skins of sheep and goats; vellum, from that of calves, kids, and dead-born lambs; the thick, common kinds, for drums, tamborines, battledores, etc., from those of old goats and in Northern Europe from wolves; and a peculiar kind is made from asses' skins, the surface of which is enameled. It is used for tablets, as black-lead writing can be readily removed from it by moisture. The method of making parchment is at first the same as in dressing skins for leather. The skins are limed in the lime-pit until the hair is easily removed. They are then stretched tightly and equally upon a square wooden frame called a *herse*. The flesh side is dressed as in currying, until a perfectly smooth surface is obtained. It is next ground by rubbing over it a flat piece of pumice stone, previously dressing the flesh side only with powdered chalk, and slaked lime sprinkled over it. It is next allowed to dry, still tightly stretched on the frame. The drying process is an important one and must be rather slowly carried on, for which purpose it must be in the shade. Sometimes these processes have to be repeated several times, in order to insure an excellent quality, and much depends upon the skill with which the pumice stone is used, and also upon the fineness of the pumice itself. Vellum is prepared with the finest pumice. When quite dried the lime and chalk are removed by rubbing with a soft lambskin with the wool on.

PARCHMENT, VEGETABLE, or PARCHMENT PAPER. When pure unsized paper is dipped into a mixture of one part of water and six parts of sulphuric acid, and then washed carefully until every trace of acid is removed, a product is obtained in which the cellulose of the paper has changed into amyloid or hydro-cellulose, which forms a gelatinous coating over the swollen fibres, and acts as a sizing. The parchment-like

paper produced is translucent, and its strength is increased threefold. A long-fibred unfilled paper is preferred for the manufacture of this parchment. A similar product is obtained by treating unsized paper with a solution of ammoniacal cuprous oxide, or zinc chloride. After dipping the paper into the bath it is passed over hot rollers and then cooled and washed in pure water to remove all excess of the solution, after which it is dried in a heated room, given a coat of paraffin oil, and calendered. Such parchments are extensively used for covering the corks of bottles and for similar purposes.

PARDESSUS, pár'de-sú', JEAN MARIE (1772-1853). A distinguished French jurist and publicist, born at Blois, August 11, 1772. He was educated to the law and early became distinguished for learning and eloquence. He was made associate judge in his native city at thirty, and mayor of Blois in 1805. His *Traité des servitudes*, published in 1806, established his reputation as a jurist, and a writer of force and eloquence. It quickly reached eight editions. In 1809 he published *Traité du contrat et des lettres de change*, subsequently published under the title of *Cours de droit commercial*, which was considered the masterpiece of its time. His works on maritime law, *Collection des lois maritimes antérieures au XVIIIème siècle* (6 vols., 1828-45), *Us et coutumes de la mer* (1847), and his *Collection des ordonnances des rois de France*, were equally esteemed. In 1810 a professorship of commercial law was created for him in the law department of the College of France, where his lectures were notable. In 1815-16 and again in 1824-27 he was a member of the Chamber of Deputies. After the Revolution of 1830 he retired from public life. He died at Blois, May 26, 1853.

PARDO, pár'dó, MANUEL (1834-78). A Peruvian statesman, born in Lima. He was educated in Santiago de Chile and in Europe, studied law and political economy, and received a Government position in the Lima Bureau of Statistics in 1853. Five years afterwards he was elected to the board of charities, and, forgetful of self, did much to check the yellow fever epidemic of 1867. In 1862 he founded the first bank in Lima. He entered the Cabinet of President Mariano Prado in 1865, was president of the Tribunal of Commerce in 1868, Mayor of Lima (1869), and President of Peru in 1872-76. He was the first civilian to hold that position, and his decrees in the interests of science, literature, and the public peace caused the people to remember him as a good ruler. He was afterwards president of the Senate. Probably at the instigation of officers who bore Prado ill-will for having reduced the army, he was assassinated in front of the Hall of Congress by a sergeant.

PARDO BAZÁN, bà-thán', EMILIA (1851—). A naturalistic Spanish novelist and critic. She was born at Coruña, September 16, 1851. After her marriage in 1868, she went to Madrid, where she witnessed the revolutionary outbreak of that year. In 1876 she won a prize offered by the municipality of Oviedo for an essay on the Benedictine monk Benito Jerónimo Feijóo, well known in eighteenth-century Spanish literature. Essays published soon afterwards in the *Ciencia Cristiana* showed her an Ultramontane, perhaps a Carlist, but ere long

Señora Pardo Bazán underwent a change, inevitable to a follower of naturalism or of nature. A journey through France, England, and Italy followed. Later she settled at Madrid, where she started her critical review, the *Nuevo Teatro Crítico*. She gained great repute as a leading representative of the naturalistic school of novelists, and as one of the most capable of modern literary critics. To some extent she is a disciple of Zola, whose determinism, however, she condemns, although in her two strongest novels, *Los pazos de Ulloa* and *La madre naturaleza*, in which she describes the decay of an aristocratic family, she is close to those very pornographic methods of Zola that she has stigmatized. But she is no mere imitator, for her realism is Spanish rather than French, and she does not limit her pictures of man and nature to the evil side only, but seeks rather a broad outlook on life. In *El cisne de Vilamorta* the ending is so romantic as to set at naught her naturalistic theories. Her descriptions of the life in her native Galicia are successful. Of her novels there may be mentioned, besides the three noted above, *Pascual López*; *Un viaje de novios*; *La tribuna*; *La dama joven*; *Insolación*; *Morriña*; *Una cristiana*; *La prueba*; *La piedra angular*; and of her essays and critical treatises, *San Francisco de Asís*; *De mi tierra* (1888); *El Padre Luis Coloma*; *Pedro Antonio de Alarcón*; *La revolución y la novela en Rusia* (1887); *La cuestión palpitante* (4th ed. 1891), rhetorical essays dealing with realism and naturalism in the modern novel; *Polémicas y estudios literarios*, a supplement to the matter contained in the *Cuestión palpitante*, embracing also the account of her quarrel with the novelist, Pereda, and a review of some of the works of Galdós, etc. As a critic, Emilia Pardo Bazán is fairly keen in her analysis, tolerably sure in her judgment, and forceful in her language. Consult her *Obras completas* (1891, ff.), and her *Nuevo Teatro Crítico* (1891-93).

PARDOE, pár'dó, JULIA (1806-62). An English author born at Beverley, Yorkshire. Her father was Major Thomas Pardoe. She traveled in Portugal, was with her father for a time at Constantinople, and visited Hungary. Since Lady Mary Montagu, no woman had ever acquired so close a knowledge of Turkish life and manners. In 1859 she was granted a civil list pension of £100. She died in London, November 26, 1862. In her fourteenth year Miss Pardoe published a volume of verse, which went into a second edition. Afterwards she became a popular novelist, writing *Lord Morcar of Hereford* (1829), *The Hungarian Castle* (1842), etc. Her miscellaneous works are descriptions of the lands and peoples she had visited and graceful essays on French history. Among them are: *Traits and Traditions of Portugal* (1833); *Louis XIV. and the Court of France* (1847); *The Court and Reign of Francis I.* (1849; reprinted with memoir 1887); *Life and Memoirs of Marie de Medici* (1852); *The Romance of the Harem* (1839); *The Beauties of the Bosphorus* (1839); *The City of the Magyar* (1840); and *Episodes of French History During the Consulate and the First Empire* (1859).

PARDON (OF., Fr. *pardon*, from ML. *perdonum*, pardon, from *perdonare*, to grant, from Lat. *per*, through + *donare*, to give, from *donum*, gift). An act of grace, exercised by a com-

petent authority, remitting the penalty imposed by law upon a person who is either guilty or accused of a crime or offense against the Government. The earliest records of governments contain instances of the exercise of such a pardoning power by the sovereign authority, relieving an offender from the consequences of a violation of a tribal rule, or later of a national law. The main reasons for vesting the chief executives of modern nations with the wide discretion which they exercise in this regard are to prevent injustice because of the fallibility of human laws, which sometimes work hardship in individual cases, although they may be salutary on the whole; the possibility that a person may be unjustly accused and convicted, which may not be discovered until long afterwards; to make it possible for the supreme authority to release persons convicted and sentenced under laws which are later considered harsh and oppressive, especially political offenders convicted in a time of great public excitement and discord, as during or at the close of a civil war; and to enable the chief executive to reward in this manner repentance and good conduct in prison, where he is satisfied that a thorough reform has been effected, and justice satisfied.

In England this power has always been vested in the King, and in early times seems to have been shared to a certain extent by the Lords of the Marches. In 1536 a statute was enacted (27 Hen. VIII., ch. 24) restricting the right to the King, and prohibiting him from delegating it to any subject within the realm. At present the Crown exercises its prerogative upon the advice of the Secretary of State. Parliament has imposed certain restrictions on the power to pardon from time to time. A pardon cannot be pleaded as a defense to an impeachment by the House of Commons. By the 'Habeas Corpus Act' of 1679, the Crown cannot pardon the offense of sending a person to prison without the realm. Where the pardon of an offense will work an injury against an innocent person, it will only be operative as far as the culprit's liability to punishment by the Crown is concerned, and will not affect his civil liability to a person injured by his crime.

In the United States the power to pardon offenses against the national Government is vested, by the Constitution, in the President. His power is absolute, except as to impeachments of public officers, and rests entirely in his discretion, not being subject to legislative control. Perhaps the greatest number of pardons are granted to soldiers guilty of a breach of the military regulations, especially to volunteers who are unused to rigid military discipline. In most of the States the pardoning power is vested in the Governor alone. Several of the States require the concurrence of one branch of the Legislature, and in a few boards of pardon have been established, of which the Governor is a member *ex officio*. Applications for a pardon are usually presented in the form of petitions, affidavits of responsible people as to the extenuating circumstances of the case, and the previous good character of the convicted person; and formal hearings on such applications are often held. The necessity for the exercise of this power is greatly lessened in some States by statutes allowing a graduated commutation of a term of imprisonment as a reward for repentance and

good conduct in prison. Many penal statutes also allow wide discretion to the trial judge as to sentence to be imposed, in the exercise of which he considers extenuating circumstances, etc., just as a Governor would do on an application for a pardon. The system of releasing prisoners on probation, and suspending sentence of convicted persons, is also a development of the idea of pardon.

Conditional pardons are sometimes granted. For example, a prisoner may be released on condition that he leaves the State forever. On violation of the condition, the ex-prisoner is again remanded to serve out his original term. A general pardon extended to political offenders, such as rebels, is usually called an act of amnesty (q.v.). A pardon is more sweeping in its effect than a reprieve, which only operates as a suspension of sentence. A full pardon effects a remission of the punishment and removes the legal disabilities which follow conviction, so that a person who is pardoned is, in law, as innocent as if he had never committed the crime, except that it does not restore forfeited property or fines. In New York, where a final conviction of murder and sentence of death operate as an absolute divorce of husband and wife, if the convicted spouse is pardoned, the marital relation is not thereby restored. A pardon obtained by deception or fraud is void, and on discovery of this fact the convicted person may be again committed to serve out his term. Consult the authorities referred to under CONSTITUTIONAL LAW; CRIMINAL LAW.

PARDONER'S TALE, THE. In Chaucer's *Canterbury Tales*, the story of three rioters who pledge themselves to find and destroy Death, who, they are informed, is under a certain tree. There they find a treasure. One is sent for food, and poisons the wine, while the others conspire to murder him when he returns. All three are killed.

PARDUBITZ, pār'dū-bīts. A town of Bohemia, Austria, situated at the confluence of the Chrudimka with the Elbe, 12 miles south of Königgrätz (Map: Austria, D 1). It has an old palace, a large Rathaus, and a higher *Realschule*. Its manufactures comprise spirits, agricultural machinery, iron products, musical instruments, etc. Population, in 1890, 12,367; in 1900, 17,029, chiefly Roman Catholic Czechs.

PARÉ, pá'râ', AMBROISE (1517-90). A French surgeon, born at Laval, Department of Mayenne. He was apprenticed to a barber in Paris, studied anatomy and surgery, and in 1536 entered the army as a surgeon. During the military operations in Italy he acquired a great reputation as a skillful surgeon. He introduced the practice of ligating arteries in bleeding wounds, in place of the fashion which then prevailed of cauterizing them with boiling oil. Although he made many other improvements in the art, it is on the ligating arteries that his fame as 'the father of modern surgery' chiefly rests. On his return to Paris in 1539 he was received with distinction by the Royal College of Surgery, and was subsequently made its president. War being renewed, he again entered active service. At this time also he substituted ligatures of the arteries after amputations for cauterization, and many other important improvements in surgery were introduced by him. Returning to Paris, honors

were showered upon him, and though he was ignorant of Latin, the *conditio sine qua non* of a liberal education at that time, learned titles and degrees were conferred upon him.

Paré's writings have exercised a profound influence on the practice of surgery, and particularly in the treatment of gunshot wounds. The first complete edition of Paré's works appeared at Lyons in 1562; the last, edited by Maligne, at Paris in 1840-41. Besides these are eight Latin editions, and more than fifteen translations. His principal work was *Cinq livres de chirurgie* (1562). Consult: Stephen Paget, *Ambroise Paré and His Times* (1897), and the *Life* by Paulmier (Paris, 1884). See SURGERY; and MEDICINE, HISTORY OF.

PAR'EGORIC (Lat. *paregoricus*, from Gk. *παρηγορικός*, *parēgorikos*, soothing, from *παρηγορός*, *parēgoros*, consoling, from *παρά*, *para*, beside + *ἀγορεύειν*, *agoreuein*, to talk in assembly, from *ἀγορά*, *agora*, assembly). The camphorated tincture of opium of the United States pharmacopæia. An alcoholic solution of opium, benzoic acid, camphor, and oil of anise, every fluid ounce containing two grains each of opium, benzoic acid, and camphor, and two minims of oil of anise. This preparation is much used both by the profession and the public. It is an excellent remedy for the chronic winter cough of old people, the opium diminishing the bronchial secretion and the sensibility of the pulmonary mucous membrane, while the benzoic acid and oil of anise act as stimulating expectorants. The volatile oil and camphor render paregoric particularly useful in diarrhœa. The preparation is often improperly given to children by careless or ignorant parents to quiet them and relieve pains in the bowels. Children are peculiarly susceptible to opium, and much harm is done by its regular administration.

PAREIRA BRAVA, pá-rā'rá brā'vá (Port., from Brazilian *pareira*, the native name, and Port. *brava*, brave, strong). The root of *Chondrodendron tomentosum*, used to some extent medicinally as a diuretic, which for a century was supposed to be the root of *Cissampelos Pareira*, but was identified by Hanbury in 1873. The plant is a tall, woody climber, a native of Brazil and Peru, belonging to the order Menispermaceæ. It has large, ovate-cordate, fine-nerved leaves, very small unisexual flowers, and purplish-black, ovoid one-seeded drupaceous fruits, resembling grapes. As it comes to market the root is in short, thick, dark-brown pieces externally ridged and fissured transversely and irregularly furrowed longitudinally. It is nearly inodorous and has a bitter taste. The stem is sometimes found mixed with the root, which it much resembles, but may be distinguished by the pith. The roots of several other menispermaceous plants have been sold for *pareira brava*, among which is a yellow *pareira brava* exported from Brazil, in the form of flat, twisted stems which have been thought to be obtained from *Aristolochia glaucescens*. It may be detected by the eccentric arrangement of its woody zones, which in the genuine are symmetrically concentric. See CISSAMPELOS.

PAREJA, pá-rā'há, JUAN DE (1606-70), called El Esclavo (the slave). A Spanish religious and portrait painter. He was born at Sevilla, the son of Moorish parents, and was

the slave of Velazquez. He accompanied his master to study, all the while secretly studying his art. By an artifice he succeeded in bringing one of his pictures to the attention of Philip IV., while he was visiting Velazquez's studio, who immediately set him free. After his emancipation he continued to serve Velazquez, though enrolled among his pupils, and after the latter's death he served his daughter. His paintings, which include portraits and religious subjects, are quite in the manner of his master. The most notable are: "The Calling of Saint Matthew," in the Prado Museum, Madrid; "Baptism of Christ," Santa Trinidad, Toledo; "Madonna de Guadalupe," in the Recolet Monastery at Madrid; "Capuchin Monk," Saint Petersburg; "Portrait of a Boy," Dulwich.

PARENCHYMA, pār-ēp'kl-mā (Neo-Lat., from Gk. *παρέγχυμα*, tissues of the lungs, liver, kidneys, and spleen). A plant tissue composed of living (usually thin-walled) cells whose three dimensions are approximately equal. Sometimes the term is applied to elongate cells. See HISTOLOGY.

PARENT AND CHILD. Under this head are usually treated the legal relations which exist between father or mother and children. The legal is to be distinguished from the natural relation, for two persons may be by the law of nature parent and child, while they are not legally or legitimately so. Conversely, the legal relation may exist although there is no natural relation. Hence a radical distinction exists between natural or illegitimate and legitimate children, and their respective legal rights with relation to their parents are very different.

EARLY LAW. While the legal relationship between mother and child has always been based on the fact of maternity, that between father and child was originally based, not on the fact of paternity, but on the husband's power over the child's mother. Marriage (q.v.), as we find it at the dawn of European history, was the appropriation of the woman by the man; and as the husband's power was originally not differentiated from other property rights, so the power of the father over children born of the wife was originally indistinguishable from ownership. Wife, children, slaves, and things were equally in the 'hand' (Latin *manus*, German *Mund*) of the head of the house. The father had the power of life and death over the child; he had also the right to sell the child. The marriage of a daughter, which put her in the 'hand' of her husband, and which usually took the form of a sale to the husband, of course carried her out of the father's power, and paternal authority over the son ended, among most of the Indo-European peoples, when the son established a household of his own. The life-long *patria potestas* (q.v.) of the Roman father seems to have been exceptional; it was connected with the Roman custom by which the son brought his wife into his father's house.

Of maternal authority over children, even when illegitimate, there is little trace in early law, because the woman was regularly herself in the 'hand' of father or husband or kinsman during her whole life. In early Frisian law, however, the mother had the same right as the father to kill her new-born child.

The earliest restraints upon the power of the

head of the house were exercised by his kinsmen, and to some extent by those of his wife, and, when the family was recognized as a religious institution, by the priests. These restraints, which at an early period began to lift the wife out of the position of a mere chattel, affected but slightly the position of the child. (For that of the Roman child, see *PATRIA POTESTAS*.) In the old German law (heathen period) the infant was not to be exposed after it had been sprinkled with water and had received its name; nor was a child to be put to death subsequently without cause; nor was a child to be sold except when the parents were in dire need. With the acceptance of Christianity by the Germans, the right of exposure disappeared, but the paternal power of punishment for crime and of sale in case of necessity were not at first affected. As regarded personal property, all that the unmarried daughter or the son living in the paternal house acquired was acquired for the father. As regards property, however, the children's eventual rights were protected; inherited realty of the parents was 'tied up' (*verfangen*) in the interest of the children, and a sale by the father conveyed no perfect title to the purchaser.

MEDIAEVAL LAW. In the course of the Middle Ages the authority of the father assumed more and more the aspect of a natural guardianship. The mother, also, with the disappearance of the rule that women were themselves always under guardianship, acquired a subordinate authority. After the death of the father, or when he was incapable of exercising control over the children, the mother became the natural guardian (at least of the persons) of her children.

The canon law introduced in the mediæval law of parent and child but one important modification, viz. legitimation of children born out of wedlock by subsequent marriage between the parents. This rule was borrowed from the Roman law, but was extended by the Church; at Roman law it applied only to children of a concubine, at canon law it applied to all illegitimate children. When it came, however, to recognizing such children as heritors, the Church encountered obstinate resistance. In many parts of Europe German law held its own, especially as regards the inheritance of entailed estates. The reception of the law-books of Justinian (see *CIVIL LAW*) had little influence upon the European law of parent and child, for the *patria potestas* of the Roman law was not generally received.

MODERN EUROPEAN LAW. In modern European law maternity is purely a question of fact; paternity is based on the presumption that the child born or conceived in wedlock is the husband's child, but proof of the contrary is permitted. The child born out of wedlock, if 'recognized' by the father, or if the fact of paternity be established by judicial inquiry, is entitled to support up to a certain age, and has rights of succession (q.v.) in the paternal estate, but not the same rights which belong to legitimate children. In the French law, however, inquiry into the paternity of the illegitimate child is prohibited, and such a child has no rights against the father unless it has been recognized. The legal relation of the parent and child is regularly established by birth in wedlock, by legitimation, and by adoption. A child born out of wedlock is legitimized by the subsequent marriage of the parents accompanied by recognition of the child;

and in some countries (e.g. in Spain and in Germany) the child may be legitimized by administrative decree issued at the father's request. Adoption (q.v.) is usually permitted only when the adopting parent is childless. Legitimation and adoption generally give parent and child the same rights which pertain to the parent and to the child born in wedlock, but this is not always the case.

The authority of the parent over the person of the child is that of a guardian; i.e. the element of duty is more emphasized than that of power. In the exercise of parental authority the voice of the father is decisive, so that the parental rights of the mother become legally effective only when the father is dead, or when he is unable to exercise his rights or has been deprived of them by a decree of court. The administration of the property of children belongs to the parents (to the father as of right; to the mother, usually, only with the authorization of the family council or the court), and in most of the codes, the parents are not obliged to account for the income, their rights being those of usufructuaries; but where property is given or bequeathed to a child, the donor or testator may exclude this parental usufruct and even the parental administration. The parental usufruct is also excluded as regards money and property acquired by the child's separate labor and industry. In case of divorce or annulment of marriage, the control of the persons and the property of the children is regulated by order of the court. The authority of the widow or divorced wife over her children and her usufructuary rights are, in all civil legislations, impaired by her remarriage; and the German law makes provision for safeguarding the interests of children of the first marriage when the father marries again. Parental authority is extinguished when the child reaches full age or is emancipated. In many legislations, however, parental consent is necessary for the marriage of a child even after the child has reached full age. See *MARRIAGE*.

In all European legislations parents, like other guardians, are subject to the control of the State, exercised through the courts; and they are usually incompetent to alienate real estate belonging to the children without the authorization of the proper court.

The chief duties of parents are the suitable support and education of their children. In many of the civil codes they are also bound to provide daughters with dowries (so at Spanish and German law); but this is not the case at French law, the Code Napoléon following the old maxim, '*ne dote qui ne veut*.' Parents are responsible for debts contracted by their children without their authorization only as a result of the duty of support and education (i.e. they are liable only for necessities). In most legislations they are liable for all torts committed by children; at German law, however, the parent is responsible only when the tort could and should have been prevented by him, i.e. when he has failed to exercise proper surveillance and control.

THE COMMON LAW.

LEGITIMATE CHILDREN. The parents are the legal as well as the natural guardians and protectors of the child. They have the legal right

to name the child and are entitled to his custody. As such custodians, they or persons *in loco parentis* may reasonably chastise the child, but for excessive punishment, amounting to willful or malicious cruelty, the parent may be civilly liable in an action of tort (although in some States this liability has been denied on grounds of policy), or criminally liable for assault, or homicide in case death ensues. At common law the parents could not be deprived of the custody and control of the child by third parties, but by modern legislation officers having supervision over public charities, and in some States private charitable corporations, are authorized to acquire custody of the child, if subjected to cruel or improper treatment by the parents, by means of a properly instituted legal proceeding. At common law, as between the father and mother, in case they were living apart or divorced, the father was deemed to be entitled to the custody of the child, but by the Statute 36 and 37 Vict., c. 12, the mother was entitled to apply to the Court of Chancery for custody of the child, which the court in its discretion might award to her if it appeared to be for the best interests of the child. It is now the practice of courts generally in the United States, even in the absence of statute, to award the custody of the child to the parent best qualified and able to care for and educate the child.

In case of divorce or judicial separation of the parents, even in the absence of statute, courts having jurisdiction over divorce generally have jurisdiction to award custody of the children of the marriage. The right to custody may also be determined in a proper case by *habeas corpus* (q.v.), or in some States upon application to courts of probate or similar courts having statutory jurisdiction over the subject matter. If the parents separate by agreement, no stipulation entered into by them as to the custody of the child will be enforced by the courts if prejudicial to the child.

A parent or one *in loco parentis* is entitled to the services of his child until he comes of age, and if the services are rendered to others, the parent is legally entitled to recover the reasonable value of the child's services unless payment for the services is made to the child with the consent of the parent. As between the father and the mother, the father is entitled to the child's services, but upon the death of the father or upon custody of the child being awarded to the mother, she becomes entitled to the child's services. The right of the parent to take the child's earnings may be waived by his voluntary emancipation of the child. See *EMANCIPATION*.

When a child having regularly rendered services to his parents continues to do so after coming of age, there is a presumption of fact that the services are rendered as a gift, and he will not be allowed to recover for the services thus rendered in the absence of some agreement to that effect.

Parents have no interest in or control over the property of their children, such control being exercised by guardians appointed by courts of chancery or probate, having jurisdiction over the property of infants. (See *GUARDIAN AND WARD*.) Wearing apparel and personal effects, however, purchased by the parent for an infant child remain the property of the parent and subject to his control. Choses in action belonging to the infant might be enforced at common law by

an action brought in the name of the infant by the parent as next friend (*prochein ami*) of the infant; and now by statute generally such actions are prosecuted in the name of the infant by a guardian *ad litem* appointed by the court, who may be but is not necessarily a parent of the litigant.

As the parent is legally entitled to the services of the child, any wrongful act of third persons interfering with this right is a tort, for which such third persons must respond in damages to the parent. Thus a parent may recover all damages suffered by him by reason of loss of services of his child because of personal injuries inflicted upon the child by the negligent conduct of third persons. And in most jurisdictions he may recover also for the medical attendance supplied to the child, although, as will appear, the parent was not bound by the common law to supply the child with necessaries.

Upon similar principles the parent may recover damages for the seduction of an infant daughter. Indeed, by the early law, as well as in some States at the present time, the parent's right to recover for the seduction was based solely upon his right to recover for the loss of his daughter's services. The courts of some States, however, have departed from this rule and permit a recovery, even though the parent has emancipated his daughter and is, therefore, not entitled to her services. See *SEDUCTION*.

As regards the maintenance of the child, it is somewhat singular that according to the common law the parent is under no civil legal duty whatever to support the child. This defect in the law was remedied somewhat when what is known as the 'Poor Law' was enacted by Parliament in the reign of Elizabeth by which some legal duty was imposed upon parents and children to support each other when financially able to do so, or rather to assist the parish authorities in contributing to their support.

This act authorized the parish authorities to enforce the law by appropriate proceedings, and even authorized them to procure a judicial seizure of the parents' property for the use of their children in case of abandonment of the children by the parents. But it did not create obligations such that one who supplies a destitute child with food and clothing has any legal claim against the parent. Similar statutes have been enacted in most of the United States, and in a few States the courts have indicated that the duty of a parent to maintain his child thus created may also be enforced by third persons by an action in the nature of *quasi contract*.

While the parent is not civilly liable to maintain his child, he is criminally responsible if, having undertaken to care for his child, he neglects it and by exposure or failure to provide it with food or clothing, causes the child's injury or death. Parents have been held guilty of manslaughter and even murder when death resulted from negligent or improper care of their children. The English courts have held that a parent who in good faith neglects to provide medical attendance for his child because he did not believe in the use of medicine was not criminally responsible for his neglect. The rule of this decision was promptly corrected by an act of Parliament, and it is probably generally the law in the United States that a parent guilty of gross neglect in

not providing proper medical attendance for his child is criminally responsible.

At common law a parent is not liable for the torts of his child unless their commission is incited or authorized by the parent, in which case the rules for determining his liability are the same as in the law of agency or master and servant.

At common law the child is an heir of the parent (see DESCENT) and is also entitled to a share of the parent's estate under the various statutes of distribution (q.v.). This interest of the child in the parent's property may, however, be defeated by the parent's will, which may dispose of all his property to strangers. In several States it is provided by statute that children of a testator born after the execution of his will and of whom no mention is made in the will shall take the same share in the parent's property which he would have secured had the parent died intestate.

ILLEGITIMATE CHILDREN. In strictness of law an illegitimate child, that is, one born out of wedlock, has no parent, and consequently he has no rights as against his natural parents, and they owe him no corresponding obligation. Natural parents at common law were, therefore, not bound to support their illegitimate child, and in case of their death intestate he acquired no interest in their property as heir or next of kin. The English Poor Law or Bastardy Act, which has been substantially reenacted in most of the United States, has qualified the common-law rule as to the duty of parents to maintain their illegitimate children.

As between the father and mother of the child the English statute makes the following requirements: The father is not bound even by the poor laws to maintain the child, and the parish officers cannot institute any proceedings whatever against him for this purpose; but the mother or the guardian of the child may, to a certain extent, compel him to contribute toward the child's maintenance and education. The first step is to go before a justice of the peace and obtain a summons of affiliation. The father is then cited before the magistrate, and if the mother swears that he is the father of the child, and some material part of her statement is corroborated by a third party, the magistrate may make an order directing the father to pay the expenses of lying in and a weekly sum until the child attains the age of sixteen. The mother may make this application either a few months before the birth, or within twelve months after the birth; and even after that time, provided that she can prove that the putative father paid her some money on account of the child within the twelve months. The putative father in these cases is a competent and compellable witness. The poor laws make the mother liable to maintain the child until it attains the age of sixteen; and not only is she so bound, but any man who marries her is also by statute bound to support all her illegitimate children until they attain that age. As regards the custody of illegitimate children, the mother is the party exclusively entitled, for the father is deemed in point of law not to be related to such child. Yet, if the father has in point of fact obtained the custody of such child, and the child is taken away by fraud, the courts will restore the child to his custody, so as to put him in the same position as before.

The bastardy statutes in the United States in general differ only in minor particulars from the English statute. One important difference, however, is a provision generally adopted authorizing the poor officers or other designated officials to bring bastardy proceedings directly against the putative father without the intervention of the mother. Although the father of an illegitimate child is under no direct positive obligation to support his child, the natural relationship has been held in some States to be a sufficient consideration to support and render enforceable the father's promise or agreement with third persons to pay for the support of the child even if made after the support has been given.

In some States also illegitimate children are by statute made heirs at law of the mother. Such is the law in New York, provided the mother leave no legitimate children. The mother may also inherit from her illegitimate child.

Consult: Field, *Legal Relations of Infants, Parent and Child*, etc. (Rochester, 1888); Ewell, *Cases on Domestic Relations* (Boston, 1891); Fraser, *Treatise on the Law of Scotland Relative to Parent and Child*, etc. (2d ed., Edinburgh, 1886); Eversley, *Law of the Domestic Relations* (London, 1885); Arndts, *Juristische Encyclopädie* (9th ed., Stuttgart, 1895); and the authorities referred to under such titles as DOMESTIC RELATIONS; HUSBAND AND WIFE; MARRIAGE; CONTRACT; DIVORCE; etc.

PARENZO, pá-rén'dzò (Lat. *Parentium*). A town on the west coast of the Crownland of Istria, Austria, situated on a rocky peninsula, connected with the mainland by a narrow strip of land, 35 miles south by west of Trieste (Map: Austria, C 4). It is the seat of the Provincial Assembly and of a Roman Catholic bishopric, and has a good harbor. Its principal building is the cathedral, a basilica of the sixth century containing fine mosaics. There are also ruins of Roman buildings. The inhabitants are engaged principally in fishing, shipbuilding, and trade. Population, in 1900, 9962, mostly Italians. Parenzo was a Roman colony, *Parentium*; became a part of the Venetian Republic in 1267 and remained so until its dissolution. The bishopric of Parenzo was founded about 524 and united with that of Pola in 1827.

PAREPA-ROSA, EUPHROSYNE (1836-74). An English soprano. She was born at Edinburgh and was the daughter of Georgiades de Boyescu, a Wallachian nobleman, and Elizabeth Seguin. She studied under Crescentini, Panzeron, and Bordogni, and made her first appearance as a singer at Malta under the name of Parepa. She made her debut in London in 1857, and in 1863 married Captain Carvell, who died two years later. She then went to America, and appeared at Irving Hall, New York, in 1865. In 1867 she married Carl Rosa, the violinist and operatic manager and conductor, with whom in 1869 she organized an English opera company. She sang at the Boston Peace Jubilee in 1869, and was a member of the Italian opera company at the Khedive's Theatre in Cairo during the winter of 1872-73. Her voice was remarkable for its purity and flexibility, and had a compass of two and one-half octaves. She died in London.

PAR'ESIS (Neo-Lat., from Gk. *πάρεσις*, letting go, paralysis, from *παρῆναι*, *parienai*, to relax, from *παρά*, *para*, beside, beyond + *lénai*,

alienai, to let go, send), GENERAL PARESIS, PAR-ETIC DEMENTIA, DEMENTIA PARALYTICA, GENERAL PARALYSIS OF THE INSANE, popularly but improperly called 'SOFTENING OF THE BRAIN.' "A chronic diffuse encephalitis, presenting mental, motor, vaso-motor, and sensory symptoms, with progressive course and fatal termination" (Starr).

ETIOLOGY. The disease is much more common in males than in females, and occurs especially between the ages of thirty and fifty-five. In but few cases has any hereditary tendency been noted. While in general the disease is said to be more frequent among the lower classes, in this country it is most common among the middle and upper classes. About 80 per cent. of cases give a syphilitic history, and the relation between syphilis and paresis is so intimate that Fournier classes the latter as among 'les affections parasymphilitiques.' Alcoholic and sexual excesses and severe mental or emotional strains may also be mentioned as etiological factors.

PATHOLOGY. The earlier changes consist of congestion of the vessels of the brain and pia mater, exudation of serum into the peri-vascular lymph spaces, and an increase in the nuclei and cellular elements of the walls of the vessels. Following these vascular changes, and probably in a measure dependent upon them, is an increase in the neuroglia or connective tissue of the brain. This neuroglia increase often goes on quite rapidly and determines a corresponding shrinkage and atrophy of the nervous tissue proper. As the process continues there are degenerative changes in the nerve cells and fibres, with pigmentation and the formation of cyst-like cavities. There are usually an increase of fluid in the ventricles and thickening of the ependyma. With the full development of the lesion the brain atrophies, becomes shrunken, weighs less than the normal brain, the convolutions are smaller and the sulci more widely open. These changes affect the whole brain, but are most marked in the frontal and parietal lobes. Accompanying the brain lesions there are often a chronic meningitis and sclerosis of the posterior columns of the cord. Sclerosis of the lateral columns may also occur.

SYMPTOMS. The onset is gradual. It is first noticed by friends that the patient does not seem in his usual frame of mind. He is irritable, either depressed or excitable, is growing inattentive to business, is laying unusual plans and schemes. These are often of great magnitude and involve expense entirely out of proportion to the man's means. The patient feels well, often saying that he never felt better in his life. A marked egotism usually develops. He boasts of his wealth, power, and abilities. Soon he becomes forgetful, careless, inattentive, unable to concentrate his mind upon any definite train of thoughts or to carry on a logical argument. This becomes noticeable in his conversation, which is disconnected. Headache and sleeplessness are common and there is a marked loss in weight and in strength. Even though previously a man of exemplary habits, the patient becomes neglectful of the ordinary proprieties of life, uses bad language, ignores family obligations, loses his temper, and indulges in sexual and alcoholic excesses. This condition lasts from one to three years and passes over gradually into a

fully developed dementia. This condition is marked by an increase in the symptoms above described. Egotism is usually a marked feature and delusions of grandeur are the rule. Instead of exaltation there may be depression and melancholia, or melancholia and elation may alternate. Illusions, delusions, and hallucinations are common, but there are no fixed systematic delusions as is the case in paranoia. The emotions are in a state of unstable equilibrium. The patient is easily moved to laughter or tears. Slight causes produce intense excitement, which may take the form of rage or frenzy, rendering the patient dangerous to his fellows. There is rarely any suicidal tendency. Self-control is weakened, and consequently voluntary actions are weak, irresponsible, and impulsive. Self-consciousness is impaired, the patient failing to appreciate his changed mental condition. He is contented wherever he is, is not concerned about the anxiety of his friends, loss of money or business, or even asylum confinement. Of motor symptoms tremor of the tongue and face muscles appears first. Later almost any motion is attended with trembling. This results in thickness of speech and in clumsiness in the finer coördinate movements, such as writing. These motor symptoms gradually pass over into a paralysis, which becomes increasingly widespread and increasingly complete. There is also marked increase or marked decrease in the reflexes, with less retention of urine and of control of the rectum. Sensory symptoms, anæsthesia and analgesia, are late manifestations. Bed-sores and cystitis are very common. The average duration of the disease is from three to four years. In the early stage of the disease there may be transient paralysis of one arm or one leg. There may be convulsions occurring at intervals of a few days, which may be mistaken for epilepsy. In the last stages convulsions are usual and severe. Death results from exhaustion, frequently from convulsions, or from some intercurrent complication, such as pneumonia, cystitis, or obstruction of the bowels.

TREATMENT. Antisyphilitic treatment may be tried in the early stages. Later the treatment is entirely symptomatic, tonic, sedative in conditions of excitement, while in the later stages confinement in an institution or constant home care is necessary. See INSANITY.

PAR/ET, WILLIAM (1826—). A bishop of the Protestant Episcopal Church. He was born in New York, graduated from Hobart College in 1849, and pursued his theological studies under Bishop De Lancey, by whom he was ordained priest at Grace Church, Rochester, June 28, 1853. He had charges at Clyde, N. Y.; Pierrepont Manor, N. Y.; East Saginaw, Mich., Elmira, N. Y.; Williamsport, Pa.; and Washington, D. C. He was consecrated sixth bishop of Maryland on January 8, 1885. He is the author of canonical digests, and *Saint Peter and the Primacy*, a lecture before the Church Club of New York.

PARGA, pār'gá. A town in the Vilayet of Janina, European Turkey, situated on the shore of the Ionian Sea, opposite the island of Paxos (Map: Balkan Peninsula, C 5). It is built on a steep cliff, surmounted by an almost impregnable citadel, and has a harbor defended by a small island. Parga, founded in the last days of the

Roman Empire, was independent and under the protection of Venice from 1401 to 1797, when it was for a short time governed by the French. In 1814 Ali Pasha, Governor of Albania, besieged it, and the people applied to the English for aid. England took possession of the fortress, but in 1819 handed it over to Ali Pasha, whereupon most of the inhabitants emigrated to the Ionian Islands. The present population is about 5000.

PAR'GASITE (named from *Pargas*, Sweden, where it is found). A name applied to the green and bluish-green varieties of hornblende. Pargasite is usually found in the form of stout lustrous crystals, although sometimes occurring in the granular form. It is distinguished from the common hornblende, which is usually dark-green or black in color.

PAR'GO. A fish—a snapper of the genus *Neomænis*. The familiar red snapper is 'pargo colorado,' called in Havana markets 'pargo guachinango,' or Mexican snapper, because brought from the Mexican coast. The silk snapper is 'pargo de lo alto.'

PARHELIA. See HALO.

PARIA, pá'rê-â, GULF OF. An inlet of the Atlantic Ocean on the coast of Venezuela (Map: Venezuela, E 1). It is 40 miles wide and 100 miles long, and almost completely land-locked, being cut off from the Caribbean Sea by the narrow and rocky Paria Peninsula, while across its mouth lies the island of Trinidad. The gulf communicates with the ocean on either side of the island by the straits known as the Dragon's Mouth in the north and the Serpent's Mouth in the south, each about 10 miles wide. They were thus named by Columbus, who discovered them in 1498, because of the difficulties he found in navigating the strong currents which race through them. The gulf receives the northern arms of the Orinoco delta.

PARIAH, pá'rî-â (from Tamil *pariah*, *pariar*, drummer, from *parai*, drum; so called because they are hereditary drum-beaters). The name applied to aboriginal individuals of low class throughout Southern India, who do not belong to any of the castes of the Brahmanical system. They are shunned even by the lowest Hindus who profess Brahmanism, since the touch of a pariah renders a Brahman impure. Pariahs were formerly compelled to wear a bell to warn Brahmans of their proximity. The pariahs are of Negrito origin, as shown by their short woolly hair, flat nose, thick lips, and short stature. They, like the Hindus, are divided into distinct grades, and imitate their superiors in that the lowest pariah is as careful to preserve his status as the proudest Brahman. In the Tamil country they form a large part of the population, and are employed as agricultural laborers or as servants to Europeans. In station, however, they are superior to other aborigines.

PARIAH DOG. The native cur of Egypt, Persia, and all Oriental countries, regarded merely as an outcast and scavenger. According to Youatt, there are several varieties, viz.: (1) a wild form bred in the jungles and lower ranges of the Himalayas, of a reddish-brown color, with sharp pointed ears; (2) a form in inhabited districts among which turnspits are often found; (3) the Sumatran form, which has the countenance of a fox, eyes oblique, ears rounded, hairy, muzzle foxy brown, tail bushy and pendulous;

(4) the Javanese indigenous dog. Stonebenge describes the pariah dog as a cross between a dhole (q.v.) and any domesticated dog of the neighborhood, and Fitzinger calls it a variant of the sheep-dog. The pariah dogs of Egypt appear to belong to a single race, and, according to Lydekker, are about the size of a sheep-dog, but of a stouter build, with a broader head, the tail being long, generally bushy, and carried close to the ground. The general color of their coarse rough hair is reddish brown, tending in some individuals more decidedly to gray, and in others to yellow. Occasionally black or tawny individuals may be observed. Their ears are short, pointed, and usually erect.

PARIAN CHRONICLE. A marble slab containing the most important inscription among the Arundel Marbles (q.v.).

PA'RIASAU'RUS (Neo-Lat., from Gk. *παρειά*, *parcia*, check + *σαῦρος*, *sauros*, lizard). A remarkable fossil anomodont reptile, of which a few quite complete skeletons have been found in the Permo-Triassic Karoo formation of South Africa. The animal was large, about 10 feet in length, of massive build, with very short stout limbs and a short tail. The skeleton presents a most peculiar squat appearance and in some respects suggests that of the turtles, for which reason this creature has been thought to afford a clue to the origin of the chelonians. There were a few rows of small dermal scales on the back, but no nearer approximation to the carapace of the turtles.

PARI'ETAL BONES. See SKULL.

PARIEU, pá'ryé', MARIE LOUIS PIERRE FÉLIX ESQUIRON DE (1815-93). A French politician and economist, born at Aurillac. He studied at Paris and Strassburg and practiced law at Rouen. In 1848 he was elected to the Constituent Assembly, where he voted with the Moderate Left. From 1849 till 1851 he was Minister of Public Instruction. He joined the Bonapartist Party, and became a member of the Council of State in 1852. In the Ministry of Olivier he was president of the Council of State. He served as Senator from Cantal in 1876, but was defeated in the election of 1885. He was one of the most earnest advocates of a single gold standard in France. His chief works are: *Traité des impôts* (1862-64); *Principes de la science politique* (1870); *La politique monétaire en France et en Allemagne* (1872); and *Histoire de Gustave-Adolphe* (1875).

PARIMA, pá-rê-mâ, SIERRA DE. An isolated mountain system running along the southern boundary of Venezuela and Guiana, and forming part of the divide between the Orinoco and the Amazon (Map: Brazil, E 3). Though the name Parima is commonly extended to the whole system, the eastern range is also known as the Sierra Pacaraima. It forms a vast turtle-back plateau consisting of a granite core underlying Old Sandstone strata. This plateau is crossed in various directions by short ridges, and falls, especially toward the Amazon valley, by several steep escarpments. The higher ridges are generally barren rocks, but the plains intervening between the successive escarpments are covered with grass or forests. The system is neither as high nor as sharply defined as the northern mountains of Venezuela. The highest points are Mount Maraguaca, 8230 feet, and Mount Duida,

8120 feet. The latter is a conspicuous landmark, situated near the point of bifurcation of the Orinoco and the Cassiquiare.

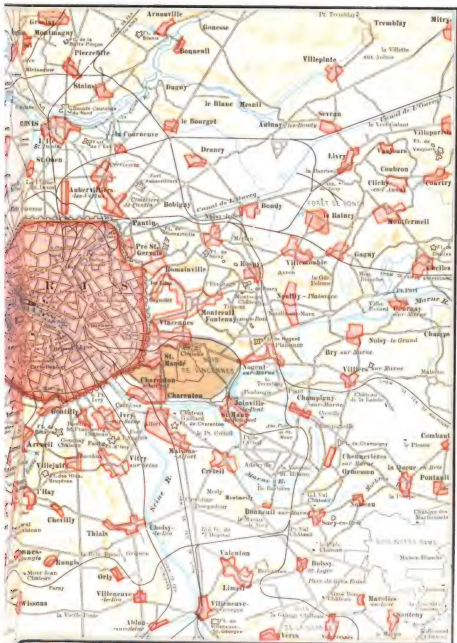
PARINI, pà-réné, GIUSEPPE (1729-99). An Italian poet, born at Bosio, May 23, 1729. After the appearance of his first verses he was made a member of the Accademia dei Trasformati, and he was admitted into a branch of the Arcadia. He became a priest in 1754. From 1773 on he taught the principles of fine arts at the Brera in Milan. To Bonaparte he owed a temporary office in the government of Milan. He died at Milan, August 15, 1799. His more important works are the descriptive poem *Il Giorno* and the *Odi* or *Odes*. The *Odi*, some twenty-one in number, were composed between 1757 and 1795, and, like most of his earlier poetry, show that he had a deal of the Arcadian spirit, although he intentionally avoided the excessive refinement and mellifluousness of the Arcadian measures. The *Giorno*, written after 1760, is not only Parini's masterpiece, but is also one of the most important literary productions of Italy in the eighteenth century. It is composed of four parts: the *Mattino* (morning), the *Meriggio* (noon), the *Vespro* (evening), and the *Notte* (night). Under the form of counsels given to a young noble as to the way in which he should spend his day, the author has here satirized the fashionable youth of his time, who were given up to effeminate and corrupt practices. Consult Reini's edition of the *Opere di Giuseppe Parini* (Milan, 1801-04), which is still the most nearly complete collection of his works, and contains his prose productions (mainly academic discourses) as well as his verse. Of the *Odi* the best edition is that of Salveraglio (Bologna, 1882). Consult also Cerquetti, *Il testo più sicuro delle Odi di Giuseppe Parini* (Osimo, 1892).

PARIS, Fr. pron. pà-ré'. The metropolis of France, and the capital of the Department of Seine, situated on the River Seine, 110 miles in a direct line from its mouth, latitude 48° 50' N., longitude 2° 20' E. With its suburbs, comprised in the arrondissements of Saint-Denis and Sceaux, Paris forms the Department of Seine (q.v.). The city lies in a hollow, about 200 feet above the level of the sea, and is surrounded by low hills, which to the north, at Belleville and Montmartre, reach a maximum altitude respectively of 330 feet and 420 feet. These hills, separated by narrow valleys or plateaus, as those of Saint-Denis to the north, Ivry to the southeast, Montrouge to the south, and Grenelle to the southwest, are encircled at a distance of from two to five miles by an outer range of heights, mostly fortified, which include Mont Valérien, 450 feet above the Seine, the highest point in the immediate vicinity of the city, Villejuif, Meudon, and Saint-Cloud. The hollow is a small level plain of Tertiary formation, known as the Paris Basin, composed at varying depths of different strata of gypsum and marls abounding in fossil remains, siliceous limestones, and a vast chalk bed. The strata provide in part the city's building material, stone, gravel, etc. The climate is fairly uniform and mild, pleasant and healthful, the mean annual temperature being 51° F., the mean January temperature 36°, July 66°. The river seldom freezes. Rain falls on an average during 143 days in a year, the average quantity during that period being 19.68 inches.

Paris is encircled by a wall 21 miles long, fortified by 94 bastions, pierced by 57 gates, and having a glacis and moat 48 feet wide. In addition there are 17 detached forts within a distance of two miles, and 19 outlying fortresses encircling an area of 400 square miles. The modern enceinte was constructed by Louis Philippe in 1841-44, but the outlying fortresses were added after the war of 1870. The city is now practically impregnable. Steam and electric railroads give access to the numerous suburbs famous alike for their picturesque situations and historical associations. These include the more immediate suburbs of Boulogne, with the famous Bois de Boulogne (bordering Paris on the west), adjoining which is the race-course of Longchamps, Neuilly, Levallois-Perret, Clichy-la-Garenne, Suresnes, Puteaux, Courbevoie, Asnières, Aubervilliers, Bobigny, Pantin, Pré-Saint-Gervais, Vincennes, with its wood, fort, château, and race-course, Charenton, Ivry, Gentilly, Arcueil, Bagneux, Châtillon, Montrouge, Vanves, Issy, Meudon, and the more distant Versailles, with its palace, gardens, fountains, art collections, and the Grand and Petit Trianon; Rambouillet, with its castle, parks, and gardens; Saint-Cloud, with its palace and park; Saint-Germain-en-Laye, with its two castles; Sèvres, famous for its porcelain factories; Saint-Denis, with its abbey cathedral, where the kings of France are buried; Enghien, noted for its sulphur springs, on a wooded lake near the forest of Montmorency; Argenteuil, a favorite boating resort; Mériel, which derives its celebrity from the neighboring Abbaye du Val, a twelfth-century monastic edifice of great archaeological interest; Dampierre, with the splendid ducal château of the Luynes family; Fontainebleau, with its palace, fine art collections, and its extensive forest with Barbizon, the resort of artists on the western border; Malmaison, with the former château residence of the Empress Josephine; and Marly-le-Roi, with its forest and aqueduct.

COMMUNICATIONS AND BRIDGES. The wall-girt city covers an area of about 30 square miles. It is entered by six lines of railroads; the palatial stations in the metropolis include the Gare du Nord on the Place Roubaix, the Gare Saint-Lazare, facing the Rue Saint-Lazare, the Gare de l'Est or de Strasbourg on the Place de Strasbourg, the Gare d'Orléans on the Quai d'Austerlitz, and the Gare de Lyon on the Boulevard Diderot. The Seine, which enters Paris in the southeast at Bercy, about a mile below its junction with the Marne, is spanned by 32 bridges. It leaves the city at Point du Jour in the southwest, having divided it in two parts, and having formed the two islands of La Cité and Saint-Louis, which are both covered with buildings. The river at Paris is from 300 to 500 feet wide. The most celebrated and ancient of the bridges are the Pont Notre Dame, dating from 1500, and the Pont Neuf, begun in 1578, completed by Henry IV. in 1604, and thoroughly restored in 1852. The latter, which crosses the Seine at the lower end of the Ile-de-la-Cité, is 1080 feet long, and abuts near the middle on a small peninsula planted with trees which form a background to the equestrian statue of Henry IV., which stands in the central open space on the bridge. Among the other bridges, the handsomest are the Pont de la Concorde, 160 yards long, built in 1781-90; the Pont d'Austerlitz, and Pont





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d'Iéna, both of the time of the First Empire; the Pont du Carrousel, built under Louis Philippe; and the Pont des Invalides, Pont de l'Alma, and Pont de Solférino—all fine structures, adorned with military and naval trophies commemorative of events and victories connected with the Second Empire. Among the most recent, and one of the most striking, is the Pont Alexandre III., named in honor of the Czar, and the Pont Mirabeau, connecting Auteuil and Grenelle. These bridges all communicate directly with the spacious quays, planted with trees, which line both banks of the Seine, and which, together with the boulevards, give characteristic beauty to the city. Although the most ancient quays—as the Quai des Augustins and the Quai de la Mégisserie—date from the fourteenth century, the greatest part of these magnificent embankments, measuring 12 miles in extent, is due to Napoleon I. and Napoleon III.

STREETS, BUILDINGS, MONUMENTS, ETC. The private houses, most of which are of the apartment or flat-house order, rising to six or seven stories, as well as the public buildings, are built of a light-colored limestone, easily wrought and carved ornamentally. Among the finest of the wide and straight streets are the Rue de Rivoli, two miles in length, the Rue de la Paix, the Rue du Faubourg Saint-Honoré, and the Rue Royale. The boulevards, which extend in an irregularly circular line on both sides of the Seine, generally on the site of the ancient ramparts, between the nucleus of the city and its surrounding quarters, present the most striking feature of Parisian life. In all the better parts of the city they are lined with trees, seats, and little towers called *Vespasiennes*, covered with advertisements. Restaurants, cafés, shops, and various places of amusement succeed one another for miles, their character varying from the height of luxury and elegance in the Boulevard des Italiens and the Boulevard Haussmann, to the domestic simplicity of the Boulevards Beaumarchais and Saint-Denis. Among the public squares or places, of which there are over 130, mostly owned by the municipality, the most noteworthy is the Place de la Concorde, which connects the gardens of the Tuileries (q.v.) with the Champs Elysées (q.v.), and embraces a magnificent view of some of the finest buildings and gardens of Paris. In the centre is the famous obelisk of Luxor, brought from Egypt to France in 1836, and covered over its entire height of 76 feet with hieroglyphics. On the site of this obelisk stood the Revolutionary guillotine, at which perished Louis XVI., Marie Antoinette, Philippe Egalité, Danton, Robespierre, and a host of other victims. Of the other squares, the following are some of the handsomest: the Place du Carrousel, west of the Louvre, with the Arc de Triomphe du Carrousel, erected by Napoleon I. in commemoration of his victories in the campaigns of 1805-06; the Place de la République, with a fine bronze statue of the Republic; the Place de l'Opéra; the Place Vendôme, with Napoleon's column of victory; the Place de la Bastille, where once stood that famous prison and fortress (see **BASTILLE**); the Place de la Nation, formerly Place du Trône (with its fine fountain and monumental group, the Triumph of the Republic); the Place de l'Hôtel de Ville, formerly Place de la Grève, for many ages the scene of public executions, and the spot at which some of the bloodiest deeds of the Revolution were perpetrated. The Porte

Saint-Martin and Porte Saint-Denis, which were erected by Louis XIV. to commemorate his victories in the Low Countries, and are adorned with bas-reliefs representing events of these campaigns, mark the ancient limits of the most turbulent quarters of the Paris of the past; the Arc de Triomphe de l'Etoile, 160 feet high and 146 feet wide, begun by Napoleon I. in 1806, and completed in 1836 at a cost of more than \$2,000,000, may be said to form the extreme western boundary of the aristocratic quarters. It is profusely adorned with bas-reliefs and alto-reliefs, representing victories of Napoleon. The great streets which radiate from the Arc de Triomphe de l'Etoile are among the most magnificent of Paris, and form the finest quarter. The Place de l'Etoile is connected with the Champs Elysées by the Avenue des Champs Elysées, with the celebrated Bois de Boulogne (q.v.) by the Avenues Grande Armée, Bois de Boulogne, and Victor Hugo, and the Portes Neuilly, Dauphiné, and Maillot; and it communicates by the Avenues Kléber and d'Iéna with the Place, the Parc, and the Palais du Trocadéro.

The Palais du Trocadéro, named after a Cadiz fort taken in 1823 by the French, dates from the exhibition of 1878; it is a mammoth building of Oriental architecture and crescent form, on an elevation surmounting a huge cascade of ornamental water. It has valuable museums of comparative sculpture and of ethnography, and its fine Salle des Fêtes, containing a huge organ, can accommodate 6000 persons. In the well-kept park is a subterranean aquarium. The Pont d'Iéna leads from the Park across the Seine to the historic Champ de Mars (q.v.), the site of the universal expositions since 1867, and of the Eiffel Tower (q.v.), 984 feet high, built for the Exposition of 1889. On the southeast is the Ecole Militaire, founded in 1752 and formerly used as barracks for infantry and cavalry, but now occupied by the Ecole Supérieure de Guerre. Near by is the Hôtel des Invalides (q.v.), founded in 1670 for disabled soldiers. The crypt of the church contains the sarcophagus, hewn from a huge block of Russian granite, in which lie the remains of Napoleon I., deposited there in 1840. The Musée d'Artillerie in the west wing comprises an historical collection of 10,000 war implements. The fine Esplanade des Invalides, fronting the building and bordered by the Quai d'Orsay, connects by the Pont Alexandre III. with the Champs Elysées on the north bank. Here are situated the Palais de l'Elysée, the official residence of the President of the Republic, the Grand and Petit Palais des Beaux-Arts, where the Salons are held, and the Palais de Glace, the three latter built for the Exposition of 1900, having replaced the Palais de l'Industrie built for the first Great Exposition in 1855, and until 1897 housing a permanent exhibition. Thence through the Place de la Concorde the Jardin des Tuileries is reached, to the east of which is the Louvre (q.v.), forming a square of 576 by 538 feet, remarkable, especially the eastern façade, for its architectural beauty.

The Louvre, formerly a royal residence, was connected with the celebrated palace of the Tuileries (q.v.) by a great picture gallery, and between the two palaces lay the Place du Carrousel. Napoleon III. further connected the Tuileries and Louvre on the northern side, throw-

ing them into one vast building, which formed the most palatial structure in the world. The Tuileries continued to be occupied as the residence of the Imperial family; but the Louvre proper, with its series of great galleries, formed a vast museum of pictures, sculptures, and collections of Egyptian, Greek, and Roman antiquities. The Communists of 1871 attempted to burn the whole pile and succeeded in destroying the Tuileries and a corner of the Louvre. The library of the Louvre, with its contents, was burned, but the rest of the building and its priceless treasures were saved. North of the Louvre is the Palais Royal (q.v.), and north of the Palais Royal is the Bourse or Exchange, a beautiful structure in Græco-Roman style, surrounded by sixty-six Corinthian columns; to the east, on the north bank of the Seine, opposite the Ile de la Cité, is the Hôtel de Ville. Since 1871, when it was burned by the Communists, it has been carefully rebuilt in the style of its predecessor, and is one of the most magnificent buildings in Paris. It is the residence of the prefect of the Seine, and includes all the offices for the transaction of the municipal business of Paris. Not far from the Hôtel de Ville is the Tour Saint Jacques, a square Gothic tower 175 feet high, dating from 1504-22, and until recently utilized as an atmospherical observatory; it affords one of the finest views in Paris. Almost opposite, on the northern bank of the Cité, stands the vast Palais de Justice, originally the residence of the kings of France; some parts of it date from the fourteenth century, others are modern. It is the seat of some of the courts of law, as the Court of Cassation, the tribunals of the first appeal, and of police. Within the precincts of this palace are the Sainte Chapelle, and the noted old prison of the Conciergerie, in which Marie Antoinette, Danton, and Robespierre were successively confined. The Conciergerie, in which prisoners are lodged pending their trial, constituted one of the eight prisons of Paris, of which the principal were La Force, Saint Pélagie, Saint Lazare, Mazas, and La Roquette. The latter have been replaced by the modern prison of Fresnes-les-Rungis, which covers fifty acres, the Conciergerie alone being retained.

Among other notable features on the north of the river are the mammoth Halles Centrales or Central Markets, the Marché du Temple, and the Parc des Buttes Chaumont. The palace of the Luxembourg (q.v.), on the south side of the Seine, was built in the Florentine style by Jacques Debrosse for Marie de' Medici. It contains many magnificent rooms and the celebrated museum devoted to the exhibition of the works of modern artists and other notable features. Also on the south side of the river are the Sorbonne (q.v.), the centre of the famous Latin Quarter, the Panthéon (q.v.), the Jardin des Plantes, the large Halle aux Vins, the Hospice de la Salpêtrière, the Observatory, and the Cemetery of Mont Parnasse.

Paris has many theatres and places of amusement, suited to the tastes and means of every class. The leading houses, as the Opéra, Théâtre Français—chiefly devoted to classical French drama—Odéon, Théâtre Italien, etc., receive a subvention from the Government, and all are under strict police supervision. The new opera house, completed in 1875, is a magnificent building, costing, exclusive of the site, \$5,600,000.

It is at present the largest theatre in the world, occupying an area of nearly three acres; its most striking features are the magnificent Grand Staircase and the Foyer with admirable decorations. Cheap concerts, equestrian performances, and public balls, held in the open air in summer, supply a constant round of gayety to the burgher and working classes at a moderate cost, and form a characteristic feature of Parisian life.

Among the large number of churches, the grandest and most interesting from an historic point of view is the Cathedral of Notre Dame (q.v.), which stands on a site on the Ile de la Cité, successively occupied by a Pagan temple and a Christian basilica of the time of the Merovingian kings. The present building was constructed between 1163 and the end of the thirteenth century; since then it has been frequently altered, and in its present state of restored magnificence ranks as one of the noblest specimens of Gothic architecture. Saint Germain-des-Près, which is probably the most ancient church in Paris, was completed in 1163; Saint Etienne du Mont and Saint Germain l'Auxerrois, both ancient, are interesting—the former for its picturesque and quaint decorations, and for containing the tomb of Saint Geneviève, the patron saint of Paris; and the latter for its rich decorations and the frescoed portal, restored at the wish of Margaret of Valois, and for the fact that from its little bell-tower the signal was given for the massacre of the Huguenots on Saint Bartholomew's night. The Sainte Chapelle, built by Saint Louis in 1245-48 for the reception of the various relics which he had brought from the Holy Land, is one of the most remarkable buildings in Paris, profusely decorated in all parts with brilliantly colored materials. In Saint Eustache, erected 1532-1637, the Feast of Reason was celebrated in 1793; here is performed probably the finest religious music in Paris. Saint Sulpice, finished in 1749, is noticeable for its size, measuring 462 feet in length, 183 feet in width, and 108 feet in height. Among modern churches are: the Madeleine (q.v.), built in imitation of a Greek temple, and surrounded by a colonnade of fifty-four massive Corinthian columns; the building having no windows, the light enters through the ceiling of the three cupolas surmounting it; the interior is gorgeous with gildings, frescoes, carvings, marbles, and statues; the Panthéon (q.v.), which was begun as a church, but converted by the Constituent Assembly at the time of the Revolution into a temple dedicated to the great men of the nation, was restored to the Church by Napoleon III, and rededicated to Saint Geneviève, but was definitely secularized in 1885, when Victor Hugo was buried there; Notre Dame de Lorette, erected in 1823, a flagrant specimen of the meretricious taste of the day; Saint Vincent de Paul, completed in 1844, somewhat more imposing in style; and, crowning the height of Montmartre, the national votive church of the Sacré Cœur, begun in 1875, a Romanesque edifice with a Byzantine dome and campanile respectively 197 feet and 263 feet high. Among the Protestant churches, L'Oratoire is the largest and the best known.

Paris has a number of cemeteries, of which the principal one is Père Lachaise, extending over 110 acres, and filled in every part with monuments erected to the memory of the multi-

tude of celebrated persons who have been buried here. The Morgue, on the Ile de la Cité, behind the Cathedral of Notre Dame, is a building in which the bodies of unknown persons who have met with a violent death are placed. These, if not claimed within three days, are buried at the public expense. The southern parts of the city are built over beds of limestone, rich in fossils, which have been so extensively quarried as to have become a mere network of vast caverns, which in some cases scarcely afford sufficient support to the houses above. These quarries were converted into catacombs in 1784, and there are deposited the bones of the dead collected from the ancient cemeteries of Paris.

EDUCATIONAL INSTITUTIONS. The chief institutions connected with the University of France are situated in the Quartier Latin. The old Sorbonne (q.v.), a large building erected by Cardinal Richelieu for the faculties of the old University of Paris, has been replaced by a magnificent modern building, with fine lecture halls and class-rooms, and an extensive library open to the public. Near the Sorbonne is the Collège de France, where gratuitous public lectures are also delivered by eminent scholars and men of letters. The Ecole Polytechnique, the School of Medicine and the School of Law, the Observatory, and the Jardin des Plantes, with its great museum of natural history, lecture-rooms, and botanical and zoölogical gardens, are situated in the same quarter of Paris.

The principal of the public libraries is that of the Rue Richelieu, now called the Bibliothèque Nationale, which contains more than 2,600,000 volumes, 100,000 manuscripts, many portfolios or engravings, and a collection of 400,000 coins and medals, which originated in a small collection of books placed by Louis XI. in the Louvre. In addition, the municipality maintains many branch libraries. No city is richer than Paris in fine-art collections, and among these the museums at the Louvre stand preëminent. The Palais or Ecole des Beaux-Arts, one of the finest educational institutions in the world, dating from 1648, is a place for exhibiting art, manufactures, and architectural models. The Hôtel Cluny, connected underground with the Roman Palais des Thermes, besides being in itself a most interesting monument of mediæval art, contains curious relics of the arts and usages of the French people from the earlier ages of their history to the Renaissance period. The mint deserves notice for the perfection of its machinery. The Gobelins, or tapestry manufactory, may be included under the fine arts, as the productions of its looms are all manual and demand great artistic skill. The Conservatoire des Arts et Métiers, in the Rue Saint Martin, contains a great collection of models of machinery and class-rooms for the instruction of workmen in all departments of applied science. The spacious building in which the exposition of 1878 took place was named the Palace of the Trocadéro, and now forms a permanent exhibition. Among the numerous learned societies, associations, and institutions the chief are the Académie de Médecine and the Institute of France (q.v.), the latter housed in the Palais de l'Institut on the Seine at the end of the Pont des Arts, and comprising five academies devoted respectively to the supervision of the French language and the publication of official dictionaries

of the French language (the French Academy); to archæology and ancient languages; to mathematics and natural science; to painting, architecture, sculpture, and music; and to philosophy, history, and political economy.

ADMINISTRATION. Paris is divided into twenty arrondissements for purposes of administration. The Prefect of the Seine is the chief of the municipal government, and is appointed by the national Government. There is a municipal council, composed of eighty members, four from each arrondissement, chosen by popular election. Each arrondissement has a mayor and two assistant councilors. The arrondissement is the unit of municipal organization for all administrative purposes. It registers all the births and deaths within its boundaries; keeps the registration lists of voters and jurors; attends to the assessment and collection of all taxes; receives application for licenses and privileges; serves as an agency in floating municipal or State loans; administers the schools and libraries; and forms the local centre for all modes of charity work. The whole work of the municipal administrative machine is greatly facilitated by the admirable system of civil service regulating all the appointments and promotions of city officials. The prefect of police is at the head of the civic guard or gendarmes, the fire brigade, and the *gardiens de la paix*, or city police, who are armed with swords. The number of policemen has been constantly increasing. At the close of the last century there were nearly 9000 men on the police force, or 35 to 10,000 population.

Paris is abundantly supplied with water, the chief sources being the Seine, the Canal d'Oureq, the Marne, the Dhuis, and a vast natural reservoir, underlying the Paris Basin; the latter is tapped by artesian wells, the most famous of which is the well of Grenelle, 1800 feet deep, and surmounted by a tower 108 feet high. The cleaning, sewerage, and water supplies are under the charge of the prefect. The sewerage system is admirable; the total length of the underground channels is over 615 miles, and they are kept so clean and well ventilated that an hour's excursion through the sewers or *égouts* is one of the ordinary experiences of visitors to Paris, the journey being made partly in boats and partly by electric trolleys. Paris has a sewage farm, five miles from the city limits (in the Saint-Germain forest), which has proved a success from an agricultural point of view, without in the least injuring the health of the community in that region. The paving of the city leaves nothing to be desired, and the street lighting is admirably carried out by means of electric and gas lights furnished by private companies, as explained below.

The administrative tendency in Paris is for municipal ownership of all works supplying public wants and directly affecting public health.

The Conseil d'Hygiène et de Salubrité, or Board of Health, is composed of men known for their high attainments in science, and includes physicians, city engineers, and men whose technical training enables them best to deal with sanitary problems. Within the scope of its work come not only cases of disease and epidemics, but the sanitary regulation of workshops, schools, and dwellings; prevention of adulteration of food; sanitary aspects of the water-supply, drainage, and cemetery management. In addition to that

central body there are twenty 'commissions d'hygiène,' one for each arrondissement, and a 'commission des logements insalubres,' composed of physicians, architects, and engineers, whose duty it is to pass upon the sanitary conditions of dwellings; they can recommend sanitary improvements or condemnation of houses, and their recommendations are as a rule favorably acted upon by the municipal council. There is a special service of sanitary police which enforces all the health laws.

In addition to the activities enumerated above, the municipality owns all markets, cattle-yards, and slaughter-houses, from which it derives a considerable income. The municipal markets and abattoirs facilitate the inspection of the meat supply, and the municipal laboratory has done a great deal in checking adulteration of milk, bread, wine, and other food of common use, and has served greatly to reduce the death rate.

The poor relief is organized in Paris on a large scale and centralized in the hands of a special department called 'L'Assistance Publique à Paris.' This has charge of the hospitals, of the homes and asylums for aged poor, as well as for friendless children, and of outdoor relief. The department is under the authority of the Prefect and is governed by a director and a board, composed of leading men from various Government departments. The work is carried out in detail by the 'Bureaux de bienfaisance,' one in each arrondissement, and composed of persons familiar with the people in their respective districts. The city comes to the aid of the poor in several other ways. There are a number of municipal lodging-houses open to unemployed workmen free of charge, and furnishing a meal to each guest. A similar home exists for working women. From 15,000 to 20,000 families are helped each year by advance of rent-money in cases of threatened eviction. An agricultural colony has been established not far from the city for those unable to make a living. A free employment office is maintained by the city in each arrondissement, and a central labor exchange known as the 'Bourse du Travail' was erected by the municipality in 1892 at a cost of 2,000,000 francs. In addition, the municipal council votes 50,000 francs annually for the maintenance of the institution, which serves as the headquarters of all the trade-unions in the city. A public pawn-shop, known as the Mont-de-Piété, has been in existence for more than a century. It advances loans in any amount at 6 per cent., which is a great accommodation for the poor. The largest of the numerous hospitals or almshouses is La Salpêtrière (for women), probably the largest asylum in the world, extending over 78 acres of land; 1300 of its 4500 inmates are insane. Bicêtre, with nearly 3600 beds, receives only men. The Hospice des Enfants Trouvés, or foundling hospital, provides for the infants brought to it till they reach the age of maturity, and only demands payment in the event of a child being reclaimed. The crèches, or public nurseries, first established in 1844, of which there are now 18, receive the infants of poor women for the day at the cost of 20 centimes. Besides institutions for the blind, deaf and dumb, convalescents, sick children, etc., Paris has 17 general and special hospitals. Of these the oldest and most noted are the Hôtel Dieu, rebuilt at a cost of \$9,000,-

000, which covered also the cost of the new site, La Charité, and La Pitié.

EDUCATION. The educational facilities of Paris are very complete. A system of kindergartens called Ecoles Maternelles is provided for children between the ages of three and six, and although attendance there is not compulsory, they are all patronized, as they are a great help to the poor. The attendance is from 50,000 to 60,000. Next follow the Ecoles Enfants, which are a transition from the kindergarten to the primary school, and are open to children between six and eight. The primary schools for children below the age of fourteen employ nearly 3000 teachers, half men and half women, and are attended by 156,000 pupils. The school system is under the joint supervision of the municipal council, the prefectural administration, and the national Ministry of Education. The children are supplied with text-books, etc., and those unable to pay (60 per cent. of the total number) are given gratis one meal each day. A new feature of the school system is the boarding-school for children of widowers or guardians unable to give proper care to their children. The cost of boarding and clothing a child has been fixed at 600 francs a year, but since 1892 the payment has been reduced to 120 francs for those unable to pay more, the city paying the rest. Upon the completion of the primary school a child is free to enter a high school or professional school, according to the profession he or she chooses.

FINANCE. The maintenance of so many institutions involves, naturally, a great annual expense, and their municipalization has required the contraction of large loans. The budget of Paris for 1901 amounted to 314,000,000 francs, of which more than a third, 113,000,000, went for payments on the public debt. It should be observed that only about 30,000,000 francs out of these 113,000,000 go to pay off the principal, the rest being interest charges. The next heaviest item is 35,000,000 francs for the police, to which the national Government adds another 10,000,000. The other items of importance are charity, 28,000,000 francs; education, 27,000,000; streets, 24,000,000. The relative expense for the various departments is about the same from year to year. The total debt of the city is about 2,000,000,000 francs (\$400,000,000). To offset these items of expense there are a number of sources of income which the city derives from the various companies holding franchises. Paris does not own its water works, nor the gas and electric plants, and has no municipal transit system. The gas company, in addition to furnishing gas for the illumination of the streets and public buildings at cost price, pays 200,000 francs a year for the right to lay its pipes and a tax of 2 francs for every 100 cubic meters of gas it sells, and divides with the city all its profits above 13½ per cent. on its capital stock, which it is not allowed to increase. This makes the total income of the city from the gas company alone equal to 20,000,000 francs. A similar arrangement with the electric lighting and water companies brings several more millions a year into the city treasury. Likewise the markets, abattoirs, and cemeteries make their contributions.

TRANSPORTATION. The main means of intramural communication is supplied by the omni-

buses and electric tramways, which latter are in a great measure supplanting the former, and so satisfactory that it seems hardly possible that until the last decade of the nineteenth century the intramural transportation was extremely inefficient. Of the comprehensive system of underground electric railways authorized by the national Government in 1898, to be built by the city and worked on lease by a private company, seven miles were in operation in 1900. One of the lines supplements the old surface steam belt railway that passes around the city just inside the fortifications. The cab service in Paris is unexcelled. The steamboats on the Seine are well patronized in pleasant weather, and it will probably be long before the ancient and familiar omnibuses are entirely put out of commission.

INDUSTRY AND TRADE. Paris is the largest industrial centre of France. It has a world-wide renown for the elegance and taste of its products. There are comparatively few large industrial undertakings, Paris being more of a centre of small workshops employing highly skilled laborers. Of late, however, a tendency has been noticed toward large establishments. Large factories are found in such industries as the manufacture of machinery, railroad supplies, chemical products, soap, dyes, brewery, and liquor establishments, china, porcelain, leather, printing, etc. Small workshops, however, predominate in the production of clothing, gold and silver articles, furniture, optical and surgical instruments, toys, paper boxes, steel and aluminum articles, artificial flowers, perfumes, articles of luxury, gloves, etc. In all these products Paris excels the world. The book-publishing business of France is almost wholly concentrated in Paris. As a trading centre Paris stands at the head of the list of French cities. The products of its industry are valued at more than 3,000,000,000 francs annually, most of which is exported. It was among the first cities of the world to introduce large department stores such as the Louvre, the Bon Marché, and Printemps. The most important financial institutions are the Banque de France, the Crédit Foncier, the Crédit Lyonnais with 22 branches in the city, and the Clearing House, called 'Chambre de Compensation de Banquiers.' Then there is the Bourse de Commerce in addition to the Bourse de Travail.

POPULATION. The population of Paris varied little from the thirteenth to the sixteenth century, ranging during that period from 216,000 to 260,000. In 1718 it had increased to 509,000; in 1817 to 714,000; in 1851 to 1,053,000; in 1881 to 2,269,000; while in 1891 it was 2,448,000, and in 1901, 2,714,068. The most densely populated quarters are the Eighteenth Arrondissement, formerly the Butte Montmartre, the Eleventh Arrondissement, formerly Popincourt, and the Seventeenth Arrondissement, formerly the Batignolles Monceaux. The average density of population in Paris exceeds 83,000 people to the square mile, or nearly two and one-half times that of London. About 10 per cent. of the population is composed of foreigners. The great bulk of the population is Roman Catholic; there are about 60,000 Protestants and 25,000 Jews.

HISTORY. The earliest notice of Paris occurs in Julius Caesar's *Commentaries*, in which it is described under the name of Lutetia, as a collection of mud huts, composing the chief settlement of the Parisii, a Gallic tribe conquered by the

Romans. The ruins of the Palatium Thermanum (Palais des Thermes), and of ancient altars, aqueducts, and other buildings, show that in Roman times the town extended to both banks of the Seine. Christianity was introduced about A.D. 250 by Saint Denis. In the fourth century Lutetia began to be known as Parisia, or Paris. In the sixth century Paris was chosen by Clovis as the seat of government; and after having fallen into decay under the Carlovingian kings, in whose time it suffered severely from frequent invasions of the Northmen, it finally became in the tenth century the residence of Hugh Capet, the founder of the Capetian dynasty, and the capital of the French monarchy. From this period Paris continued rapidly to increase, and in two centuries it had doubled in size and population. In the Middle Ages Paris was divided into three distinct parts—La Cité, on the islands; the Ville, on the right bank; and the Quartier Latin, or University, on the left bank of the river. Louis XI. did much to enlarge Paris, and to efface the disastrous results of its hostile occupation by the English during the wars under Henry V. and Henry VI. of England. Its progress was again checked during the wars of the last of the Valois, when the city sustained several sieges. On the accession of Henry of Navarre in 1589, a new era was opened for Paris. The improvements commenced under his reign were continued during the minority of his son, Louis XIII. Louis XIV. converted the old ramparts into public walks or boulevards, organized a regular system of police, established drainage and sewerage works, founded hospitals, almshouses, public schools, scientific societies, and a library, and thus gave to Paris a claim to be regarded as the focus of European civilization. The terrible days of the Revolution (see FRENCH REVOLUTION) caused a temporary reaction. The improvement of Paris was commenced on a new and grander scale under the first Napoleon, when new quays, bridges, markets, streets, squares, and public gardens were created. All the treasures of art and science which conquest placed in his power were applied to the embellishment of Paris, in the restoration of which he spent more than \$10,000,000 in twelve years. His downfall again arrested progress, and in many respects Paris fell behind other European cities.

Renovation of various sorts was recommenced under Louis Philippe, under whom fortifications on a colossal scale were constructed, but it was reserved for Napoleon III. to render Paris the most commodious, splendid, and beautiful of modern cities. When he commenced his improvements Paris still consisted, in the main, of a labyrinth of narrow, dark, and ill-ventilated streets. With the assistance of Baron Haussmann, the Prefect of the Seine, his schemes were carried out with rare energy and good taste. Two straight and wide thoroughfares, parallel to and near each other, were made to traverse the whole width of Paris from north to south crossing the Cité; a still greater thoroughfare was made to run the whole length of the town, north of the Seine, from east to west. The old boulevards were completed so as to form outer and inner circles of spacious streets, the former chiefly lying along the outskirts of the old city, the latter passing through and connecting a long line of distant suburbs. In the year 1867, when the international exhibition was opened, Paris had

become in all respects the most splendid city in Europe, and in that year it was visited by upward of 1,500,000 foreigners. Many further improvements were contemplated, but financial and political difficulties supervened (see FRANCE), and these great schemes had to be postponed. The siege of Paris by the Germans, which lasted from September 19, 1870, to January 28, 1871, caused much less injury to the city than the vandalism of the Red Republicans, who rose against the Government in March, 1871, took possession of Paris, and proclaimed the Commune (q.v.) the only lawful Government. Acts of pillage and wanton destruction followed. The column erected to the memory of Napoleon and the Great Army, in the Place Vendôme, one of the principal squares of Paris, was pulled down as 'a monument of tyranny.' When the Government troops under Marshal MacMahon pressed forward into the city, in the latter part of May, the Communists began systematically to set fire with petroleum to a great number of the chief buildings of Paris, public and private. The fire for a time threatened to destroy the whole city. It was not checked until property had been lost to the value of many millions of dollars and historical monuments were destroyed which never can be replaced. Two years later, however, all the private houses burned had been rebuilt, the monuments only partially injured had been restored, and the streets and public places were as splendid and gay as in the best days of the Empire. The Universal Expositions of 1878, 1889, and 1900 are among the chief events of the subsequent history of Paris.

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PARIS. A city and the county-seat of Edgar County, Ill., 20 miles northwest of Terre Haute, Ind.; on the Cleveland, Cincinnati, Chicago and Saint Louis and the Vandalia Line railroads (Map: Illinois, E 4). It is mainly a residential place, and has a public park of 100 acres, 70 of which are now submerged, forming an artificial lake. The city is in a farming district, the products of which form the staples of a considerable trade. There are extensive manufactures of brooms. Paris was laid out in 1825 and incorporated first in 1849. The government is administered under a general law of 1872, which provides for a mayor, chosen biennially, and a council. The municipality owns and operates the water-works and electric light plant. Population, in 1890, 4996; in 1900, 6105.

PARIS. A city and the county-seat of Bourbon County, Ky., 90 miles east of Louisville; on Stoner Fork of the Licking River, and at the junction of divisions of the Louisville and Nashville Railroad (Map: Kentucky, G 2). A handsome court-house, to cost more than \$150,000, is in course of construction (1903), and a new library (Carnegie) is projected. Situated in the famous 'blue-grass region' of Kentucky, Paris is engaged extensively in breeding fine horses. It has also a large trade in whisky, tobacco, hemp, grass seed, etc. The gas-works are owned by the municipality. Paris was settled in 1784 and was chartered as a city in 1862. Population, in 1890, 4218; in 1900, 4603.

PARIS. A city and the county-seat of Henry County, Tenn., 110 miles west of Nashville; on a fork of the West Sandy River, and on the Louisville and Nashville and the Nashville, Chattanooga and Saint Louis railroads (Map: Tennessee, C 4). It is the centre of a fertile region, producing cereals, cotton, and tobacco, and has several tobacco and medicine manufactories, planing mills, flouring mills, and repair shops of the Louisville and Nashville Railroad. Population in 1890, 1917; in 1900, 2018.

PARIS. A city and the county-seat of Lamar County, Texas, 100 miles northeast of Dallas; on the Texas and Pacific, the Texas Midland, the Saint Louis and San Francisco, and the Gulf, Colorado and Santa Fe railroads (Map: Texas, G 3). It has a fine United States court and post-office building, and a county court-house of granite. The city is the centre of a productive cotton-growing section, and controls extensive wholesale and shipping interests. Its industrial establishments include large cottonseed-oil mills, a large compress, cotton gins, a flouring mill, canning factory, brick plants, etc. Paris, settled in 1841, is governed under a charter of 1889,

which provides for a mayor, elected every two years, and a council. The water-works are owned and operated by the municipality. Population, in 1890, 8254; in 1900, 9358.

PARIS, CONGRESS OF. See CRIMEAN WAR; DECLARATION OF PARIS; PARIS, TREATIES OF.

PARIS, TREATIES OF. The name given to important treaties of peace concluded at Paris in 1763, 1783, 1814, 1815, 1856, and 1898.

The treaty of February 10, 1763, was concluded between France and Spain on the one hand, and Great Britain and Portugal on the other, at the end of the Seven Years' War (q.v.). It provided for a cession to Great Britain of Canada, Prince Edward Island, Cape Breton, and the region east of the Mississippi River, possessed or claimed by France, except New Orleans and the isle on which it stood. Great Britain was confirmed in the possession of Nova Scotia. France retained a share in the fisheries of Newfoundland and the Saint Lawrence, under certain restrictions, together with the isles of Saint-Pierre and Miquelon. In the West Indies, Great Britain restored Martinique and Guadeloupe, and ceded Saint Lucia to France, while France ceded to Great Britain Dominica, Saint Vincent, Grenada, and Tobago (the last previously neutral territory). France ceded Senegal to Great Britain. She recovered possession of Pondicherry, but had to agree not to maintain military settlements in Bengal. In Europe, France relinquished her conquests in Germany, restored Minorca, and engaged to maintain the status quo. By way of compensation for the loss of Florida, which Spain ceded to Great Britain, which had fallen into the hands of that Power, France ceded to Spain the bulk of Louisiana, including New Orleans. The effect of the treaty was to establish the supremacy of Great Britain in America, in India, and on the seas.

The Treaty of Paris of September 3, 1783, between Great Britain and the United States marked the close of the American Revolution and recognized the independence of the colonies. Simultaneously with its conclusion Great Britain made peace with France and Spain at Versailles. The four difficult questions upon which the British and American negotiators labored at great length before reaching a settlement related to (1) the boundaries of the United States; (2) fishing rights on the coast of Newfoundland; (3) payment of private debts due from Americans to British creditors; and (4) compensation of the loyalists. As finally concluded, the treaty recognized the Mississippi River as the western boundary from a point west of the Lake of the Woods to the thirty-first parallel of north latitude; thence the boundary was to run due east to the Appalachicola (Chattahoochee) River, thence down the middle of that stream to the Flint River, thence to the head of the Saint Mary's River, and thence along the middle of that river to the Atlantic Ocean. The Great Lakes and the Saint Lawrence River were recognized as the northern boundary to the forty-fifth parallel. Thence to the Atlantic Ocean the boundary was described as following the highlands which divide those rivers that empty themselves into the Saint Lawrence from those which empty into the Atlantic; thence from the highlands to the source of the Saint Croix River; and thence down that

stream to its mouth. (See NORTHEAST BOUNDARY DISPUTE; also NORTHWEST BOUNDARY DISPUTE.) With regard to the fisheries, it was provided that the Americans were to continue to enjoy the same rights of fishery at Newfoundland and vicinity which they had enjoyed as English colonists, and while they were to be permitted to dry their fish on other unsettled shores, they were not allowed to do so on the island of Newfoundland. At the same time they were to have the exclusive right of fishing on their own coasts. On the third point it was provided that creditors on either side should meet with no lawful impediment to the recovery of the full value in sterling money of all bona fide debts contracted before the war. With regard to the loyalists, the American negotiators consented that Congress should be asked to recommend to the State legislatures to provide for the restitution of confiscated estates, and to abandon all future confiscations and to cease all prosecutions commenced against persons known as loyalists. The navigation of the Mississippi was declared to be free to the subjects of both nations. By the terms of the Treaty of Versailles, signed on the same day as that of Paris, Great Britain restored Florida and Minorca to Spain and ceded Tobago to France. Senegal was relinquished to France.

The Treaty of Paris of May 30, 1814 (First Peace of Paris), was concluded between France on the one hand and the representatives of all the great Powers of Europe on the other. It provided that France should surrender all her conquests except slight territories on the northern and eastern boundaries, leaving her with the boundaries of 1792. She was to pay no indemnity, and was to retain all works of art taken from conquered countries with a few exceptions. Most of the colonies taken from her by Great Britain were restored; Holland was restored to the House of Orange; of the colonial possessions wrested from Holland, Great Britain retained Ceylon, the Cape of Good Hope, and part of Surinam (Guiana); Switzerland was declared independent; Italy, except the Austrian provinces, was to consist of independent States; a similar arrangement was made for Germany; the navigation of the Rhine was to be open; and the settlement of all other questions of European concern was to be intrusted to a European congress to be convened at Vienna. (See VIENNA CONGRESS.) By secret provisions it was agreed that the Allies should control the distributions of territory at the congress; that Austria should receive Northern Italy; that the King of Sardinia should receive Genoa; and that Belgium and Holland should be united as a defensive territory against France.

The Treaty of Paris of November 20, 1815 (Second Peace of Paris), was concluded between France on the one hand and the Allies on the other, and materially modified the treaty of 1814. By this treaty France was deprived of certain small territories to the north and east which she had been allowed to retain by the treaty of 1814. She was also compelled to pay indemnities to the allied Powers for the expenses of the war, amounting to some £40,000,000; to consent to the occupation of her frontier provinces for a period of five years by an allied army of 150,000 men, and to defray the cost of this occupation out of her own revenues. Indemnities

to a large amount were allowed several of the allies for the spoiliations committed on them by the French armies, the total amount of the entire indemnity exceeding £60,000,000.

The Treaty of Paris of March 30, 1856, was concluded among the Powers at the close of the Crimean War (q.v.), and settled a number of questions of European public law of great importance. It provided that the Black Sea should be neutralized, and that it should be thrown open to the merchant marine of every nation. All war vessels of every nation, including Russia and Turkey, were forever prohibited from entering the sea. The Czar and the Sultan agreed not to establish upon its coasts any military fort or arsenal. A portion of Bessarabia was surrendered by Russia, and the River Danube was declared to be open to free navigation. For the purpose of insuring free navigation, and for policing and improving the river, it was placed under the supervision of an international commission. This provision was declared to be a part of the public law of Europe. The Sublime Porte was formally admitted to the European concert, and the Powers engaged to respect the independence and integrity of the Ottoman Empire. The Danubian principalities of Moldavia and Wallachia were to continue under the suzerainty of the Porte, Russia renouncing her protectorate over them and the Powers guaranteeing all the privileges and immunities of which they were then in possession. Several important principles of international law were agreed upon at the same time, and were embodied in the Declaration of Paris (q.v.).

The Treaty of Paris of December 10, 1898, terminated the Spanish-American War. Spain relinquished her sovereignty in Cuba, and ceded Porto Rico, the Philippine Islands, and the island of Guam to the United States, from which she received the sum of \$20,000,000.

PARIS, UNIVERSITY OF. One of the oldest and largest universities in the world. It had its inception in the schools of Notre-Dame, Sainte Geneviève, and Saint Victor, and first comes into prominence about 1170. In the early part of the twelfth century Paris was already the noted seat of a number of great masters, among whom were William of Champeaux and his pupil Abélard (q.v.). Thousands of scholars from all over Europe flocked to Paris. Hence arose the necessity for common protection against the impositions of citizens and particularly against the chancellor of Notre Dame, who possessed the right to grant the 'license to teach' and thus constituted the quasi head of the university, and from a mere association of masters there gradually developed a corporation with special rights and privileges. In 1200 Philip Augustus granted a charter conceding among other privileges the right of students to be tried in an ecclesiastical court. In 1207 there is mention made of 'Communitas Scholarium' and 'Universitas Magistrorum,' indicating a fully organized Studium Generale. The chancellor's power to grant licenses was somewhat neutralized by the custom of Inception, which obliged a candidate to deliver an inaugural address before being permitted to associate with the masters. In 1229 a bloody fight between students and citizens caused an emigration which greatly benefited Oxford. Two years later, however, Pope Gregory IX. came to the

assistance of the university, and masters and scholars returned in large numbers. Popes Honorius III. and Gregory IX., by siding with the masters in these disputes, acquired an enormous influence over the affairs of the university. The corporation, which at first was nothing more than an association of masters, now consisted of masters and scholars, although the right to vote was vested in the masters only. The university was divided into the superior faculties, viz. theology, medicine, and law, and the inferior faculty of arts ever, on account of the predominance of their number the rector of the faculty of arts became practically the head of the university in the fourteenth century. The arts faculty was divided into four nations: French, Picards, English, and Normans. In the Congregations of the university there were seven voices, the nations controlling four and the other faculties three. In the middle of the thirteenth century the university entered into a series of litigations with the aggressive Mendicants, who included among their teachers such men as Thomas Aquinas, Alexander of Hales, and Saint Bonaventura. They established three chairs in theology without taking the oath of obedience to the university statutes. After a struggle of seven years the Pope decided against the masters and the Mendicant scholars were placed on a basis of equality with the seculars. The contest with the Mendicants, however, was fortunate in that a series of 'colleges' or foundations modeled after those of the Orders where laymen could get lodging, care, and instruction were established. The most famous of these were the Sorbonne (q.v.), founded by Robert de Sorbon about 1257, and the College of Navarre.

In the fourteenth and fifteenth centuries the university attained its highest stage of development. Princes and popes courted its favor, and followed the teachings of its famous theologians and jurists. It became the centre of the educated world. However, its conservative attitude toward the humanism of the fifteenth century; the civil wars; the constantly increasing centralization of the French Government, which crippled free university life—all contributed toward the gradual decline of its fame. The theological faculties, owing to the establishment of the bishop seminaries, lost their prestige as educational institutions, and degenerated into mere degree-conferring bodies. The famous jurists also forsook Paris for the practical business of administration in the provinces. The faculties of arts and the colleges came to serve the purposes of secondary education, while most of the higher education fell into the hands of the Jesuits, who established a number of colleges in France. The university never flourished again as during the mediæval period. Henceforth the great scholars of France were connected with the Academy. During the Revolution the university went down with the rest of the French universities. In 1808 Napoleon reorganized it as part of the University of France, and until 1896 it was known as the Facultés de Paris. In 1902 it consisted of the following faculties, school, and administrative body: (1) The Conseil de l'université; (2) the Protestant theological faculty; (3) the medical faculty, including the Musée Dupuytren, established in 1835; (4) the law faculty; (5-6) faculties of science and letters at the Sorbonne; (7) the school of pharmacy.

The total attendance is over 12,000. The library contained, in 1902, 477,590 volumes, including 1590 manuscripts. Consult: Jourdain, *Histoire de l'université de Paris au XVIII^e et au XVIII^e siècle* (Paris, 1862-66); Budinszky, *Die Universität in Paris und die Fremden an derselben im Mittelalter* (Berlin, 1876); and Denifle and Chatelain, *Chartularium Universitatis Parisiensis* (Paris, 1889 et seq.). See NATIONAL EDUCATION, SYSTEMS OF.

PARIS (Lat., from Gk. Πάρις, of unknown etymology), also known as ALEXANDER. In Greek legend, the second son of Priam, King of Troy, and Hecuba, and cause of the Trojan War. His mother dreamed that she gave birth to a fire-brand, which set the whole city on fire, a dream interpreted by Helenus or Cassandra to signify that the child would bring the city to destruction. To prevent this, Priam caused the infant to be exposed upon Mount Ida, where he was found and brought up by shepherds, among whom he distinguished himself. After a time he accidentally discovered his origin, and was received by Priam as his son, but continued to live on Mount Ida, where he had won the love of the nymph Cēnone, daughter of the river-god Cebren. While on Ida he was appealed to as umpire in a strife which had arisen among the three goddesses, Hera, Athene, and Aphrodite, as to which of them was the most beautiful, the goddess Eris (strife) having revengefully flung among them at the marriage of Pelus, to which she had not been invited, a golden apple (of discord) inscribed *To the Most Beautiful*. Each of the three endeavored to bribe him. Hera promised him dominion over Asia; Athene, military renown; Aphrodite, the fairest of women for his wife, Helen, the wife of Menelaus. Paris decided in favor of Aphrodite, hence the animosity which the other two goddesses displayed against the Trojans in the war that followed. Paris now equipped a ship and sailed to Sparta, where, with the aid of Aphrodite, he persuaded Helen to elope with him to Troy. Upon this followed the Trojan War, in which the princes of Greece joined Menelaus in his endeavor to recover his wife. In the *Iliad* Paris is at times represented as a cowardly boaster, disliked by his countrymen, while in other portions of the poem he is valiant and skillful in battle, especially with his bow, and is welcomed on his appearance by the Trojans. His manly beauty is more than once praised. In the epic he was said to have killed Achilles, while endeavoring to force his way through the Scæan gate into Troy, but the later writers elaborated the story of Achilles's love for Polyxena, and represented the Greek hero as enticed to the temple of Apollo and there murdered by Paris and Deiphobus. The *Little Iliad* told of the death of Paris by the arrow of Philoctetes, who owned the bow and arrows of Heracles. The Alexandrian writers, to whom the Cēnone episode is due, added the version that when Paris was wounded by the poisoned arrow he turned for healing to his old love on Mount Ida. She, however, refused to employ her magic skill, and the hero died, whereupon, in remorse, she destroyed herself. Representations of Paris are common in ancient art. On the earlier vases he appears at the judgment of the goddesses as a shepherd, often with the lyre, and amid his flocks. Later he is usually distinguished by the

Phrygian cap, and sometimes by the close-fitting trousers and jacket worn by the Asiatics.

PARIS, pá'rēs', GASTON (1839-1903). A French philologist, born at Aveny, son of Paulin Paris. He studied Romance philology for two years at Göttingen and Bonn, where he was for a while associated with the illustrious founder of modern Romance philology, Friedrich Diez. Having gone back to France, he worked at the Parisian Ecole des Chartes and became director of the Ecole des Hautes Etudes. He gave to his department of it such fame that students came to him from all parts of the world. He was also soon associated with the work in the Collège de France, and succeeded to the chair of his father when the latter retired in 1872. He was one of the staff of the *Revue Critique* from 1866 to his death, and in 1872 with his life-long fellow-worker, Paul Meyer, he founded the *Romania*, one of the most important of the Romance journals. In 1895 Professor Paris was made director of the Collège de France, and in 1896 he was elected to the French Academy. He had long been a member of the Institute. Since Sainte-Beuve, who gave little attention to the linguistic side, the French nation had had no critic so great as Gaston Paris. In him the philologist and the lover of beauty were at one. Paris was reared among literary men. Toward the end of his life he was at the head of scientific literary criticism in France. He had no showy theories, but his discoveries were many, and his knowledge was so wide that other great scholars were loath to assail his views. Yet his influence, which had been won by his steadfastly scientific attitude, and by the moderation, clearness, and charm of his thought, created no doctrinary school. He had rare personal dignity, a keen but sober wit, an extraordinary memory, and a wide acquaintance with men. Paris devoted himself mainly to the language and literature of France. He excelled not only in textual criticism, but in teaching and in arousing a sound love of old literature. In 1902 Paris became head editor of the *Journal des Savants*, and had other great work on hand when he died in Cannes, March 5, 1903, the most famous of Romance scholars, with disciples in all civilized countries. Some of the more important of his productions, besides the manifold articles to be found in the *Romania* and other reviews, are: *Etude sur le rôle de l'accent latin dans la langue française* (1862; new ed. 1896); *De Pseudo-Turpino* (1865); *Histoire poétique de Charlemagne* (1865); *Les contes orientaux dans la littérature française du moyen âge* (1875); *Le petit Poucet et la grande Ourse* (1875); *La poésie au moyen âge* (1885); *La littérature française du moyen âge* (Paris, 1888); *Poèmes et légendes du moyen âge* (1900); *Poètes et penseurs* (1896). Perhaps his most fascinating work is his biography and literary estimate of François Villon (1901). Among the notable texts edited by him are the *Vie de Saint Alexis*, with L. Pannier (1872; new ed. 1887), a remarkable work, and the *Extraits de la chanson de Roland*; also *Merlin*, and *Les miracles de Notre Dame*. Consult: Todd, "Gaston Paris, Romance Philologist and Member of the French Academy," in *Publications of the Modern Language Association*, vol. xii. (Baltimore, 1897); and *Romania* for April (Paris, 1903).

PARIS, JOHN AYRTON (1785-1856). An English physician and author. He was born and was educated at Cambridge, where, after pursuing courses of study at Edinburgh, he took his medical degree in 1808. He began the practice of his profession in London, was made physician to Westminster Hospital, and later settled in Cornwall. There he obtained a large practice, studied natural history, and founded the Royal Geological Society of Cornwall. Returning to London, he lectured on materia medica and the philosophy of medicine at the Royal College of Physicians. He became a censor of the Royal College of Physicians in 1817; delivered the Harveian oration before it in 1843, and the next year succeeded Sir Henry Hallford in its presidency, retaining that office until his death. Among his works are a *Pharmacologia* (1812), long the standard treatise on the subject; a *Treatise on Diet* (1827); *Philosophy in Sport Made Science in Earnest* (1827), a popular treatise on physical science; and a *Life of Sir Humphry Davy* (1831).

PARIS, PA'RI', LOUIS PHILIPPE D'ORLÉANS, Count of (1838-94). Pretender to the crown of France. He was born in Paris, August 24, 1838, being the eldest son of Ferdinand, Duke of Orleans, and grandson of Louis Philippe. On the death of his father in 1842 the Count of Paris became the French heir apparent. He was carefully educated in Germany and later in England, whither his mother had removed after the events of 1848. A journey to Syria with his brother, the Duke of Chartres, in 1859, resulted in the publication of a journal of the voyage, entitled *Damas et le Liban*. Early in 1861 the Count of Paris became interested in the Civil War in the United States, offered his services with his brother's to the Federal Government, and with their uncle, the Prince de Joinville, the two were attached to the staff of General McClellan, with the rank of captain. They remained in active and efficient service in all the disastrous battles of that campaign, and only retired when the attitude of France toward Mexico gave cause of offense to the United States. The Count of Paris returned to England in the summer of 1862, and shortly afterwards began to appear as a contributor to the *Revue des Deux Mondes*, though under a nom de plume. In 1864 he married his cousin Isabella, the daughter of the Duke of Montpensier. In 1871 he was chosen to the National Assembly, which voted that his property in France, confiscated by Napoleon, should be restored. In 1873 the Count of Paris made a formal resignation of the claims of his family to the throne of France by a visit to the Count of Chambord at Frohsdorff, but after the latter's death in 1883 he was generally regarded as the Count of Chambord's successor and as the chief of the Legitimist Party. By the Expulsion Act of 1886 the Count of Paris and his family were compelled to leave France. He settled in England and devoted himself to literary pursuits, though occasionally issuing a royal manifesto to the people of France. Of his eight children, the most noteworthy is the eldest, Philippe, Duke of Orleans. The Count of Paris revisited the United States, where he was well received, in 1890. He died at Stowe House, Buckinghamshire, England, September 8, 1894. Of his writings, the most important are: *De la situation des ouvriers en Angleterre* (1869), which

has been translated into English and German, and *Histoire de la guerre civile en Amérique* (1874-75), an able military history, which has been translated.

PARIS, MATTHEW (c.1200-59). The greatest English historian of the Middle Ages. In 1217 he entered the Monastery of Saint Albans, where Roger of Wendover (q.v.) was historiographer. When Roger died in 1236 Paris took up the work of continuing the *Chronica Majora*, which had been brought to the year 1235. Paris evidently enjoyed a wide renown even in his own day, for about 1246 he was specially invited by King Haakon IV. of Norway to reorganize the Abbey of Saint Benet Holm, and was ordered by Pope Innocent IV. to investigate its spiritual condition also. He returned to England in 1249 laden with presents. With the year 1250 Paris intended to end his chronicle, but new events aroused his interest, and the great work ended only nine years later. An abridgment which he prepared is known as *Historia Minor*, and extends from 1067 to 1253, and contains a few incidents not noted in the *Chronica Majora*. In addition, Paris wrote the *Vita Abbatis S. Albani*, and the *Additiones*; the latter contains charters, etc., supplementing both the *Chronica Majora* and the *Vita*. He died probably about May, 1259. In his own day Paris was considered a universal scholar, and was indeed versed in most of the learning of his time. There is a continuation of his works ascribed to Rishanger (q.v.). All of the works of Paris are published in the *Rolls* series. For other editions and works connected with Paris, consult: Gross, *Sources and Literature of English History* (London, 1900); Potthast, *Bibliotheca Historica Medii Aevi*, vol. ii. (Berlin, 1896).

PARIS, PA'RÊS', PAULIN (1800-81). A French historian and philologist, born at Avenay, Marne. His appointment in the manuscript department of the National Library gave him opportunity to study the old French writers. He was made a member of the Academy of Inscriptions (1837), wrote memoirs for its publications, and for those of other learned societies to which he belonged, and was professor of mediæval history in the Collège de France (1853-72). His most notable achievement was his catalogue, *Manuscrits français de la bibliothèque du roi* (1836-48). Besides other translations, he made a French edition of Byron (1830-32-36). He edited the *Grandes chroniques de France* (1836-40) and other works. His own *Etudes sur François I.* (1885) were published posthumously.

PARIS BASIN. A geologic basin eroded in the Cretaceous rocks of the vicinity of Paris and subsequently filled with Tertiary marls and sands. The basin occupies an oblong area of about 20,000 square miles, which is divided by the Seine into a northern and a southern half. The underlying strata are chiefly remarkable for the rich harvest of organic remains which they supplied to Cuvier, and which led to the foundation of the modern science of paleontology.

PARISH (OF. *parosse*, *paroiche*, Fr. *paroisse*, from Lat. *paræcia*, *parocia*, from Gk. *παροικία*, *paroikos*, ecclesiastical district, from *παρὰ*, *paros*, neighboring, from *παρὰ*, *para*, beside, beyond + *oikos*, *oikos*, house). A division either of territory or population, originally ecclesiastical.

tical, but in some places also civil. The word in its Greek form was applied in its earliest ecclesiastical use to a body of Christians living in a city and its neighborhood to distinguish them from the other inhabitants. Gradually it came to mean the district under the care of a bishop. The subdivision of the dioceses of the kingdoms of England into what are now known as parishes is not supposed to have taken place much earlier than the time of King Edgar (970), the boundaries of the parishes being fixed by those of manors. In this later ecclesiastical sense, the parish came to be the territory committed to the charge of one priest. But since the modern development of the English poor laws the term parish in the statutes defines a district for which a separate poor rate is or may be made and a separate overseer appointed. On the temporal side the administration is in the hands of the vestry, and especially of the church wardens, one of whom is usually nominated by the incumbent, the other elected by the ratepayers. Their duties are to have a care for the fabric of the Church and other property, preserve order during divine service, and provide whatever is necessary for its due celebration. There has for many centuries been an apparent confusion in the use of the term, arising from the fact that as a rule the same body of individuals represented both the civil and the religious organizations. From an early period, however, the ecclesiastical side of the parish has predominated over the civil side, and this was the condition of affairs at the time of the first English settlements in America. It was in Virginia that the parish as it existed in England was developed, although, on account of the peculiar circumstances of the colony, it came later than the military and civil divisions, and therefore never possessed civil powers equal to the parishes of the mother country. The word parish was used in the New England colonies to denote the township from the ecclesiastical point of view, as well as a portion of a township not possessing town rights. In the United States at the present time the word parish as an ecclesiastical district is used loosely by the Episcopal and Reformed Episcopal churches, and often with a more definite territorial limitation by the Roman Catholic Church. In the Episcopal Church the parish is the local unit of organization, and, as a rule, possesses a corporation composed of the rector, wardens, and vestrymen. In Louisiana the term parish is given to the civil territorial divisions called counties in other States.

PARISH CLERK. A secular officer in the parishes of the Church of England and in some of the colonial churches of the Anglican communion. It is the duty of a parish clerk to represent the congregation in public worship. A person in holy orders may be appointed, but such a clerk is usually a layman, who by the canon law is required to be at least twenty years of age and of competent skill in singing.

PARISH SCHOOL. A term applied to institutions located in the district called the parish.

In the capitulary of 789 Charles the Great directed every monastery to have its school where boys might be taught the Psalms, the system of musical notation, singing, arithmetic, and grammar. Such schools would, of course, reach only a

very little beyond those designed for the Church, but in 796 Theodulphus, Bishop of Orléans, issued a similar capitulary to the clergy of his diocese, requiring them to give gratuitous instruction to the children of the laity in every town and village. From time to time other decrees by both Church and State attempted to render more effective the popular instruction that the clergy of France were supposed to give. After the revocation of the Edict of Nantes (1685), Louis XIV. decreed that there should be in every parish a school to teach the Roman Catholic religion, reading, and even writing. The 'Brethren of the Christian Schools,' founded in 1679 by La Salle, a canon of the cathedral church at Rheims, afforded a most effective means of education for the common people.

The early Protestant reformers, Luther, Melancthon, Zwingli, Knox, and others, were anxious that the common people should have proper religious instruction, and to this end they deemed the rudiments of reading and writing of the greatest importance. They urged upon the pastors the duty of attending to this matter, and the early Protestant parish schools either were taught by the pastors or their assistants or were at least under their supervision. As the schools were taken in hand by the State, ecclesiastical supervision was retained, and it has been done away with very slowly, vestiges of it remaining in Prussia even to-day.

Consult: M. Arnold, *Popular Education of France* (London, 1861), and Balfour, *Educational Systems of Great Britain and Ireland* (Oxford, 1898).

PARISIUS, pá-ré-zé-us, LUDOLF (1827-1900). A German politician and author. He was born at Gardelegen, studied law at Halle, and practiced in his native town. In Berlin he became prominent in the politics of the Progressist Party as an editor of the *Parlamentarische Korrespondenz aus der Fortschrittspartei*, and a member of the Prussian House of Deputies. Afterwards he joined the National Liberal Party, and sat in the Reichstag in 1874-77 and 1881-87. In 1871 he was made conspicuous by his attacks on Von Mühler, Minister of Education. He wrote various legal commentaries; a valuable history, *Deutschlands politische Parteien und das Ministerium Bismarcks* (1877); and several novels.

PARIS SKETCH-BOOK, THE. A collection of sketches and stories by W. M. Thackeray (1840).

PARJANYA, pār-jān'yā. In the Veda (q.v.), the rain-god. He is mentioned about thirty times in the Rig-Veda, where he is celebrated in three hymns. His action, however, is not wholly independent, as he, like the Maruts, is subject to Mitra and Varuna (q.v.). Parjanya, as being a rain-deity, is frequently associated with thunder, and occasionally also with lightning. It naturally follows from his functions that he is in a special degree the god who promotes and fosters vegetation. His wife is by implication the earth, although one passage of the Atharva-Veda expressly calls her name Vasa. Parjanya is mentioned in connection with several other deities, especially with Vata, the wind, and less often with the Maruts, the storm-gods, and with Agni, the fire. He has likewise many points of resemblance with Indra (q.v.), with whom in the epic he is regularly identified.

Parjanya is often thought to be identical with the Lithuanian thunder-god Perkūnas, but this view must be regarded as more inviting than probable. Consult Macdonell, *Vedic Mythology* (Strassburg, 1897).

PARK. See PARKS AND PLAYGROUNDS.

PARK (MEng. *park*, *parrok*, from OF., Fr. *parc*, and from AS. *pearroc*, OHG. *pfarrh*, Ger. *Pferch*, *park*, of uncertain etymology, possibly connected with provincial Eng. *par*, inclosure for domestic animals, and with OHG. *sparro*, Ger. *Sparren*, Eng. *spar*), MILITARY. Any inclosed space in which is stored either guns, wagons, or supplies. Specifically, an artillery park is one consisting of guns and their equipment; and similarly an engineers' park would consist of wagons, pontoons, animals, etc. Wagons or other train vehicles, brought together for purposes of storage, camping, or for defense against attack, are said to be parked.

PARK, EDWARDS AMASA (1808-1900). An American theologian. He was born in Providence, R. I., December 29, 1808. He graduated at Brown University in 1826, Andover Seminary in 1831, and was ordained as colleague pastor with Rev. Richard Salter Storrs of Braintree, Mass., in the latter year. In 1835 he became professor of intellectual philosophy at Amherst College, and the following year was called to Andover Theological Seminary as professor of sacred rhetoric. Nine years later he was transferred to the chair of systematic theology, succeeding the first incumbent, Rev. Dr. Leonard Woods. In this position Professor Park remained till he retired from active labor in 1881. He died June 4, 1900. Dr. Park was a famous preacher, but he was before all things else a teacher, and his influence from his lecture room was second to that of no man of his generation. In a sense he was the last of the 'New England' theologians. (See NEW ENGLAND THEOLOGY.) His system may be defined in a phrase as that of the Westminster Confession, grounded upon a new philosophy, and purged of its artificial and realistic details. His literary labors appeared chiefly in the *Bibliotheca Sacra*, which he founded in 1844 and continued to edit till 1884. He also published memoirs of Samuel Hopkins (Boston, 1854), Nathanael Emmons (ib., 1861), and others; and a volume of *Discourses on Some Theological Doctrines as Related to the Religious Character* (Andover, 1885). Consult the memorial address by R. S. Storrs (New York, 1900), and the volume in celebration of his ninetieth birthday (Boston, 1898).

PARK, MUNGO (1771-1806). An eminent African explorer. He was born near Selkirk, in Scotland, was educated in Edinburgh University, and devoted his attention particularly to the study of surgery. In 1792 he went to the East Indies as a surgeon in the sea service of the East India Company. Returning from his first voyage, he offered his services to the African Association, which for a half century was the chief promoter of the exploration of Africa. Under its auspices, in 1795, at the age of twenty-four, he went to the river Gambia with instructions to reach the Niger River, and to ascertain its source, its course, and, if possible, its termination. After acquiring some knowledge of the Mandingo language, he set out for the interior in December, 1795, crossed the Senegal,

and finally reached the Niger at Sego in July, 1796. He pursued his journey down the river until he arrived within fifteen days' travel of Timbuktu, which he was unable to reach on account of the tropical rains, and because he had entered the country of merciless and fanatical Mohammedans. After having been in the interior for nineteen months he returned home and wrote *Travels in the Interior of Africa* (1799; frequently reprinted).

The achievements of this solitary white man in inner Africa excited the widest interest. He had brought to the knowledge of his generation more important facts respecting the geography of Western Africa than had been collected by any former traveler. By pointing out the positions of the sources of the Senegal and Gambia, he showed where to look for the elevated parts of the country, and for the water-partings between the Gambia and Niger, and between the fertile country and the desert. The remarkable success of his first journey induced the British Government to employ him to complete the discovery of the course of the Niger. He received a captain's commission, and was accompanied by his brother-in-law, Anderson, and forty-five English soldiers, besides natives. He started into the interior in April, 1805. The employment of white soldiers soon proved to be a fatal mistake. Many died, and when the party embarked in canoes on the Niger to float down to its mouth, it had dwindled to seven men. Anderson died in October. Undaunted by his misfortunes, Park was resolved to find the mouth of the Niger or die in the attempt. He sailed more than 1000 miles down the river, but entering a stretch of rapids, below Yuri on the lower river, while both shores were lined with hostile natives, the little vessel was wrecked, and Park and his three surviving comrades were drowned. The journal he sent home and information obtained by later explorers gave all the facts that are known about his last expedition. An "Account of the Life of Mungo Park," by Wishaw, was published in Park's *Journal of a Mission to the Interior of Africa* (1815).

PARK, ROSWELL (1852-). An American physician, born at Pomfret, Conn. He studied at Racine College and at Harvard, and in 1876 graduated at the medical department of the Northwestern University. During the following years he was interne at several hospitals and a member of the faculties of the Woman's Medical College, Chicago, Northwestern University, and Rush Medical College. In 1883 he was elected professor of surgery at the University of Buffalo, and afterwards became surgeon to the Buffalo General Hospital and director of the New York State Pathological Laboratory at Buffalo. His writings include *Text Book of Surgery* (1896) and *History of Medicine* (1897).

PARK CITY. A city in Summit County, Utah, 31 miles east-southeast of Salt Lake City: on branches of the Union Pacific and the Rio Grande Western railroads (Map: Utah, B 1). It is in a rich silver-mining district, and its principal mechanical industries are connected with metallurgical work. Population, in 1890, 2850; in 1900, 3759.

PARKE, JOHN GRUBB (1827-1900). An American soldier, born in Chester County, Pa. He graduated at West Point in 1849, and was

assigned to the topographical engineers. From 1857 until the outbreak of the Civil War he was engaged in surveying the northwest boundary. In 1861 he was commissioned brigadier-general of volunteers, and was placed in command of one of the three brigades in Burnside's North Carolina expedition, during which he assisted at the capture of Roanoke Island (February 8, 1862) and New Berne (March 14, 1862), and commanded at the capture of Fort Macon (April 26, 1862). For these services he was promoted major-general of volunteers in 1862, and was made chief of staff of the Ninth Corps, with which he served at South Mountain (September 14, 1862) and Antietam (September 16-17, 1862). When his superior, General Burnside, was appointed commander of the Army of the Potomac, Parke remained his chief of staff until after the battle of Fredericksburg (December 13, 1862). He accompanied the Ninth Corps into Kentucky the following March, and commanded it when sent to aid Grant before Vicksburg. At Jackson, Miss. (July 16, 1863), he commanded Sherman's left wing; but when his corps was ordered north he accompanied it and took part in the siege of Knoxville (November 15-December 5, 1863), and the pursuit of Longstreet into Virginia. He participated in the battles of the Wilderness and Spottsylvania. During the latter part of the Richmond campaign he again commanded the Ninth Corps, which he led at the capture of Petersburg and in the pursuit to Appomattox. He was mustered out of the volunteer service on January 15, 1866, and returned to the boundary survey, which had been interrupted by the outbreak of the war. Subsequently he had charge of various military works, and from 1887 till 1889 was superintendent of West Point. In the latter year he retired from active service with the rank of colonel of engineers and the brevet of major-general in the Regular Army. He published *Compilations of Laws of the United States Relating to Public Works for the Improvement of Rivers and Harbors* (1877; rev. ed. 1887), and *Laws Relating to the Construction of Bridges Over Navigable Waters* (1882; rev. ed. 1887).

PARKE, EDWARD HARPER (1849—). An English Chinese scholar. From 1860 to 1871, in the character of student interpreter, he traveled in Mongolia, and afterwards he served in British consulates at Wenchow, at Fusan, and at Shanghai, and traveled through Oceanica, Eastern Asia, and North America. He retired from the consular service in 1895, became reader in Chinese at University College, Liverpool, in 1896, and in 1901 was appointed to a chair in Chinese at the Owens College, Manchester. His works include: *Comparative Chinese Family Law* (1879); *Up the Yangtze* (1892); *Burma* (1893); *A Thousand Years of the Tartars* (1895); and *China* (1901).

PARKER, EDWIN POND (1836—). A Congregational clergyman. He was born at Castine, Maine, graduated from Bowdoin College in 1856, and completed his divinity course at Bangor in 1859. The next year he was installed pastor of the Second Congregational Church at Hartford, Conn., and has continued in its ministry ever since. He is the author of *The Ministry of Beauty*; *Memorial of Horace Bushnell*; *History of the Second Church, Hartford* (1892); and *Historical Discourse on the One Hundredth*

Anniversary of the Missionary Society of Connecticut. He is also the writer and composer of hymns and tunes, and the compiler of the *Book of Praise*, *Sunday School Songs*, and *Christian Hymnal*.

PARKER, FOXHALL ALEXANDER (1821-79). An American naval officer, born in New York City. He graduated at the Naval School in Philadelphia in 1843, served against the Florida Indians, and in 1850 became a lieutenant. During the Civil War he first commanded the gunboats *Mahaska* and *Wabash*, and after 1863 the Potomac flotilla. In 1866 he was promoted to be captain, and in 1872 to be commander. The next year he was chief signal officer of the navy, and from 1878 until his death was superintendent of the Naval Academy at Annapolis. He published: *Fleet Tactics Under Steam* (1863); *Squadron Tactics Under Steam* (1863); *The Naval Howitzer Afloat* (1865); *The Naval Howitzer Ashore* (1865); *The Fleets of the World: The Galley Period* (1876); and *The Battle of Mobile Bay* (1878).

PARKER, FRANCIS WAYLAND (1837-1902). An American educator, born in Bedford, N. H. He was principal of a school in Manchester, N. H. (1865-68), and of one in Dayton, Ohio, from 1868 until 1872, when he went to Germany for a course at the Berlin University. Afterwards he was school superintendent in Quincy, Mass. (1875-80), supervisor in Boston (1880-83), principal of Cook County, Ill., Normal School (1883-96), and of the Chicago Normal School (1896-99). He was appointed president of the Chicago Institute in 1899. His publications include: *Talks on Teaching* (1883); *The Practical Teacher* (1884); *Course in Arithmetic* (1884); and *How to Study Geography* (1889).

PARKER, Sir (HORATIO) GILBERT (1862—). A Canadian novelist, born at Camden East, Addington, Ontario. He studied pedagogy in Ottawa, and taught in Frankford and Seaforth. He studied for the ministry at Trinity University, Toronto, held a curacy at Trenton for a short time, and taught in the Belleville Deaf and Dumb Institute, but in 1886 went for his health to Australia. There he entered journalistic work and the writing or adapting of plays, but after his return to Canada was principally known as a writer of romances and short stories, such as *Pierre and His People* (1892); *Mrs. Falchion* (1893); *The Translation of a Savage* (1894); *When Valmond Came to Pontiac* (1895); *The Seats of the Mighty* (1896); *The Battle of the Strong* (1898); *The Lane that Had no Turning* (1900); *The Right of Way* (1901); and *Donovan Pasha* (1902). He made his home in England, was elected Conservative member of Parliament for Gravesend in 1900, and was knighted in 1902. The dramatic quality of his later books won for them considerable popularity, despite their disregard of truth in local color.

PARKER, HORATIO WILLIAM (1863—). An American composer and teacher. He was born at Auburndale, Mass., and was a pupil first of his mother, then of George W. Chadwick and Stephen A. Emery, and subsequently of the Munich Conservatory. Upon his return to America he held several important appointments, commencing with that of organist of the Garden City Cathedral, Long Island, and professor of music at the Cathedral School. In 1886

he was organist and choirmaster at Saint Andrew's, New York, and two years later went to the Church of the Holy Trinity, Boston. He became professor of music at Yale University in 1894. His oratorio, *Hora Novissima* (1893), has been called by European critics one of the finest of American compositions. Other compositions are: *The Holy Child* (1890); *The Kobold* (1891); *The Dream King* (1893); *Saint Christopher* (1896); *A Northern Ballad*, for orchestra (1899); and numerous choruses for female voices, male voices, anthems, organ pieces, transcriptions, as well as considerable chamber music.

PARKER, Sir HYDE (1739-1807). A British admiral, son of the vice-admiral of the same name, under whom he served the first years he was in the navy. He was knighted in 1779 for his success three years before in occupying the North River, which was strongly fortified by the colonial forces. He served with some slight distinction through the Revolutionary War, was appointed commander-in-chief at Jamaica in 1796, and in January of 1801 was sent into the Baltic to terrorize Denmark. His lieutenant, Lord Nelson, urged bolder and more decisive action than seemed good to Parker, and in the battle off Copenhagen took command in the lighter vessels because of the shallow channel, and refused to obey the order to retreat issued by Parker, who was loath to go counter to the customary rules of naval warfare. Parker was soon replaced by Nelson, and saw no further service.

PARKER, JOEL (1816-88). An American politician, born near Freehold, N. J. He graduated at Princeton in 1839, and three years later was admitted to the bar. In 1847 he was elected to the Legislature by the Democrats, and in 1852 was appointed prosecutor of the Pleas. At the outbreak of the Civil War he was appointed by the State Government a major-general of militia, and devoted himself zealously to the work of enlisting volunteers. The next year, 1862, he was elected Governor by an unprecedented majority; for though a Democrat and opposed to the Abolitionists, he was a strong Union man. So energetic and successful was he in raising troops that the draft was never applied in New Jersey, her quota being made up entirely of volunteers; and during Lee's invasion of Pennsylvania in 1863 he induced several recently returned regiments to go again to the front, thereby earning the thanks of the neighboring State. Equally successful was his financial policy, for during his administration the State bonds never sold below par, and the adoption of his plan for wiping out the war debt resulted in its being paid off without the imposition of a special tax. At the expiration of his term as Governor, in 1866, he retired to private life, but in 1871 was again elected. In 1875 he was appointed Attorney-General, and in 1880 he was appointed an associate justice of the State Supreme Court, and was reappointed in 1887.

PARKER, JOSEPH (1830-1902). An English Congregational clergyman. He was born at Hexham, Northumberland. He had but little training in the schools, but read much. In 1852 he visited London, preached a number of times at Whitefield Tabernacle, Moorfields, and employed his leisure in attending classes at Uni-

versity College, London. The next year he became pastor of the Congregational Chapel at Banbury, and remained five years, when he was called to the Cavendish Street Chapel, Manchester. He at first declined on account of a debt contracted in building a new church at Banbury; but the Manchester people assumed the debt, and the transfer was effected. In 1869 he left Manchester and went to London to preach at the Old Poultry Chapel, Cheapside. Here his success was so great that the chapel became inadequate for the congregations, and in May, 1873, the foundations were laid for the City Temple on Holburn Viaduct, and the church itself was opened a year later. He continued pastor of the church until his death at his home in Hampstead. His eccentricities did not always secure public approbation, but he was fortunate in being surrounded by enthusiastic admirers who turned the edge of public criticism. He was twice chairman of the London Congregational Board, and twice chairman of the Congregational Union of London and Wales. In 1887 he visited America, preached in Plymouth Church, Brooklyn, and delivered a eulogy on his friend, Henry Ward Beecher. His published works include: *Ecce Deus: Essays on the Life and Doctrine of Jesus Christ* (1868), a reply to *Ecce Homo: The Paraclete* (1874); *The People's Bible* (25 vols., 1885 sqq.); *People's Prayer Book* (1898); *Paterson's Parish* (1898). Works of an autobiographical nature are: *Springdale Abbey. Extracts from the Letters and Diaries of an English Preacher* (1869); *Tyne Chylde, My Life and Ministry, Partly in the Daylight of Fact, Partly in the Limelight of Fancy* (1883); *A Preacher's Life: An Autobiography and an Album* (1899). For his life, consult Adamson (New York, 1903).

PARKER, LOUIS NAPOLEON (1852-). An English composer and dramatist, born in Calvados, France, and educated at Freiburg in Breisgau, and at the Royal Academy of Music. From 1877 to 1896 he was director of music in Sherborne School. To this period belong his songs, cantatas, and instrumental music. He was made a fellow of the Royal Academy in 1898, and devoted himself to the drama, being connected as sole author, collaborator, or translator with many successful plays. Among those which he translated, *Magda*, *Cyrano de Bergerac*, and *L'aiglon* should be mentioned.

PARKER, MATTHEW (1504-75). The second Protestant Archbishop of Canterbury. He was born at Norwich, August 6, 1504, studied at Corpus Christi College, Cambridge, and was ordained a priest in 1527. At the university he was a distinguished student, and was from an early period favorably disposed toward the doctrines of the Reformation, and lived in close intimacy with some of the more ardent reformers. In 1535 he was appointed chaplain to Queen Anne Boleyn, who thought very highly of him. With this appointment he obtained the deanery of the monastic college of Stoke-by-Clare in Suffolk. Here he appears for the first time to have definitely sided with the reforming party in the Church and State, the sermons which he preached containing bold attacks on different Catholic tenets and practices. In 1538 Parker took the degree of D.D.; and in 1544, after some minor changes, became master

of Corpus Christi College, Cambridge, which he ruled admirably. Three years later he married and probably about this time drew up his defense of the marriage of priests, entitled *De Conjugio Sacerdotum*. In 1552 he was presented by King Edward VI. to the rich deanery of Lincoln. On the accession of Queen Mary he refused to conform to the reestablished order of things, and was deprived of his preferments, and even obliged to conceal himself. It does not appear, however, that he was eagerly sought after by the emissaries of Mary; for he was very unwilling to disturb the framework of the Church. On the death of Mary and the accession of Elizabeth (1558) he was appointed by the Queen Archbishop of Canterbury. The consecration took place in Lambeth Chapel, December 17, 1559.

The subsequent history of Archbishop Parker is that of the Church of England. The difficulties that beset him were very great. Elizabeth herself was addicted to various 'popish' practices, such as the use of images, and was strongly in favor of the celibacy of the clergy. But his greatest anxiety was in regard to the spirit of sectarian dissension within the bosom of the Church itself. Already the germs of Puritanism were beginning to spring up, and there can be no doubt that their growth was fostered by the despotic caprices of the Queen. Parker himself was manifestly convinced that if ever Protestantism was to be firmly established in the land at all, some definite ecclesiastical forms and methods must be sanctioned to secure the triumph of order over anarchy, and he vigorously set about the repression of what he thought a mutinous individualism incompatible with a catholic spirit. That he always acted wisely or well cannot be affirmed; he was forced into intolerant and inquisitorial courses, and as he grew older he grew harsher, the conservative spirit increasing with his years. He gave the English people the "Bishops' Bible," which was undertaken at his request, prepared under his supervision, and published at his expense in 1572. Much of his time and labor from 1563 to 1568 was given to this work. He had also the principal share in drawing up the *Book of Common Prayer*, for which his skill in ancient liturgies peculiarly fitted him, and it was under his presidency that the *Thirty-nine Articles* were finally reviewed and subscribed by the clergy (1562). Parker died in the palace at Lambeth, London, May 17, 1575.

Among other literary performances, Parker published in 1567 an old *Saxon Homily on the Sacrament*, by Ælfric of Saint Albans, *A Testimonie of Antiquitie Showing the Auncient Fayth in the Church of England Touching the Sacrament of the Body and Bloude of the Lord*, to prove that transubstantiation was not the doctrine of the ancient English Church; edited (1571) the histories of Matthew of Westminster and Matthew Paris (q.v.); and superintended the publication of a most valuable work, *De Antiquitate Britannicæ Ecclesiæ*, probably printed at Lambeth in 1572, where the Archbishop, we are told, had an establishment of printers, engravers, and illuminators. He also founded the 'Society of Antiquaries,' and was its first president; endowed the University of Cambridge, and particularly his own college, with many fellowships and scholarships and with a magnificent collection of manuscripts relating to

the civil and ecclesiastical condition of England, and belonging to nine different centuries (from the eighth to the sixteenth). His correspondence from 1535 on was published by the Parker Society (Cambridge, 1853). Consult his *Life* by Strype (best ed., 3 vols., Oxford, 1821), and in Hook's *Archbishops of Canterbury*, new series, vol. iv. (London, 1872). In his honor the Parker Society was formed, which published 53 volumes of Elizabethan ecclesiastical literature (Cambridge, 1841-54).

PARKER, PETER (1721-1811). A British naval officer, born probably in Ireland. He entered the navy and became lieutenant in 1743, and captain in 1747. He served in the West Indies, and took part in the capture of Belle Isle in 1761. For ten years he was out of the service on account of the reduction of the navy. He was knighted and restored in 1772, and on October, 1775, with a small squadron, was sent to coöperate with Sir Henry Clinton in the reduction of the Southern colonies of America. The attempt of Josiah Martin (q.v.) to arouse the Tories of North Carolina failed, and he proceeded to Charleston and made the unsuccessful attack on Fort Moultrie June 28, 1776. He aided Lord Howe in the capture of New York in September, and commanded the squadron which afterwards took possession of Rhode Island. In April, 1777, he was promoted to rear-admiral and placed in charge of Jamaica, in 1778. He became vice-admiral in 1779, was made a baronet when he returned to England in 1782, and became admiral in 1787. From 1793 to 1799 he was commander-in-chief at Portsmouth and succeeded Lord Howe as admiral of the fleet. He is perhaps best remembered as the friend and patron of Nelson.

PARKER, PETER (1804-88). A medical missionary and diplomat, born in Massachusetts; graduated at Yale College in 1831; studied theology and medicine at New Haven; was ordained and went to China as a missionary in 1834. He established a hospital at Canton, principally for eye diseases, but soon for other diseases. Dr. Parker possessed great surgical skill, and his fame spread rapidly. War breaking out in 1840 between England and China, the hospital was closed, and Dr. Parker returned to the United States. In 1842 he went back to China and reopened the hospital, which was soon crowded. In 1845 he resigned his connection with the American Board, and became secretary to the United States legation and interpreter of the new embassy, still having charge of the hospital. In the absence of the minister he acted as chargé d'affaires. In 1855, his health having failed, he again visited the United States, but by request of the Government he returned the same year to China as commissioner with full power to revise the treaty of 1844. This position he held until a change of administration in 1857, when, his health again failing, he returned to the United States, and settled in Washington. He published *Reports of the Ophthalmic Hospital at Canton* (Canton, 1836-52); *Statements Respecting Hospitals in China* (London, 1841); *Notes of Surgical Practice Among the Chinese* (Edinburgh, 1846).

PARKER, THEODORE (1810-60). An American preacher, scholar, and reformer. He was born in Lexington, Mass., August 24, 1810. His father was farmer and mechanic, and the son

shared actively in his occupations in the intervals of study at the district school and Lexington Academy. He entered Harvard College in 1830 and took the full course of study privately, passing all the examinations, but getting no A.B. degree because he had paid no tuition fees. In 1840 the degree of M.A. was given him. By that time he had mastered several languages which the college did not teach. In 1833 he entered the Harvard divinity school, from which he graduated in 1836. He was ordained June 21, 1837, and the same day installed pastor of the West Roxbury Unitarian Church. May 19, 1841, he preached in South Boston an ordination sermon, "The Transient and Permanent in Christianity," which attracted much attention and elicited violent opposition. With Channing's "Baltimore Sermon" of 1819 and Emerson's Divinity School Address of 1838, it is accounted one of the three epoch-making sermons of the Unitarian development. It was virtually a rejoinder to Andrew Norton's "Latest Form of Infidelity," which, replying to Emerson's address, contended that no man can be a Christian who accepts the teachings of Jesus for any other reason than that of their miraculous attestation. The sermon did not deny the miraculous in Christianity, but men's present need of it. Invited to preach in Boston, his first important sermons were gathered into a book, *A Discourse on Matters Pertaining to Religion* (1842), which increased the controversial heat. There were Unitarians who wished formally to expel him from their fellowship, and did achieve his virtual exclusion. In 1846 the Twenty-eighth Congregational Society was formed in Boston and he became its minister, preaching in the Melodeon until 1852, and for the next seven years to a congregation of several thousands in Music Hall. To much controversial preaching, he added more of the kind represented by his *Lessons from the World of Matter and the World of Man* (1865). He had inherited a tendency to consumption, and in January, 1859, was attacked with severe illness. He was taken to Santa Cruz and there wrote his *Experience as a Minister* (1859). From Santa Cruz he went to England and thence to Italy, and died, May 10, 1860, at Florence, where he is buried in the Protestant cemetery. Theodore Parker's Christianity was anti-supernatural; his philosophy intuitional, transcendental; his theology theistic, affirming God, the moral law, and immortality as certainties of consciousness. His conception of Jesus was purely humanitarian and his criticism of the Bible anticipated the results of more recent orthodox scholarship. He was one of the most conspicuous leaders of the New England abolitionists, uniting a great personal admiration for Garrison with some differences from his views and aims. His works have been published collectively (edited by Frances Power Cobbe, 14 vols., London, 1863-70; 10 vols., Boston, 1870). Consult also his *Historic Americans* (Boston, 1870); *Discourse on Matters Pertaining to Religion*, with introduction by Hannah E. Stevenson (New York, 1871); *Prayers*, with memoir by F. B. Sanborn (Boston, 1882); *Views of Religion*, with introduction by James Freeman Clark (ib., 1885); *West Roxbury Sermons* (ib., 1892). For his life, consult Weiss (New York, 1864), Frothingham (Boston, 1874), and Chadwick (with full bibliography, ib., 1901).

PARKER, THOMAS JEFFERY (1850-98). A zoölogist, born in London. He received his education in the Royal School of Mines and in the University of London. From 1872 to 1880 he was demonstrator under Huxley at South Kensington and lecturer in biology in Bedford College, London. In 1880 he became professor of biology in the University of Otago, Dunedin, New Zealand. He published a number of memoirs on New Zealand animals, important of which are: *On the Structure and Development of Apteryx* and *On the Cranial Osteology, Classification, and Phylogeny of the Dinornithidae*. He also wrote the following text-books, in which great literary and artistic ability are joined with extensive knowledge and pedagogical skill: *Zoöatomy* (1884); *Lessons in Elementary Biology* (1890); *A Text-book of Zoölogy* (with W. A. Haswell, 1897). The last named is the guide followed in the classification of animals in this Encyclopædia. Professor Parker died at Warrington, New Zealand, November 7, 1898.

PARKER, WILLARD (1800-84). An American surgeon, born at Lyndeborough, N. H. He graduated from Harvard in 1826, and from its medical school in 1830, when he was made professor of anatomy in Vermont Medical College, and in the same year professor of anatomy in the Berkshire Medical College, in which latter institution he became professor of surgery in 1833. The following year was spent in the hospitals of London and Paris; and upon his return he was appointed professor of surgery at the College of Physicians and Surgeons in New York City, a post he occupied for thirty years. He then became professor of clinical surgery. In 1854 he first described and reported cases of what is now known as malignant pustule. In 1865 he was made president of the New York State Inebriate Asylum at Binghamton, and in 1867 a member of the Metropolitan Board of Health. He was the first to point out the phenomenon of concussion of the nerves, as distinguished from that of the nerve centres, a condition which had previously been confounded with congestion or inflammation. Dr. Parker made several important discoveries in practical surgery, among which were the operation of cystotomy for the relief of certain cases of chronic cystitis, and that for the cure of abscess near the vermiform appendix, called at that time perityphilitis. He was also a successful operator in many important cases of ligature of the larger arteries. Consult his biography in *Medical Record*, xxv. 492 (New York, 1884).

PARKER, Sir WILLIAM (1781-1866). An English admiral, born at Alington Hall, Staffordshire. He went to sea when twelve years old on the *Orion*, which shared in Lord Howe's victorious engagement with the French fleet in 1794. As commander of the *Amazon* he was engaged in arduous service on the Portuguese and Spanish coasts and made a notable capture of the French frigate *Belle Poule* (1806). He was made a rear-admiral in 1830, and was knighted in 1834 for his services aboard the flagship *Asia* during the three preceding years. He remained in England as an Admiralty lord until 1841, when he was made vice-admiral in command in the East Indies, and his prompt action in capturing the ports and blockading the mouth of the Grand Canal brought the Chinese war to an end.

In 1845-52 he was commander-in-chief in the Mediterranean, and in 1857 he retired. He was created admiral of the fleet in 1863.

PARKER, WILLIAM KITCHEN (1823-90). An English naturalist and morphologist, born at Dogsthorpe, near Peterborough. He studied medicine at King's College, London, and began to practice in 1849. In 1873 he was appointed Hunterian professor in the Royal College of Surgeons, conjointly with Prof. W. H. Flower. His chief and most suggestive work was on the comparative osteology of the higher vertebrates, from amphibian to mammal. He constantly dwelt on the developmental side and on the phylogeny of the vertebrates, making many improvements in the classification of the types he studied. His larger monographs were: *Monograph on the Structure and Development of the Shoulder-Girdle and Sternum in the Vertebrata* (1868), and memoirs on the skull of the Batrachia (1878 and 1880), the urodelous Amphibia (1877), the common snake (1878), sturgeon (1882), Lepidosteus (1882), Edentata (1886), Insectivora (1886), and an elaborate paper on the development of the wing of the common fowl (1869). His general works were *Morphology of the Skull* (1877) and *On Mammalian Descent* (1885).

PARKERSBURG. A city and the county-seat of Wood County, W. Va., 98 miles southwest of Wheeling, on the Ohio River, at the mouth of the Little Kanawha, and on the Baltimore and Ohio, the Baltimore and Ohio Southwestern, and the Ohio River railroads (Map: West Virginia, C 2). It is regularly laid out with a gradual rise from the water's edge, the limits of the city extending for some distance on both rivers. A railroad bridge spans the Ohio at this point, one and one-third miles long, and another spans the Kanawha, both being imposing examples of engineering. The city has a fine public park, public library, Washington High School, Academy of the Visitation, Federal building, courthouse, and city hall. Blennerhasset Island, of historic interest, is in sight of the city. There are regular steamboat lines to important river ports. The city is favorably located in the centre of a fertile agricultural region, and has an active trade. There are several noted medicinal springs near the city, petroleum and gas wells, and coal and clay deposits of great value. The industrial interests are extensive. There are lumber mills, iron foundries, machine shops, furniture and chair factories, oil refineries, veneer and panel works, breweries, oil-well supply works, flouring mills, etc. Settled in 1773, Parkersburg was first incorporated in 1820, and in 1863 was chartered as a city. Under a charter of 1893, the government is vested in a mayor, chosen biennially, and a council which elects the majority of administrative officials. The water-works are owned and operated by the municipality. Population, in 1890, 8408; in 1900, 11,703.

PARKES, parks, Sir HARRY SMITH (1828-85). A British diplomatist, born in the Parish of Bloxwich, near Walsall, in Staffordshire, England. Left an orphan in tender years, he was educated at King Edward's Grammar School, Birmingham. In 1841 he went to Macao, China. By his energy and diligence he rose to be British Consul at Canton. On October 8, 1856, the Chinese seized the British ship *Arrow*, taking therefrom twelve Chinese sailors. Parkes's vig-

orous protest and Mandarin Yeh's defiant refusal to make amends led, in December, 1857, to the bombardment and occupation of Canton by the British forces, who were aided by French. In July, 1860, Parkes joined Lord Elgin in the Anglo-French punitive expedition to North China. After the capture of Tien-tsin, August 24th, Parkes, with twenty-five men, proceeding to T'ung-Chow under a flag of truce, was captured and imprisoned. Though suffering torture, he sent word to his chief to make no delay or compromise, and to take no account of him. The Allies arrived in Peking October 6th, and half of the prisoners—those not already murdered or starved—were delivered up October 9th; but in punishment of the Government's treachery, the Emperor's summer palace was pillaged and destroyed. Parkes was knighted in 1862, became Consul at Shanghai, and in 1865 was appointed British Minister to Japan. For eighteen years in this office, he enjoyed extraordinary popularity with his countrymen, and was always a stalwart upholder of British interests. He was a powerful element in the modern history of Japan, fearless, truthful, and a despiser of the shams and hypocrisies which marked the old school of Japanese statesmanship. In 1882 he was made G. C. M. G. He was appointed Minister to China in 1883 to succeed Sir Thomas F. Wade, and in the following year he also became Minister to Korea. He visited Seoul and negotiated a treaty there; but after the Tongking question and diplomacy, in which "he tired out the Tsung-li Yamen" (q.v.), he died of overwork, March 22, 1885. He was buried at Whitechurch in England. A marble bust of Parkes was unveiled in 1887 by Sir Rutherford Alcock in Saint Paul's Cathedral in London, and in April, 1890, his was the first public statue unveiled in Shanghai. See his *Life*, by Stanley Lane-Poole (London, 1894), and the *Dictionary of National Biography*.

PARKES, Sir HENRY (1815-96). An Australian statesman. He was born at Stoneleigh, in Warwickshire, England; was compelled by his father's poverty to earn his own living from the time he was eight years old, and was entirely self educated. When twenty-four years old he emigrated to Australia, and opened a little store in Sydney, New South Wales. He attracted some attention as a writer of verses, and gained considerable influence by his writings on economic subjects. In 1849 he founded the *Empire*, a liberal newspaper. Parkes became a zealous advocate of responsible government in New South Wales and of the larger question of an Australian federation. This last was the great work of his life. Upon the establishment of responsible government in 1858, he was elected to the New South Wales Parliament, and was re-elected in 1863. In 1866-68 he was a member of Sir James Martin's Ministry as Colonial Secretary; in 1871 he became Prime Minister, an office which he held again four times during the following years, and in 1891 he presided over the convention which made Australian federation a surety. The most important of his books are: *Australian Views of England* (1869); *Federal Government in Australia* (1890); *Fifty Years in the Making of Australian History* (his autobiography, 1892); and *An Emigrant's Home Letters* (1897). Consult Lyne, *Life of Sir Henry Parkes* (1897).

PARKHURST, CHARLES HENRY (1842—). An American clergyman. He was born at Framingham, Mass., and graduated from Amherst College in 1866. In 1872 he went to Europe and devoted two years to study at Leipzig, Halle, and Bonn. In 1874 he became pastor of the Congregational Church at Lenox, Mass., and in 1880 was called to the Madison Square Presbyterian Church, New York City. As a preacher he is rapid, nervous, and effective, dealing much in epigram, intensely practical, and fearless in utterance. In 1891 he was made president of the Society for the Prevention of Crime, and the investigations made by the society into the conditions of vice existing under police protection resulted in the appointment by the Senate, on January 30, 1894, of the Lexow Committee to investigate the police department; the work of this committee sustained the accusations brought by Dr. Parkhurst and his society. He has been a frequent contributor to the periodical press, and has published: *Forms of the Latin Verb Illustrated by the Sanskrit* (1870); *The Blind Man's Creed, and Other Sermons* (1883); *Pattern in the Mount and Other Sermons* (1885); *The Question of the Hour* (1896); *The Fellowship of Suffering* (1891); *Our Fight with Tammany* (1895); *Talks to Young Men* (1897); *Talks to Young Women* (1897); *Guarding the Cross with Krupp Guns* (1900).

PARKHURST, JOHN (1728-97). An English Bible scholar. He was educated at Rugby and Clare Hall, Cambridge, and took orders, but received no preferment, spending his life in retirement and study. He published a *Hebrew and English Lexicon* (1762), to which he added in later editions a Hebrew grammar and a Chaldean grammar; a *Greek and English Lexicon to the New Testament*, with a Greek grammar (1769); and treatises against Wesley's doctrine of assurance (1753), and Priestley's views concerning the divinity and preëxistence of Jesus Christ (1787). Parkhurst's lexicons had much merit, but were marred by fantastic theories which he adopted from John Hutchinson (q.v.). The edition of his Hebrew lexicon published in 1823 contains his life.

PARKIN, GEORGE ROBERT (1846—). A Canadian educator and author. He was born in New Brunswick, and was educated at the University of New Brunswick, and later at Oxford University, England. He was principal of the College School at Fredericton for several years, and began to take an active interest in the 'Imperial federation' question, upon which subject he spoke in various parts of the Empire. In 1895 he was appointed principal of Upper Canada College, Toronto. Afterwards he was made one of the trustees to arrange for the scholarships at Oxford provided for by the will of Cecil Rhodes. His publications include: *Imperial Federation* (1892); *Round the Empire* (1892); and *The Great Dominion* (1895).

PARKINGTON, JOHN H. SOMERSET, Baron Hampton. See HAMPTON.

PARKINSONIA (Neo-Lat., named in honor of John Parkinson, an English botanist of the seventeenth century). A genus of plants of the natural order Leguminosæ. *Parkinsonia aculeata* is a West Indian, Texas, and California shrub or small spiny tree with pinnated leaves, and large yellow flowers spotted with red. When

in flower it is one of the most splendid objects in the vegetable kingdom. It is often used for hedges, hence its name Barbadoes flower fence. The bark yields a beautiful, white, short but rather weak fibre, which might be used for paper-making. *Parkinsonia microphylla* and *Parkinsonia Torreyana*, both commonly known as Palo Verde tree or green-barked acacias, are small trees from western Texas to California and south to Mexico.

PARKMAN, FRANCIS (1823-93). A distinguished American historian, born in Boston, September 16, 1823. He graduated at Harvard in 1844, and then studied law for two years in the Harvard Law School, but never practiced. Having become interested in American history, he selected, as his life work, the writing of the story of the rise, decline, and fall of the French power in America. With this thought in mind, he at once began to prepare himself for his great task. In his vacations he visited historic scenes connected with the struggle between the French and the English, and made a study of several Indian tribes yet remaining in New England, New York, and Southern Canada. In 1846, feeling the need of seeing Indians who were still in an entirely primitive state, he traveled westward with a friend, and in company with a tribe of Dakotas spent several months in the Black Hills, in the Platte River country, and on the eastern slopes of the Rocky Mountains. An account of this expedition appeared the next year in *The Knickerbocker Magazine*, under title of "The Oregon Trail," and was republished two years later in book form as *California and the Oregon Trail*.

The hardships he endured while in the West resulted in the breaking down of his health, and he remained a semi-invalid all the rest of his life. Despite this misfortune, he continued in his work, and succeeded, in 1851, in bringing out the first of his historical works, *The Conspiracy of Pontiac* (2 vols.). Fourteen years elapsed before he was able to complete a second. A part of this period he devoted to collecting material, both in America and in Europe, and to writing a novel, *Vassall Morton*, which appeared in 1856, but which met with little success. During much of the time, however, his health was so bad that he was forced to abstain almost entirely from literary work. To occupy his time, he interested himself in horticulture, and acquired such a knowledge of the subject that in 1886 he published *The Book of Roses*, and in 1871 was made professor of horticulture in the Harvard Agricultural School. This position, however, he resigned in the following year. In 1865 the second of his historical works, *Pioneers of France in the New World*, appeared. It was followed in 1867 by *The Jesuits in North America*; in 1869 by *La Salle and the Discovery of the Great West*; in 1874 by *The Old Regime in Canada*; in 1877 by *Count Frontenac and New France Under Louis XIV.*; in 1884 by *Montcalm and Wolfe* (2 vols.); and in 1892 by *A Half-Century of Conflict* (2 vols.), which completed the series. Besides these works, he published also an *Historic Handbook of the Northern Tour* (1885), and numerous articles, many of them advance chapters from his histories, in magazines and other periodicals. During all this time his health continued to be precarious, and his eyes were so weak that his material, collected for him

by hired copyists, had to be read to him, and he was forced to rely almost entirely upon dictation instead of the pen. The story of his struggle against such odds is one of the most heroic in the history of literature. He died at his home at Jamaica Plain, Mass., November 8, 1893, the year following the completion of his great work.

Authorities are unanimously agreed that Parkman belongs a place with such historians as Bancroft, Prescott, and Motley, and many are of the opinion that his work will live longer than any other yet done in the field of history on this side of the Atlantic. In him, in fact, existed a combination rare among historians; for while he was a scholarly and indefatigable investigator, he was at the same time a consummate literary artist. His search for material was one of the most exhaustive that any historian has ever made. He seven times visited Europe, and while there sought out the documents bearing upon the period about which he intended to write. He visited also all the important localities mentioned in his story, and his knowledge of the Indians and of the wild life of the woods was invaluable in giving him insight into the events he narrated. Consult Farnham, *A Life of Francis Parkman* (Boston, 1901).

PARKS AND PLAYGROUNDS. The term park is here used to denote a tract of ground set apart for public use and enjoyment. A grassy expanse, large or small, stocked with shade trees, and used for rest and recreation, is a park, whether it be as formal as at Versailles, as wild and picturesque as Fontainebleau, or as trim as an old Dutch garden. Even grass may be omitted and yet the park remains, as in the park of the Tuileries in Paris, where the entire surface among its trees not occupied by pavements, groups of shrubs, or parterres of flowers, is covered with loose gravel, through which water percolates to the tree roots, and over which there is no restraint of popular use. The distinction between a park and a pleasure garden is this: The decorated garden where no crop is grown is cultivated to exhibit a growth of grass, trees, shrubs, or flowers with reference to the special beauty of each, as well as the beauty of harmonious arrangements. The perfectness of development of each part of a pleasure garden is the object aimed at. (See **LANDSCAPE GARDENING**.) The garden becomes a park whenever freely used for recreation by persons not interested in its special growth. Frederick Law Olmsted, the highest American authority on parks, suggests that small open spaces in cities, designed for public use, should be called places when not large enough to have grass and trees, and place-parks when barely large enough to have grass-plats and a few trees; that thoroughfares planted with trees for special adaptation to promenades, or as avenues to parks, should be called parkways; and public forests without roads simply woods.

The practice of reserving public parks for the use and delight of the people seems to be as old as civilization. The Egyptians had parks from the earliest times. These were small and formal, ornamented with colonnades and other architectural features, and with sculpture. Very different were the parks of the Assyrians and later Persians, who reserved and lavishly decorated vast areas of mountain land. Little is known of the parks of the Greeks, but they were probably

limited and formal, like those of the Egyptians. In Rome, however, in the time of the Cæsars there were, according to Lanciani, eight camps or commons and thirty parks belonging to the city. Of these the most extensive was the Campus Martius. During the Middle Ages public parks were little thought of, but the Renaissance is notable for the beautiful public gardens and parks which were then laid out and which are still the ornament of many European cities.

Another condition has favored the existence of accessible parks in European cities: Nearly every town formerly had its wall and surrounding ditches and reserve of open ground outside kept clear for military defense, all belonging to the State. These walls and adjacent grounds, before as well as after the fortifications were razed, were the promenades of the people, and in modern times have been converted into parks and boulevards. Towns which have grown greatly have had several successive circles of inclosing fortifications, thus providing, as in Paris and Vienna, several successive circles of public promenades, boulevards, and commons.

The area of parks in London is proportioned to the immensity of the city. Only a small part of them is broken by carriage roads, nearly their whole extent being dedicated to the exclusive use of pedestrians. Its seven great parks are: Hyde, containing about 400 acres, intersected by walks and carriage roads (including the famous saddle-horse road called Rotten Row) clothed with old forests, and graced by the lake called Serpentine; Kensington Gardens, an adjoining royal park of about the same size, farther from the city; Green, a smaller pedestrian park, by which Hyde Park may be approached; Regent's, nearly circular, with 450 acres, and having zoölogical and botanic gardens; Victoria Park, with 290 acres; Battersea Park, 320 acres; Kensington Park, 20 acres. These are almost exclusively for pedestrians, as well as the great Botanic Gardens of Kew outside of London. Paris is more noted for the elegance and great number of its place parks and avenues for promenades than for real parks. The latter have become numerous of late years, and are even more recent than the Central Park of New York. The Bois de Boulogne, an ancient wood belonging to the Crown, was given to the public about 1852. It contains 2,250 acres, not particularly interesting by nature, with no noble trees, but treated with all the graces of art possible to cover its natural deficiencies. Carriage drives and promenades traverse it in every part, and four artificial lakes are its most interesting feature. The most striking new park in the city is the Buttes Chaumont, in the quarter occupying the site of extensive old stone quarries. The Park Monceau is a smaller example of similar transformation. The old gardens of the Tuileries, already alluded to, and the gardens of the Luxembourg, though more like gardens than parks in their treatment, are so completely used by the public that they fulfill all the uses of parks. Paris is provided with park resorts outside of the city to a greater extent than any other city. All the old chateau forests and hunting grounds of successive kings of France are now the property of the State and furnish attractions in every direction from the city. Saint-Cloud, Versailles, Vincennes, and Fontainebleau, the last named one of the most picturesque and extensive of old royal hunting forests.

are the most noted. Smaller cities in France and throughout Europe abound in beautiful small parks contiguous to their population, most of which have been improvements of the last thirty years, made possible by the possession by municipalities of suitable ground previously used by the public, but not specially improved for their enjoyment.

Public parks in the United States on a small scale are as old as the cities. A seaside walk was originally the most common. The Battery in New York, and the Bay Side in Charleston, S. C., are familiar examples. The City Hall Park in New York was originally a playground or common. Boston Common was specifically dedicated to public use by the founders of the city, and has more perfectly fulfilled its use than any other equal area in the country. Public squares in nearly all the cities, notably around Yale College in New Haven, have shown the noble expression that may be given to a very limited park by avenues of full-grown native trees. The period of land speculation from 1830 to 1837, when great numbers of Western cities were planted, was peculiarly unfortunate in the failure to dedicate ground liberally either in park-places, public squares, or larger grounds. Many of the so-called 'boom' cities which have since been planted farther west have provided for parks and other public grounds in a most liberal manner. The beginning of the era of public parks for large cities, commensurate with their size, was made when the city of New York secured special legislation to create the Central Park. Though inferior in many respects to older parks, especially if its comparatively recent growth of trees be compared with noble old park forests, and its limited ranges of lawn with the great expanse of the finest English parks, yet it has this merit in a remarkable degree that, in proportion to the ground which it covers, the loss of space by the great reservoir being considered as well as its proportions and topography, it has developed more beauties and interest for public use than any other. The property was secured in 1857, and the plans for its laying out submitted by Frederick Law Olmsted and Calvert Vaux were adopted and put in their charge to be executed. The ground occupied is two and a half miles long north and south, and a half-mile wide east and west. The city reservoirs within it occupy 142 acres, forming a lake, the elevation of which does not permit it to be given the air of a natural piece of water, but which nevertheless is a pleasing feature. Besides this water there are several artificial lakes. Exclusive of the reservoirs and building sites, the park contains 683 acres. About 110 acres are in lawn, little broken by rocks and only bordered by trees, and the remainder mostly broken ground, in glades and young forests, or covered with copses and shrubbery, but nearly all in a condition to have a surface lawn. The grand terrace by Mr. Vaux—the first great work of park architecture executed in the United States—is an admirable study. Prospect Park, in the Borough of Brooklyn, is an outgrowth of the enthusiasm developed by the creation of the Central Park. It contains 550 acres, all of which is available for park use. Well-grown trees already on a part of it, and larger stretches of grassy ground, gave a nobler immediate effect in sylvan features than was possible in Central Park. Its architec-

tural features, though on a grand scale, are not so interesting as those of Central Park, except at the entrance, which is finer. The heights command a fine view of New York Bay and the ocean, and there are picturesque artificial lakes.

Philadelphia, in addition to her generous original squares for park use, followed and outdid New York in the purchase and improvement of Fairmount Park. Its extent, varied surface, fine old trees, broad expanses of turf, the Schuylkill River at its side, and the stream of the Wissahickon, flowing through a picturesque rocky valley clothed with the trees, shrubs, and wild vines of virgin nature, through dark dells, broken by numerous waterfalls, altogether give it a different character from that of most other parks of the United States. Baltimore has the honor of the noblest forest park of the United States, Druid Hill—an old forest of 700 acres acquired in 1860, previously the private park of an old estate. Most of the larger and many of the smaller American cities have followed the example of New York and Philadelphia in providing liberal park areas.

PLAYGROUNDS. Recently there has been an effort to secure public playgrounds for city children. When children have no playgrounds but the streets they will necessarily be interfered with in their games by the police, and thus a most unfortunate spirit of antagonism toward the guardians of the peace is engendered. Not only the moral and physical value of playgrounds, but also their educational value, is beginning to be understood by those who have the welfare of the children at heart. The forerunner of the playground was the New England 'common,' where the boys met to play that peculiarly American game, baseball. It is not surprising, therefore, that the New England city of Boston leads in the provision of children's playgrounds. At the close of 1901 Boston had 14 grounds ranging in size from 0.4 acre to 77 acres, and making a total area of 182 acres. Brooklyn has maintained for years a fine though inaccessible playground. In 1898 Milwaukee established an open-air gymnasium in one of its parks. In the city of New York, portions of Central Park have for years been set apart as children's playgrounds. A general movement for the establishment of municipal playgrounds throughout the city, and especially in the congested tenement-house district, was inaugurated in 1887. In that year an act was passed by the State Legislature permitting an annual expenditure of \$1,000,000 for the establishment of small parks. The City Park Department, however, has steadily opposed the use of any portion of this sum for the foundation and equipment of children's playgrounds. In May, 1888, the New York Society for Parks and Playgrounds for Children was incorporated under a special law giving the society unusual powers, including the appointment of special police. In 1894 the Tenement-House Commission secured the adoption of a law which provides for at least two parks on the lower East Side "to be furnished in part as public playgrounds." The first of these plots was opened to the children in 1900. It was merely a bare piece of ground with no apparatus for children's games and no directors. Under such management it has done little good. The management of the second of these plots, known as Seward Park, was assumed by the Recreation League, an organiza-

tion devoted to work of this character; apparatus was obtained and directors secured to help the children in their games, the entire cost of equipping and operating the playground being paid by the League. The playground was opened to the public on June 3, 1899, in the presence of from 15,000 to 30,000 people. From the start it has been immensely popular with the children, and is an effectual proof of the feasibility and usefulness of such undertakings. In 1903 various other parks were opened as playgrounds.

Another branch of the work of furnishing playgrounds for the children of New York was undertaken in 1898. In that year the school boards of Manhattan and the Bronx appointed a committee for the management of summer playgrounds and appropriated \$15,000 for the work. On July 6th twenty playgrounds attached to public schools were opened. Apparatus for games and gymnastics were supplied the children and a director was appointed to take charge of each playground. The daily attendance in the playgrounds averaged from 300 to 1000 children, and many had to be turned away.

The work of securing playgrounds for the children is not confined to the few large cities mentioned. According to Baker, *Municipal Year-Book* (New York, 1902), 187 cities and towns in

the United States reported municipal playgrounds in 1901. Of these, 51 were in New England, 39 in the Middle Atlantic States, 11 in the South Atlantic, 13 in the South Central, 41 in the North Central, 16 in the Northwestern, 9 in the Southwestern, and 7 in the Pacific States. According to the same authority 747 cities and towns of the United States reported the possession of municipal parks.

RECREATION PIERS. Another form of open-air enjoyment has been provided by several American cities in the form of *recreation piers*. These are simply second stories to the ordinary shipping piers, fitted up with canopy roofs. They are open day and evening; music is furnished at certain hours, and dancing enjoyed.

With the advent of the trolley and the bicycle, the outskirts of cities have become more accessible to the inhabitants, so that parks many miles distant may be reached in a comparatively short time and for a trifling sum. Many of the trolley companies have themselves taken advantage of this fact and have fitted up parks on their lines for the sake of the traffic which they attract. At the close of the last century, the description of more than one hundred such parks could be found in recent numbers of the street railway journals. The movement for park sys-

CITIES	June, 1900, Population	Area of city in acres	Area of parks		Percentage of area in parks*
			Owned by city	Not owned by city	
New York, N. Y.	3,437,202	197,192	6,909	.....	3.4
Chicago, Ill.	1,698,577	122,240	2,151	.....	1.7
Philadelphia, Pa.	1,294,697	84,933	4,044	.....	4.6
Saint Louis, Mo.	575,238	39,277	2,177	.....	5.5
Boston, Mass.	569,892	69,661	2,618	.....	4.3
Baltimore, Md.	508,957	24,172	1,136	4	4.7
Cleveland, Ohio	381,768	21,190	1,326	.....	6.2
Buffalo, N. Y.	352,219	25,344	1,026	.....	4.0
San Francisco, Cal.	342,782	27,000	1,193	.....	4.4
Cincinnati, Ohio	325,992	20,860	539	.....	2.6
Pittsburg, Pa.	321,616	19,418	886	.....	4.5
New Orleans, La.	287,104	125,000	553	220	.6
Detroit, Mich.	285,704	18,560	1,056	.....	5.7
Milwaukee, Wis.	285,315	13,625	435	.....	3.2
Washington, D. C.	278,718	44,320	1	3,506	8.1
Newark, N. J.	246,070	11,840	19	336	2.8
Jersey City, N. J.	206,433	8,620	18	.....	.2
Louisville, Ky.	204,731	12,800	1,350	20	10.6
Minneapolis, Minn.	202,718	34,106	1,553	.....	4.5
Providence, R. I.	175,597	11,706	544	.....	4.6
Indianapolis, Ind.	169,164	17,792	1,235	24	7.1
Kansas City, Mo.	163,752	16,640	279	.....	1.7
Saint Paul, Minn.	163,632	35,483	599	.....	1.7
Rochester, N. Y.	162,435	11,635	654	.....	5.6
Denver, Colo.	133,859	31,485	571	.....	1.8
Toledo, Ohio	131,822	18,285	809	.....	4.4
Allentown, Pa.	129,896	5,040	350	.....	6.9
Columbus, Ohio	125,560	10,400	196	912	16.0
Worcester, Mass.	118,421	21,773	387	.....	1.8
Syracuse, N. Y.	108,374	10,041	249	.....	2.4
New Haven, Conn.	104,927	14,340	1,100	.....	7.7
Paterson, N. J.	105,171	5,357	96	.....	1.8
Fall River, Mass.	104,863	26,240	89	.....	.3
Saint Joseph, Mo.	102,979	6,400	27	.....	.4
Omaha, Neb.	102,555	15,680	593	.....	3.8
Los Angeles, Cal.	102,479	27,774	3,720	.....	14.0
Memphis, Tenn.	102,320	10,240	13	.....	.1
Seranton, Pa.	102,026	12,108	97	.....	.8
Lowell, Mass.	94,960	7,032	125	.....	1.5
Albany, N. Y.	94,151	6,807	470	.....	6.8
Cambridge, Mass.	91,886	4,182	285	.....	6.8
Portland, Ore.	90,426	25,600	285	.....	.8
Athens, Ga.	89,872	7,040	146	.....	2.1
Grand Rapids, Mich.	87,585	11,200	196	.....	1.2
Dayton, Ohio	85,483	6,720	4	.....	.6
Richmond, Va.	85,050	3,526	373	9	10.0
Nashville, Tenn.	83,825	5,900	8	.....	.1
Seattle, Wash.	80,671	30,720	415	25	1.4
Hartford, Conn.	79,850	11,065	513	14	4.8
Reading, Pa.	78,261	3,965	186	.....	4.7

*Regardless of ownership.

tems on an extensive scale is progressing in the United States, and two such systems are being developed at public expense with considerable success, one in the region about Boston, and the other in Essex County, N. J. At the beginning of 1902 the Metropolitan Park System for Boston and vicinity included 9248 acres of parks and 23.6 miles of parkways, and an immense ocean-bathing establishment. Besides this large area in parks and public reservation, the city of Boston alone had 2389 acres in parks and playgrounds, and hundreds of acres of parks were owned by the other cities and towns in the park district. In 1902 the Essex County Park System included 3548 acres of land, with a comparatively short length of parkways built, but many miles projected. Much of this land lies along the ridge of the Orange Mountain, commanding a view of New York City and Harbor and the intervening country. A feature of these two park systems is the providing of large reservations, to be left as nearly as possible in their natural state.

The preceding table gives the population, area devoted to parks, and the percentage of the total area which is in parks, for the 50 largest cities in America. The table was compiled from the *Bulletin* of the United States Department of Labor for September, 1900, and the column of percentages has been added. It will be seen that Columbus, Ohio, has the largest percentage of its area devoted to parks. It must be remembered, however, that two factors enter into this proportion, and that where a city has a great area in proportion to its population, like Saint Paul, the need for public parks is not so great as in a densely crowded city like Jersey City. The latter city, crowded as it is, is one of the most poorly provided with parks of the cities of the United States.

PARLEMENT. The name borne in France, before the Revolution, by a number of local tribunals which exercised a great influence on the government in fields other than the judicial. The Parlement of Paris, the most influential and celebrated of the French parlements, is generally supposed to have had its origin in the *curia regis* of the Frankish kings, an assembly consisting of the lay and ecclesiastical dignitaries of the court which met under the presidency of the king or his representative and exercised a wide though undefined jurisdiction, equitable in nature. Broadly speaking, its powers extended to all cases involving the royal interest, but it also heard appeals from inferior courts where delay or denial of justice was concerned. Under the Carolingian monarchs it became the court for the trial of cases involving the high nobility, and its jurisdiction was also extended over all persons living under the royal protection. In the course of time the *curia regis* fell apart into three separate bodies: the *conseil de roi*, the *chambre des comptes*, and the Parlement proper, which name first prominently appears under St. Louis. Under Philip the Fair the *légistes* or members of the learned bourgeoisie began to enter the Parlement which up till then had been composed exclusively of the lay and ecclesiastical nobility. These came to constitute a very important element in the body, as is indicated by an ordinance of 1296, which ordered that 18 laics and 16 clerks should always be in session for the doing of judicial

business. The Parlement at this time comprised three chambers: the *grand' chambre* or full Parlement, meeting for the rendering of decrees; the *chambre des enquêtes*, to which was referred the greater mass of detailed work, such as preliminary investigation and the sifting of testimony, and the *chambre des requêtes*, which received the petitions of those desiring to come within the jurisdiction of the Parlement. From 1417 to 1436, while Paris was in the hands of the English, the Parlement was in session at Poitiers. In 1467 the irremovability of members of Parlement was established. The method of admission at this time was by royal appointment from a list submitted by the Parlement, but frequently the kings exercised the power of direct appointment. Under Francis I. the principle of purchase became general; nominations henceforth ceased and membership, as a rule, passed from father to son, resulting in the establishment of a so-called nobility of the robe, fully as class-conscious, as jealous of its prerogatives, and as careful of furthering its interests, as was the feudal nobility. The salary was slight, and the chief income of the magistrates was derived from fees which were very high. The kings at various times sought to increase their revenue from the sale of offices by increasing the number of members of Parlement, or even the number of chambers, there being at one time no less than nine of these in the Parlement of Paris. In 1604 the so-called *Paulette* was introduced in accordance with which members of Parlement paid an annual fee of 1-60 of their income in return for which their office, on death, passed to their heirs.

The provincial parlements had their rise after the Hundred Years' War. As the great feuds were reunited with the crown, parlements were established in the local capitals to perform the same judicial functions as the Parlement of Paris did within its jurisdiction. The Parlement of Toulouse had been established in 1302, but was dissolved after some time, and was not reestablished till 1443. The other local parlements, with the date of their foundation, were as follows: Grenoble, 1461; Bordeaux, 1462; Dijon, 1477; Aix, 1501; Rouen, 1515; Rennes, 1553; Pau, 1620; Metz, 1633; Besançon, 1676; Douai, 1686; Trévoux, 1762; Nancy, 1775. The early theory was that all the parlements constituted but one body, and that the members of one parlement were entitled to sit in any other. This, however, was not maintained for a long time. The parlements were all on a basis of equality in that each was supreme within its jurisdiction, but a certain predominance was enjoyed by the Parlement of Paris, whose decrees, after 1474, were binding in any part of the kingdom without the *visa* or confirmation of the local parlement. For the facilitation of business the parlements frequently sent out a number of its members to hold court in different places. These were known as *Grand Jours* and constituted, practically, courts of assize.

The political importance of the Parlement of Paris dates from the reign of Charles VI. Under Louis XI. it began definitely to put itself into opposition to the royal will in matters of legislation and administration by attempting to modify the text of the royal edicts submitted to it for registration (*enregistrement*) or by rejecting them altogether. The process of registration, which

in the beginning was merely formal and largely in the nature of an act of record, had come in time to be regarded by the Parlement as essential for the validity of all royal decrees. The kings met the opposition by letters of "jussion" commanding the Parlement to register, frequently, too, by imprisonment and exile. After 1563 the common form was by means of a royal bed of justice (q.v.), where the king appeared in solemn state and ordered the Parlement to register the obnoxious decree. The Parlements exercised great influence during the period of the civil wars when they were the strongholds of catholicism. They submitted, however, to Henry IV. The Parlement of Paris sought to assert its authority during the reign of Louis XIII., but failed before the masterful will of Richelieu. Under Louis XIV. Parlement, after playing a leading part in the troubles of the Fronde (q.v.), was restricted entirely to its judicial functions. After that monarch's death, however, the Parlement declared his will invalid, and vested the regency in the Duke of Orleans. Thereafter it was engaged in continuous struggles against the crown in the hope of regaining its former power. It was conspicuous in the Jansenist controversy in connection with the Bull *Unigenitus* (see *JANSENISM*), and was the bitter enemy of the Jesuits, whose expulsion it brought about with the aid of Madame de Pompadour. The conflict between the Parlement and the crown culminated in the coup d'état of 1771, when the Chancellor Maupeou declared all the offices of the Parlement vacant and organized a new body whose authority was greatly curtailed by the establishment of six superior courts in the territory formerly under the jurisdiction of the Parlement. Purchase and fees were abolished, but the principle of irremovability was retained. In spite of the fact that the change was on the whole for good, the new Parlement—the Parlement Maupeou, as it was called—was extremely unpopular, and when Louis XVI. succeeded to the throne he restored the old magistrates. The quarrels with the crown nevertheless continued, the Parlement making itself the mouthpiece of the new ideas of popular rights, national sovereignty, and thorough-going reform. Its protestations, however, were not sincere, as was evidenced at the summoning of the States-General, in 1787, when it showed itself no less jealous of its prerogatives than the nobility or the clergy. It lost thereby the popularity which it had enjoyed for some time, and in 1790 the Parlement of Paris, with the provincial parlements, was abolished by the National Assembly. As judicial tribunals the French parlements take a very high position among such institutions in history. Though narrow in spirit as far as concerned their privileges as a caste, they nevertheless dispensed justice in an admirable manner, and were largely instrumental in unifying the customary law of France. Consult Voltaire, *Histoire du parlement de Paris* (Paris, 1769); Dufey, *Histoire, actes et remontrances des parlements* (vol. ii., Paris, 1826); Flammermont, *Le chancelier Maupeou et les parlements* (Paris, 1883).

PARLER, pär'lër, PETER (c.1333-c.1397). The most famous and successful of a family of German architects. He was born in Gmünd and his name seems to have been corrupted in Bohemia

from Arler to Parler, possibly under the influence of *Parlierer* or *Polier*, a word used in the architecture of the Middle Ages, signifying 'foreman.' Like his father, Heinrich, he got his early training in Cologne. In 1356 he was architect on the Prague Cathedral, of which he built the choir. His brother, JOHANNES, became master architect of the Cathedral of Freiburg in 1359. Some members of the family were known by the name of Von Gmünd. All are classified by Klemm in the *Allgemeine deutsche Biographie*. Consult Newwirth, *Peter Parler von Gmünd und seine Familie* (Prague, 1891).

PARLEY (OF. *parlee*, turn of speech, from *parler*, to speak, from ML. *parabolare*, to discourse, from Lat. *parabola*, comparison, speech, parable). In military affairs, this term is used to describe the conversation between antagonists, which may be introductory to an exchange of prisoners, burial of dead, or care of wounded soldiers. Hostilities are temporarily suspended in the vicinity near where the parley takes place. A parley is usually preceded by a flag of truce, although it may be preceded by a roll of drums, known as *beating a parley*.

PARLEY, pär'li, PETER. The pseudonym of the American author Samuel Griswold Goodrich (q.v.).

PARLIAMENT (OF., Fr. *parlement*, discourse, conference, legislature, from *parler*, to speak). The name of the legislative assembly of Great Britain and Ireland. The legislative assemblies of Scotland and of Ireland previous to the union with England (1707) and Great Britain (1801) respectively bore the name of Parliament. This is also the designation of the legislatures of the Dominion of Canada and of the Commonwealth of Australia. The Parliaments (Parlements) which existed in France before the Revolution of 1789 were not legislative, but judicial bodies. The word was first used by Matthew Paris in 1246, but only gradually replaced the terms by which the councils of the English King had previously been known. Moreover, even when so called Parliament had not at first the privileges and functions which it exercises to-day. Modern Parliament has developed by slow and painful degrees from the Witenagemot of Anglo-Saxon times. This body was composed of princes, prelates, ealdormen, and a varying number of royal nominees. It met thrice yearly, had the power of electing and deposing kings, gave counsel and assent in all matters of legislation, and was the supreme court of justice for the kingdom. It was in no sense a representative and legislative body, but, as the name indicates, a council of *witan* or wise men, assembled to advise the King. After the Norman Conquest the Witenagemot gradually lost its old significance together with its name, and was merged in the Great Council, an assembly to which in theory every tenant-in-chief of the King belonged. This was generally attended only by royal officials, the great prelates, earls, and those barons who were individually summoned. The powers of the body were three: it held a somewhat loose control over taxes, it gave consent to laws proposed by the King, and it acted as a court of justice. The first function became of some importance by the end of the twelfth century, when the idea that taxation and representation go hand in hand first germinated;

the second was exercised to good purpose in great crises like the conflict between Henry II. and Thomas à Becket; but the third developed earliest and gave the Council its peculiar character.

With the granting of the Great Charter on June 15, 1215, by King John, the national assembly entered upon its chief period of transition. (See MAGNA CHARTA.) The commons, especially the citizens of London, had given important aid to the barons in their struggle, and the latter obtained certain privileges, personal and commercial, for them. More important was the fact that for the first time the nobles and commons were thus united against the Crown. The Great Charter provided that scutage, a form of feudal taxation hitherto exacted at the pleasure of the King, should no longer be levied without the consent of the Great Council, which was to be summoned forty days before the appointed date for meeting, so that all might have time to attend. The document took no notice of the representative principle, however, and the minor barons subsequently regarded themselves as exempt from attendance at the Great Council because they were no longer entitled to summons by special writ. But, curiously enough, John had already recognized the principle of representation in 1213 when he summoned to the Council of Saint Albans the reeve and four men from each vill on the royal demesne. This is the first occasion where all three estates, nobles, clergy, and commons, sat together. Recognition had thus been gained for the ideas of representation, election, and concentration in a central assembly, but until 1254 the experiment seemed abortive. In that year Queen Eleanor and Earl Richard of Cornwall, regents during the absence of Henry III. in Gascony, called a council to meet at Westminster, at which were present two knights chosen from each shire. This element was to be of great importance in the development of Parliament, since the knights of the shire henceforth furnished leaders for the commons, and, many of them being nearly related to the nobles, they enabled the two estates to unite in opposition to the Crown. This was a most important effect of the rule of primogeniture which, contrary to the custom on the Continent, was in strict force in England. The younger sons of the nobility were usually country gentlemen and thus served as a connecting link between the nobles and the commons.

In spite of the part played by the commonalty in these early attempts at constitutional reform, the tendency of the time was oligarchical. This is clearly shown by the struggle between Henry III. and Simon de Montfort (qq.v.). Though in the course of it distinction was first made between the representatives of shires and of boroughs, Simon called upon the commons only to further his ambitious plans, and even then gave them no voice in the formation of his governmental scheme. In 1258 a form of provisional government was ratified, embodied in the Provisions of Oxford (q.v.), which was distinctly oligarchical and altogether unsatisfactory. In 1261 the barons under the leadership of Simon summoned three knights from each shire south of the Trent to the autumn Parliament at Saint Albans to consider the Provisions. The King, not to be outdone, summoned the same knights to Windsor, with the result that neither council

was held. Three years later, after the battle of Lewes, Simon gathered his first Parliament, to which somewhat extended powers were granted. It is with the Parliament of Westminster, however, which met in January, 1265, that Simon's name is especially connected. To this assembly were summoned not only two knights from each shire, but also two burgesses or citizens from twenty-one boroughs or cities mentioned by name in the writ. Thus for the first time the third estate, made up of county freeholders and burgesses, was fully represented in a national assembly. Nevertheless, the importance of Montfort's act has been somewhat exaggerated. In the first place, the Parliament was not truly representative. Of the lords, who as a whole were unfavorable to his cause, only five earls and eighteen barons were summoned, while of the clergy, who were his supporters, there was a very disproportionate number. Furthermore, it is doubtful whether the Parliamentary representation of the third estate was intended to be permanent. Yet Simon cleverly adapted existing materials to his own ends and showed the lines on which a real Parliament was to be formed. Meanwhile there was developing on the part of the commons a tendency toward organized opposition to excessive taxation and a somewhat indefinite theory that a grant of supply should receive the consent of Parliament. It was a step in advance that Henry III. recognized the necessity of support from the barons and that both parties no longer ignored the rights of the towns.

To Edward I. belongs the honor of completing the work of founding Parliament. During the first twenty years of his reign, though there was no important advance, he summoned representative assemblies occasionally. Whether consciously or not, he seems to have been experimenting in order to determine the proper representation of the various classes which had crystallized during the struggle of the last reign. In 1294 the right of the clergy to give consent to taxation was formally acknowledged. In the following year Edward was beset with difficulties on account of his wars with Wales and France. He needed money, and accordingly summoned representatives of the three estates the consent of which had become essential in the matter of taxation. This assembly, which met in November, 1295, is known as the Model Parliament. To it came, aside from the bishops and the abbots, the earls and the barons, two knights from each of 37 shires and representatives of 110 cities and boroughs. The Parliament was held at Westminster, which became from this time the regular meeting place of the assembly. That Parliament was not formed into three chambers rather than into two was due to the attitude of the lower clergy, who soon withdrew and voted grants of money in their own assembly or Convocation. It was not till the reign of Edward III. that the definite separation into two Houses took place. The knights at first vacillated between the lords and the commons, but in 1332 is found the first clear reference to the arrangement which after 1339 was permanent, the lords forming the Upper House, the knights and burgesses the Lower.

If the thirteenth century marks the formation the fourteenth century is especially notable for the development of the privileges of Parliament.

In 1322 Edward II. definitely acknowledged that "the matters which are to be established for the estate of our lord the King and of his heirs, and for the estate of the realm and of the people, shall be treated, accorded, and established in parliaments by our lord the King, and by the assent of the prelates, earls, and barons, and the commonalty of the realm." Though the position of the lords and commons was thereby recognized, the latter had yet to struggle for actual power. Laws were still made by means of petitions to the King, and only the King could proclaim them. A purely formal survival of this condition explains the phraseology of the laws in our own time, which, according to the stereotyped preamble, always emanate from the Crown, Parliament merely consenting. The Hundred Years' War (q.v.) still further increased the power of Parliament, because of the necessity of appealing to the people to meet the enormous expenses which it entailed upon the Government. The advance in privilege during the period from the accession of Edward II. to the death of Henry V. may be summarized as follows: (1) By the ordinance of 1311, succeeded by the acts of 1330 and 1362, it became the rule to summon Parliaments every year. This provision was often evaded; but regular and frequent assemblies were nevertheless held throughout the fourteenth and fifteenth centuries. (2) From 1340 taxation without the consent of both Houses was illegal. (3) After 1407 the Commons possessed the preponderating voice in making money grants. (4) Parliament began to exercise the right of supervising expenditure, which involved not only the audit of accounts, but also the impeachment of royal officials. This was first done by the Good Parliament (q.v.) in 1376, and constituted an early but important step toward ministerial responsibility.

The Wars of the Roses proved in a manner detrimental to the development of Parliament, since the destruction of the powerful nobles left the commons unaided in their struggles against the Crown. Yet the introduction of legislation by means of bills instead of petitions in the reign of Henry VI. really laid the foundations for the subsequent power of Parliament. During the earlier part of the Tudor period Parliament was denied even the semblance of power, but Thomas Cromwell showed Henry VIII. the way to use it for his own ends while observing the letter of the law. Subsequently the Tudors were despots by means of their control over Parliament. The course they followed was this: (1) Occasionally they employed the old device of dispensing with Parliament altogether; but (2) they found a safer method in creating a number of small boroughs, later called 'rotten boroughs,' and narrowing the right of franchise; (3) they secured the nomination of the Speaker of the Commons and made the Secretary of State a member of that body; (4) as a last resort they fell back upon the royal prerogative of government by proclamation. The Reformation also worked toward the same end, since the loss of the 27 abbots and priors to the Upper House left the temporal peers in the majority and gave the Crown the opportunity of controlling the lords by means of new creations by letters patent. At first temporal peers had been the great tenants-in-chief; from the time of John they were those barons who received personal summons to the

Great Council; under Edward I. such barons were confirmed in their hereditary rights; but not till the device of creation by letters patent was established did the hereditary peerage in the modern sense appear. Instances of such creations are found as early as the reign of Stephen, but they were rare till the time of Richard II. Since the Reformation the spiritual lords have been the two archbishops and the several bishops holding English dioceses. In connection with the House of Lords it is necessary to note the peculiar function of acting as a court of last resort, a right which it has kept since the separation of the Privy Council from Parliament in the reign of Richard II.

With the accession of James I. (q.v.) in 1603 began the last great struggle between Parliament and the Crown. The Tudors had been able to retain their personal popularity and to rule somewhat despotically because they held to a definite public policy. The Stuarts, in default of this, obstinately asserted the principle of divine right, which was peculiarly obnoxious to the Puritan Party, at that time just becoming strong. Moreover, James was a foreigner and understood the needs of Scotland better than those of England. The struggle with Parliament continued throughout his reign and that of his son, Charles I. (q.v.), resulting in the Great Civil War and the rule of Oliver Cromwell (q.v.). The strife centred about the right of taxation and the right to impeach royal officials. In both of these matters the House of Commons ultimately won a complete victory, as also in the subsidiary question of the inviolability of its own members. Though the army was all-powerful during the Protectorate itself, the Restoration found Parliament in possession of the rights for which it had long struggled. The reign of Charles II. was strictly Parliamentary, at least as far as outward forms went, and freedom of speech in Parliament was definitely established. In this reign, moreover, the influence of the Lower House was vastly increased by the provision that bills for the grant of supplies must not be amended by the Lords. With Charles II. also appeared the Cabinet, or body of ministers who lead Parliament and are responsible to it, though as yet this represented no definite party or system. The number of members of the House of Commons for England and Wales, which had been greatly increased by the Crown in preceding reigns, now became fixed at 513. This rigidity increased the abuse of rotten boroughs, while new centres of population remained unrepresented. The loss of its power of creating boroughs was a serious blow to the Crown, but it still enjoyed great influence by means of appointment to lucrative offices and even grosser forms of bribery.

Though the Revolution of 1688 was hardly due to Parliamentary struggles, its effect upon the development of the powers of Parliament was far-reaching. The Bill of Rights (1689) marked the end of the long struggle between the Crown and the Legislature, and established the principle that the right of the throne depends on Parliamentary recognition. This was more clearly shown in 1701 by the Act of Settlement, which vested the Crown in the Protestant succession. By the Triennial Act of 1694 the life of Parliament was limited to three years. This did away with the possibility of the King keeping a subservient Parliament in existence after it had lost

the confidence of the nation. The limit was extended to seven years by the Septennial Act of 1716, which is still in force. The eighteenth century is notable for the complete development of the party system, though the Whigs and Tories had existed under these names since 1679. In connection with the rise of parties appeared the completely developed Cabinet government, whereby the Crown is compelled to select its ministers from the dominant party in the House of Commons. The fact that George I. was a foreigner and unable to speak English had much to do with this change in government. George III. (q.v.), indeed, tried to create a party of his own, but failed. Henceforth the maxim that 'the King reigns but does not govern' represents the spirit of the English Constitution. In 1707, by the union of Scotland with England and Wales to form the Kingdom of Great Britain, certain changes were made in the composition of Parliament. Scotland received 45 members in the House of Commons, while its peers were to elect for every Parliament 16 representatives from their number to sit in the Upper House. As the Crown was restrained from creating new peers for Scotland, the Scottish peerage is gradually becoming extinct. In 1800 the Irish Parliament also ceased to have a separate existence, and Ireland was to be represented in the Parliament of Great Britain and Ireland by one of the four archbishops and three of the eighteen bishops sitting by rotation of sessions, by 28 temporal lords elected for life by the Irish peerage, and by 100 members of the House of Commons. The spiritual lords lost their seats in 1870, however, in consequence of the disestablishment of the Irish Church.

In the latter part of the eighteenth century Parliamentary corruption became notoriously prevalent. In 1793 the Duke of Norfolk had eleven seats for rotten boroughs in his gift, and many other wealthy men were answerable for a lesser number. Moreover, many great towns had no representatives whatever in the House of Commons. After various abortive attempts at the reform of Parliamentary representation by the younger William Pitt and others, the question became acute at the close of the Napoleonic wars and did not cease to agitate the kingdom during the greater part of the nineteenth century. Legislative measures began with the great Reform Bill of 1832, which was passed after the opposition of the peers had been overcome by the threat of numerous creations. This act completely remodeled Parliament. In England 143 votes were taken from boroughs and redistributed among the counties and large towns. The county franchise was given to freeholders or copyholders to the value of £10 a year, to leaseholders for twenty years whose annual rent was £50, and to tenants at will who paid £50 a year. The borough franchise was given to all holders of houses to the annual value of £10. For Scotland the number of members was increased from 45 to 53, of whom 30 were to sit for the counties and 23 for the cities and boroughs. The county franchise was given to all holders of property to the annual value of £10, while the borough franchise was made the same as that of England. For Ireland the number of members was raised from 100 to 105. Both the borough franchise and the county franchise were given as in England, except that the occupation franchise

in the counties was limited to holders of land to the value of £20 per annum. This provision was designed to prevent the control of the priests, who were much feared after the Catholic Emancipation Act of 1829. With the Reform Bill the parties took new names, the Tories being succeeded by the Conservatives, the Whigs by the Liberals. Since then Parliament has undergone little change in its essential features, though several reform acts have been passed. In 1867 household suffrage was established in boroughs, with a lodger franchise at a value of £10; in the counties existing qualifications were reduced by one-half and an occupation franchise at £12 was created. There was also a slight redistribution of seats. In 1872 voting by secret ballot was established. In 1884 there was a thorough redistribution of seats, with an attempt to make equal electoral districts, and an assimilation of the county and borough franchises. In 1885 the franchise was again somewhat extended so that at present there is nearly universal suffrage in Great Britain and Ireland. Meanwhile the House of Commons has become by far the most important branch of the Government. It rules the country absolutely and is quickly responsive to popular demands. The following table illustrates the composition of the House of Commons in 1903:

	Counties	Boroughs	Universities	Total members
England.....	234	226	5	465
Wales.....	19	11	0	30
Scotland.....	39	31	2	72
Ireland.....	85	16	2	103
	377	284	9	670

Details concerning the existing system of parliamentary government will be found in the section *Government* under GREAT BRITAIN, but something remains to be said of certain customs of Parliament. The Houses of Parliament or New Palace of Westminster, in which Parliament sits, were opened in 1852, though the assembly has had its abode on that site for six centuries. The former building was destroyed by fire in 1834. The Commons' Chamber is in the north side of the building, the Lords' in the south. About them are the retiring rooms of their respective members, and the residences and bureaus of their officials, aside from a great number of other apartments. Unless sooner dissolved, a Parliament lasts for seven years. It meets about the middle of January or early in February, and when it has completed its work it is prorogued, though either House may adjourn for a short time on its own initiative. Business is now rarely completed before August or September. A new Parliament is opened with imposing ceremonies, the hour fixed being usually two o'clock. In the morning the vaults are searched for possible bombs and the like, in memory of the plot of Guy Fawkes (q.v.). By one o'clock every seat in the House of Commons is occupied, since there are many more members than seats. The members of the Government party occupy the benches—there are no desks—to the right of the Speaker; the members of the Opposition those to the left. A member secures a seat by placing upon it his hat, or since 1895 a card marked with his name. The House is opened by the clerk, who is chair-

man till the Speaker is elected. The first incident of the session is the summoning of the Commons to the Peers' Chamber by the Black Rod, the messenger of the Upper House, to hear the royal message. When the King does not open Parliament in person, this is read by the Lord Chancellor. Before the actual reading of the King's speech, the Commons return to their own chamber to elect a Speaker. The Speaker is not a party leader, as in the United States, but is supposed to be strictly impartial, and is usually re-elected regardless of the party in power. He receives an annual salary of £5000, and has some perquisites, such as an official residence. He ranks as first commoner, and when he retires he is usually rewarded with a peerage and a yearly pension of £4000. The chairman of the House of Lords is the Lord Chancellor, whose official seat is the celebrated Woolsack. He is ordinarily a member of the Cabinet. Most of the measures introduced into Parliament are Government bills, and a vote is taken by the members passing out of different doors into the lobby and being counted in the process. Each party has designated members, known as 'whips,' who gather the party forces for important divisions in the House of Commons.

Besides the general histories, which will be found in the bibliography under GREAT BRITAIN, consult: Gneist, *The English Parliament in Its Transformations of a Thousand Years*, Eng. trans. (4th ed., London, 1895); Smith, *History of the English Parliament* (ib., 1892); Skottowe, *A Short History of Parliament* (ib., 1886); Dickinson, *The Development of Parliament During the Nineteenth Century* (ib., 1895). For the many interesting customs of Parliament and its method of work, consult MacDonagh, *The Book of Parliament* (ib., 1897).

PARLIAMENT, HOUSES OF, OR NEW PALACE OF WESTMINSTER. The seat of the British legislature, a great mass of buildings on the Thames in London, built at a cost of \$15,000,000 after plans by Sir Charles Barry on the site of the previous building, which was destroyed by fire in 1834. The edifice covers an area of eight acres, and contains 1100 apartments, 100 staircases, and 11 courts. The exterior, in rich late-Gothic style, is made impressive by three massive towers: Victoria Tower, 340 feet high; Middle Tower, 300 feet high; and Saint Stephen's or the Clock Tower, 318 feet high. The latter contains a clock with dials 23 feet in diameter, and a great bell, 'Big Ben,' weighing 13 tons. The interior is fitted up with much magnificence. In it are the sumptuous House of Peers and the simpler House of Commons, an octagonal central hall, Saint Stephen's Hall on the site of Saint Stephen's Chapel, the former meeting-place of the Commons, the residence of the Speaker and other officials, the libraries, committee rooms, and lobbies connected with the two Houses, and offices. With the edifice is connected Westminster Hall (q.v.). An unsuccessful attempt to destroy the palace by explosions of dynamite was made in 1885. For illustration, see Plate accompanying the article LONDON.

PARLIAMENTARY LAW. The body of rules and precedents regulating the procedure of deliberative assemblies. Certain rules of parliamentary procedure have always been found necessary for the accomplishment of the purposes for

which deliberative assemblies are called. Experience has shown that restrictions must be placed on individual members in the general interest of the whole body; that mere customary rules are insufficient, and hence regular parliamentary codes must be prepared for the government of deliberative assemblies. In the United States this has become almost a distinct branch of the law, and its mastery is highly essential to the success of the legislator. The necessary officers of a deliberative assembly are a chairman, usually called Speaker, president, or moderator, and a secretary or clerk. It is the duty of the presiding officer to call the meeting to order; to state clearly all questions brought before the assembly; to put motions properly made and in their proper order; to preserve order and enforce the rules of procedure; and decide questions of order subject to the right of appeal to the whole assembly. These are his primary duties, but he may in addition participate in debate as any other member, and vote in case of a tie. It is the duty of the secretary to keep a record of the proceedings of the meeting, including a correct statement of every motion made and the manner in which it was disposed of; the names of members of all committees appointed; a true copy of every resolution passed with the affirmative and negative votes cast therefor, etc.

Business is or should be brought before an assembly by motion of a member or in the form of a resolution which is presented by a member who at once moves its adoption. If it is a mass meeting called for a particular purpose, a motion is made for the appointment of a chairman, who, upon taking the chair, asks for a statement of the purpose for which the meeting is called. A proposition which is presented to an assembly is usually called a *motion* if it relates to a matter of secondary importance; and a *resolution*, if of greater importance. The difference is of no practical consequence, however, since a resolution may be offered as a motion and a motion may be presented in the form of a resolution. The member upon whose motion the subject under discussion was brought before the assembly, or upon whose report the conclusion of a committee is presented, is entitled to be recognized as having the floor, although another member may have already risen and addressed the chair. No member who has once had the floor is again entitled to it while the same question is before the assembly so long as any member who has not spoken claims the privilege of the floor. From the decision of the chairman as to the claim of two members for the floor an appeal may be taken, or, in first instance, the chairman may refer the question directly to the assembly for decision. It is the custom, except in the United States Congress, to require important motions to be seconded as a means of assurance that the measure has the support of more than one member. The motion is often seconded as a matter of course, even though the person seconding it may not favor it. After the motion has been made and seconded, the chairman clearly states it to the assembly and then recognizes the author of the motion as entitled to the floor if he wishes to claim it, otherwise the first member who rises and addresses the chair. The question is now before the assembly and cannot be withdrawn or modified by the mover, if any member objects, except by obtaining leave from the assembly or

by moving an amendment. Before the chair has put the question, however, the mover may withdraw it without the consent of the assembly.

The question on the adoption of a motion or resolution is usually known as the main question, and during the consideration of it the introduction of any other question is not permissible, but it is allowable to make subsidiary motions that may aid in disposing of the main question, or such as arise incidentally in the course of the consideration of the main question, or such as relate to the rules of procedure, the privileges of members, or the termination of the meeting. Among the subsidiary motions for disposing of the main question, all of which must be decided before the main question can be acted upon, are: First in precedence, the motion to lay on the table. The purpose of this motion is to postpone further consideration of the question until some future time, when it may again be taken up, which would not be allowable had the question been disposed of by a motion to postpone either definitely or indefinitely. This is a common method of suppressing a question, and is successful whenever a majority cannot be found to take it from the table during the session. A motion to lay on the table is not open to debate, cannot be amended, nor can another subsidiary motion be applied to it. The effect of the motion is usually to place on the table everything pertaining to the subject; thus, if an amendment be ordered to lie on the table the subject which it is proposed to amend is also laid on the table. A second means of disposing of the main question by means of a subsidiary motion is the demand for the previous question. This takes precedence of every debatable question, but is itself neither open to debate or amendment. It applies to questions of privilege as well as to any other debatable question. Its effect is to stop immediately all debate and bring the assembly to a vote on the question pending. When a demand is made for the previous question and seconded, the presiding officer immediately puts the question, "Shall the main question now be put?" If the question is lost, the discussion continues as if the motion had not been made. The previous question requires a two-thirds vote for its adoption, may be demanded on a pending amendment, and if carried, debate on the amendment only is closed, the main question being still open to debate and amendment. It may also be used on an amendment to an amendment. (See PREVIOUS QUESTION.) A third method of disposing of the main question is by means of the motion to postpone to a certain day. Debate on this motion is limited, and must not go into the merits of the subject matter any further than may be necessary to enable the assembly to judge of the propriety of the postponement. The effect of this motion is to postpone further consideration of the subject until a certain time, during which period it cannot be taken up except by a two-thirds vote. When that time arrives the question is entitled to be taken up in preference to everything except privileged questions. In the fourth place, the main question may be disposed of by a motion to commit or recommit. The purpose of this motion is to refer the subject to a committee. If different committees are proposed, they should be voted on in the following order: (1) Committee of the whole; (2) a standing committee; (3) a special committee.

The committee, if a select one, may be appointed by the Chair or nominated by a member or members and elected by the assembly. The motion to commit is debatable, and the merits of the question may be gone into. In the next place, the main question may be disposed of by a motion to amend, which may take either of the following forms: (1) to 'add' or 'insert' certain words or sentences; (2) to 'strike out'; (3) to 'strike out certain words and insert others'; (4) to 'substitute'; and (5) to 'divide the question.' A paragraph once inserted cannot be struck out or amended except by adding to it. Similarly, words inserted cannot be struck out except by a motion to strike out the paragraph or a portion thereof. Certain motions are never open to amendment; among these are the motions to adjourn, to lay on the table, to postpone indefinitely, to reconsider, an amendment of an amendment, a demand for the previous question, for the orders of the day, and all incidental questions. An amendment may itself be amended, but not so as to alter its form. While an amendment is pending it is not in order to make another motion to amend until the first amendment is disposed of. Lastly, the main question may be disposed of by a motion to postpone indefinitely. This motion opens to debate the whole question which it is proposed to amend, but, as already observed, it cannot itself be amended. Its effect is to withdraw the question from the further consideration of the assembly for the remainder of the session. The previous question applies to this motion without affecting the main question.

What are called incidental questions are those which often arise in the course of the consideration of the main question, and consequently take precedence of the questions out of which they arise. Such questions are unamendable, and, with a single exception, are undebatable. The incidental questions are those of appeal, objection to the consideration of a question, the reading of papers, leave to withdraw a motion, and suspension of the rules. The appeal arises out of objection raised to a decision of the chair on a question of order. The decision of the presiding officer is made without debate, and if a member objects to the result of the decision, he may say "I appeal from the decision of the Chair." If the appeal is seconded, the chairman puts the question as follows: "Shall the decision of the Chair stand as the judgment of the assembly?" If there is a tie vote the decision of the Chair is sustained. The appeal is the only incidental question which is open to debate, and there are a few cases when it cannot be debated. When debatable, no member is allowed to speak more than once. If the presiding officer neglects to enforce the rules of procedure, any member may call his attention to the breach of order by rising and saying, "Mr. Chairman, I rise to a point of order," whereupon the chairman will request the member to state his objection, which he does, and then resumes his seat. If the chairman decides that the point of order is not well taken, and no appeal is made against the decision, the first member is permitted to resume his speech. If the decision sustains the point of order, and objection is made, he cannot continue without a vote of the assembly. It is in order for any member to object to the consideration of the main question before debate has begun on it. The objection does not require a second, and may

be made while another member has the floor. It cannot be debated, amended, or have any other subsidiary motion applied to it. Whenever objection is raised to the consideration of a motion the chairman states the question, "Shall the question be considered?" Unless an affirmative vote of a two-thirds majority is secured, further consideration for the remainder of the session is ended, otherwise the discussion continues as though objection had never been raised. The purpose of this motion is not to cut off debate, but to avoid the discussion of any question which may seem irrelevant or inexpedient. Any member has the right to ask for the reading of papers for the information of the assembly, but if an objection is raised, the decision is rendered by the Chair subject to appeal to the assembly. It is in order for the mover of a question which is before the assembly to withdraw it or substitute another in its place, if no one objects. If objection is made, it is necessary to obtain leave to withdraw or substitute, which may be done by motion. Such a motion is neither debatable or amendable. A motion to suspend the rules is one of the important incidental motions. Like the others of its kind, it cannot be debated or amended. It cannot be renewed at the same meeting for the same purpose, nor is it allowable except for a definite purpose, and then only by a two-thirds vote.

Another class of motions are those which are commonly known as privileged questions. They take precedence of all other questions, and are not open to debate except when they relate to the rights of the assembly or of its members. Privileged questions include motions to fix a time for adjournment, to adjourn, motions relative to rights and privileges of the assembly or of its members, and the call for the orders of the day. The motion to fix a day for adjournment takes precedence of all other privileged motions, and is in order even after the assembly has voted to adjourn, provided the chairman has not announced the result of the vote. Next in precedence is the motion to adjourn. This motion is neither debatable, amendable, nor open to reconsideration after a vote has been taken. If the adjournment does not close the session, all unfinished business has precedence over new business at the next meeting, and is treated as if there had been no adjournment. If the adjournment closes the session, and the next session is that of a new assembly, an end is put to all business unfinished at the close of the session, and it can be brought before the assembly only by being reintroduced. Questions of privilege are decided by the presiding officer, subject to the right of any two members to appeal from the decision. The assignment of one or more subjects to a particular day constitutes the orders of the day, and they are not open to consideration before that time except by a two-thirds vote. The orders of the day are classified as special and general, the former always taking precedence of the latter. A special order involves suspension of all rules that interfere with its consideration at the time specified, and it therefore requires a two-thirds vote to make any question a special order. The effect of an affirmative vote is to withdraw the question then under consideration as though an adjournment had happened. It is in order at any time, even though the floor is already occupied, to move a reconsideration of a previous

vote on any measure, unless another question is before the assembly at the time. Unless the vote is by ballot, the motion to reconsider must be made by a member of the prevailing side, and only on the day the vote was taken which it is proposed to consider. No question can be twice reconsidered, and a motion to reconsider cannot be amended, although it is debatable, and when debated it opens up for discussion the entire subject to be reconsidered. If the motion to reconsider is carried, the original question is in the condition it was in before the first vote was taken, and must be disposed of as if it had never been voted on. No one can debate the question reconsidered who had previously exhausted his right of debate on the question, although it is allowable to discuss it while the motion to reconsider is before the assembly.

The preliminary work of deliberative bodies is usually prepared by means of committees. These may be standing committees appointed for a definite time, select committees appointed for a special purpose, and committees of the whole consisting of the entire assembly. The first person named on a committee is usually the chairman, whose duty it is to call the committee together. A committee may facilitate its labors by the appointment of a subcommittee of its own membership. A committee report is usually made by the chairman, is signed by the members and delivered to the clerk. In case of disagreement among the members, there may be a majority and a minority report. The report of the majority is the report of the committee, and it may be adopted by the assembly, rejected, or recommitted. After the report has been adopted, the question is open to amendment as if there had been no committee report. An assembly may go into 'committee of the whole' for the consideration of a subject which it does not wish to refer to a committee, but which it is desired to consider with the freedom and informality which characterizes the procedure of committees. When this is done, the presiding officer calls another member to the chair and takes his place as a member of the committee. During the consideration by committee of the whole no motions are in order except to amend and adopt, or that the committee 'rise and report.' Debate may be without limit unless the assembly votes that debate in committee shall cease at a certain time, and until then any member may speak as often as he can get the floor if no one else who has not had an opportunity to speak on the question claims it. When the debate is concluded, a motion is made that 'the committee rise and report.' This motion is always in order and is undebatable. When it is adopted, the presiding officer of the assembly resumes the chair, while the chairman of the committee, having resumed his place in the assembly, reports to the Chair the decision of the committee. Like other committees, the committee of the whole has no power to alter the text of any resolution referred to it. It is the practice of many deliberative assemblies to consider certain questions 'informally' without going into committee of the whole, a procedure which is not very different from that of committee of the whole. This is the practice of the United States Senate in the consideration of measures on their second reading.

Debate upon a motion begins after it has been

stated by the chairman and is closed by the chairman rising to put the question. If the presiding officer thinks the debate has ended, he inquires if the assembly is ready for the question, and if no one claims the floor, he puts the question to a vote. The rule of the United States House of Representatives requires that those favoring the motion shall indicate their preference by saying *Aye*, and those opposing it say *No*. If when the presiding officer announces the result any member rises and expresses doubt as to the correctness of the result, or calls for a division, the presiding officer requests those who favor the motion to rise. After counting these and announcing the result, those opposed are requested to rise. These are counted and the final result is then declared. Or he may appoint tellers to make the count and report to him. Whenever there is a tie vote, the motion is lost unless the presiding officer gives his vote for the affirmative. If his vote will cause a tie, he may cast it and thus defeat the measure. Still another form of ascertaining the wish of members is the ballot. The following motions require a two-thirds vote for their adoption: Amendment or suspension of the rules, making of special orders, objections to the consideration of a question, the demand for the previous question, and the closing or limiting of debate.

The most convenient and in some respects the most authoritative manual of parliamentary law is Robert, *Rules of Order* (Chicago, 1883 and 1901). Consult, also, Stevens, *Law of Assemblies* (Minneapolis, 1901); Hackett, *The Gavel and the Mace* (New York, 1900); Thomas Brackett Reed, *Rules of Order*; Cushing, *Manual of Parliamentary Practice* (Boston); *Rules and Practices of the Senate and House of Representatives of the United States* (Washington).

PARLIAMENT OF DUNCES, THE. The Parliament of 1404, under Henry IV., to which, because no lawyers were admitted, the name *Unlearned* or *Lawless* (*Parliamentum Indoctum*) was given by Sir Edward Coke.

PARLIAMENT OF FOWLS, THE, OR THE ASSEMBLY OF FOWLS. One of Chaucer's minor poems, written in his favorite form of a vision. A student reading the "Dream of Scipio" in Cicero's *Republic* falls asleep, and is led by Scipio into a garden where nature assembles the birds on Saint Valentine's Day, and holds a court of love. The poem is taken partly from Boccaccio's *Teseide* and alludes to other Italian sources, but is based mainly on Macrobius's *Commentary on Scipio's Dream*, a favorite book in the Middle Ages.

PARLOA, pär'ló-ä', MARIA (1843—). An American domestic economist, born in Massachusetts. She appeared in Boston as a lecturer on cooking in 1877, was special instructor, or lecturer, at various seminaries in Massachusetts and New Hampshire, and gave courses of lessons in sick-room cookery to Harvard medical students. In 1878 she visited Paris for study; in 1881 lectured in Western cities, and in 1882 opened a cooking-school in New York City. Her publications include: *Miss Parloa's New Cook Book and Marketing Guide* (1882); *The Young Housekeeper*; *Home Economics*; and other books of a similar nature.

PARMA, pär'mä. Before 1800 a duchy in Northern Italy, lying between Sardinia, Lombardy, Modena, and Tuscany. The city of Parma was one of the colonies established along the Æmilian Road by the Romans after the conquest of Cisalpine Gaul in B.C. 222. It was included in the Ostrogothic, Lombard, and Frankish kingdoms, and ultimately in the new German Roman Empire. In the eleventh century it was an appanage of Tuscany, and as such passed to the Countess Matilda, and may have been included in her donation to the Papacy (1102). Lucchino Visconti, ruler of Milan, bought it from Obizzo d'Este about 1346. It passed, together with Milan, to the Sforza, and in 1499 was included in the conquests of Louis XII. of France. In 1511 Pope Julius II. retook it from the French. In 1515, when Francis I. reconquered the Milanese, he reannexed to it Parma and Piacenza, with the Papal consent; but in 1521 it was retaken by the Papal and Imperial troops. In 1545 Pope Paul III., one of the Roman House of Farnese (q.v.), separated Parma and Piacenza from the Papal domains and erected them into duchies for his natural son, Pietro Luigi Farnese, whose son, Ottavio, married Margaret, natural daughter of the Emperor Charles V. Pietro Luigi, after two years of tyranny, was assassinated by his exasperated subjects, and Parma and Piacenza were seized for the Emperor. Thereupon Paul III. retracted his grant and resumed the Papal claim. His successor, Julius III., who owed his election to the Farnese support, restored Parma to Ottavio Farnese. The Emperor retained Piacenza, and in 1551 sought to take Parma, whereupon Ottavio sought the protection of France. Philip II., to secure his alliance against France in 1556, when Italy was menaced by a new French invasion, restored to him Piacenza, though a Spanish garrison remained there. Alessandro Farnese, son of Ottavio, entered the Spanish service and rose high in Philip's favor, and in 1585 the Spanish troops were withdrawn. Duke Ottavio was succeeded in 1586 by Alessandro, who died in the Netherlands in 1592. The latter's son, Ranuccio, succeeded to the duchies under the guaranty of Spain and the Pope. Elizabeth Farnese, Queen of Philip V. of Spain, in 1725 secured the reversion of Parma and Piacenza to her son, Don Carlos, who received them upon the death of the reigning Duke, Antonio, without issue, in 1731. Carlos exchanged them in 1735 with Austria for the Two Sicilies. In 1748 Parma and Piacenza, together with Guastalla, were handed over by Austria to the Spanish Bourbons in the persons of the Infante Don Philip, with a reversion to Austria in case of failure to him of male descendants, or in case any of his descendants should ascend the Spanish or Neapolitan throne. In 1765 Philip was succeeded by his son, Ferdinand, who expelled the Jesuits in 1768. In 1801 Bonaparte concluded The Treaty of Madrid with Spain, by the terms of which Parma, Piacenza, and Guastalla were to be given to France on the death of Ferdinand, in exchange for which Don Luis, the son of Ferdinand, was made King of Etruria. France came into possession by the death of Ferdinand in the following year. The Treaty of Paris (1814) gave Parma, Piacenza, and Guastalla as a duchy to Maria Louisa, Napoleon's wife, and this was carried out, notwithstanding the protest of the King of Spain in behalf of the widow of the

King of Etruria. On the death of Maria Louisa in 1847 the duchy reverted to Charles, Duke of Lucca, son of the King of Etruria, who succeeded as Charles II. Guastalla was given to Modena, and some small districts were added to Parma. The rule of Charles was tyrannical and illiberal. On the outbreak of the Revolution in 1848 he was forced to grant the popular demands, but he soon afterwards left the country. Parma joined Sardinia against Austria, and was involved in the defeat of its ally. In March, 1849, Austria imposed upon Parma the rule of Charles III., son of Charles II., who had abdicated. The arbitrary rule of Charles III. was closed by his assassination in 1854, when his widow, Louise Marie Thérèse de Bourbon, assumed the government in behalf of her son, Robert I. She made some attempt at reform, but left the country with her son on the outbreak of the war of 1859. On March 18, 1860, Parma was annexed to Sardinia and became a part of the new Kingdom of Italy by the will of its people. It now forms the two provinces of Parma and Piacenza.

PARMA. The capital of the Province of Parma, Italy, situated on both sides of the river Parma, 12 miles south of the Po and 75 miles southeast of Milan (Map: Italy, E 3). The town is circular in form, and is surrounded by walls and ditches flanked by bastions. The site of the former fortifications is now nearly a complete circle of promenades. The streets are straight and wide, and meet at right angles. The Roman Via Emilia, here called the Corso Vittorio Emanuele, crosses the city from east to west, dividing it into two nearly equal parts. It traverses the Piazza Grande, where the official palaces and the statues of Correggio and Garibaldi stand. The northwest corner of the town is laid out in a fine public park. Here is situated the Del Giardino Palace, now a military school, constructed by the Farnese, and containing frescoes by Carracci. Along the opposite side of the city extends the Stradone promenade.

Parma has notable churches. The cruciform cathedral (consecrated 1106 A.D.) is built in the Lombard-Romanesque style. In the octagonal dome is Correggio's "Assumption." The Baptistery is a splendid edifice of Veronese marble, completed in 1270. It is surmounted by several turrets, and the exterior is richly ornamented with tablets representing symbolic scenes. In the interior is a series of good reliefs. The Madonna della Steccata, a Renaissance church in the form of a Greek cross, contains mural paintings by Parmigiano. The San Giovanni Evangelista is a fine Renaissance creation of eminent architects. It dates from 1510. The dome has noteworthy frescoes by Correggio, who has also here a valued "Saint John the Evangelist."

The large but incomplete Palazzo della Pilotta owes its origin to the Farnese. In it are Parma's valuable art collections. In the museum of antiquities here are meritorious bronze statuettes. Its picture gallery contains good paintings by Giulio Romano, Canova's statue of Marie Louise, Holbein the Younger's "Erasmus," paintings and drawings by Parmigiano, and also famous examples of Correggio. Of these last the "Madonna della Scodella" is the most prominent. Other excellent works by Correggio are a "Descent from the Cross," a "Martyrdom of Saints Pla-

cidus and Flacia," and two Madonnas. The public library (Palatina) in the same edifice contains over 300,000 volumes and about 5000 manuscripts, some of the latter of great interest and value. The Teatro Farnese is also here, dating from 1618, and latterly restored. In the Convent of San Paolo, now used for a school, are found masterful frescoes by Correggio. The university was founded in 1512. There are faculties of jurisprudence, mathematics and science, and medicine and surgery. In 1902 it had 42 instructors and 621 auditors. Its paleontological collection and its African fauna from the Italian colonies are noteworthy. Connected with the university are a botanic garden, an observatory, and a pharmaceutical school. Among the other educational institutions of Parma are an episcopal seminary, a lyceum, an agricultural institute, an academy of fine arts, and a school of music. The city is notable in art history as the place of residence of Correggio and the birthplace of Parmigiano.

Parma has manufactures of musical instruments, silks, woolens, linens, felt hats, leather, glass, and ironware. There is also a royal tobacco factory. The printing establishment founded by Bodoni in 1766 is famous in Italy. The trade is chiefly in wine, grain, cattle, and cheese. In June is held a silk fair. Population (commune), in 1881, 45,217; in 1901, 49,340.

PARMA, ALESSANDRO FARNESE, Duke of. Spanish governor of the Netherlands. See FARNESE.

PARMA, JEAN JACQUES REGIS CAMBACÉRÈS, Duke of. See CAMBACÉRÈS.

PARMENIDES (Lat., from Gk. Παρμενίδης). A Greek philosopher of the fifth century B.C., and the most famous member of the Eleatic School (q.v.). Little is known of his life, but he was greatly revered in antiquity for his intellectual powers and noble character. He is said, when sixty-five years old, to have visited Athens, where Socrates, then a young man, heard him. Like his master Xenophanes, Parmenides set forth his philosophical doctrine in verse—his work being entitled *On Nature* (Περὶ Φύσεως). Considerable fragments of it are still extant. The leading design of this poem is to demonstrate the reality of actual being, the non-existence of which Parmenides declares to be inconceivable, but the nature of which, on the other hand, he admits to be equally inconceivable, inasmuch as it is dissociated from every limitation under which man thinks. As for the phenomena of nature, they are only apparent and due to man's error: they only seem to exist, but have no real existence. Apparently Parmenides made no attempt to grapple with the inevitable contradiction between the doctrine of being and that of seeming. The fragments are published by Karsten, *Philosophorum Græcorum Veterum Reliquiæ*, vol. i. (Amsterdam, 1835); Stein, in *Symbola Philologorum Bonnensium* (Bonn, 1867); Ritter and Preller, *Historia Philosophiæ Græcæ* (7th ed., Gotha, 1888); Diels, *Parmenides' Lehrgedicht, griechisch und deutsch* (Berlin, 1897). Consult Zeller, *Philosophie der Griechen*, vol. i. (5th ed., Leipzig, 1892).

PARMENION (Lat., from Gk. Παρμενίων) (c.399-329 B.C.). A Macedonian general, who served under Philip and Alexander the Great. In 356 he defeated the Illyrians; in 342 carried

out a successful campaign in Eubœa; and in 337 was sent into Asia Minor to pave the way for the conquest of Persia. While he was there Philip was assassinated. Parmenion, his most trusted servant, remained faithful to Alexander and acted as his military adviser and as commander of the infantry. In 330, when Parmenion was in Media guarding the booty, his son, Philotas, was accused of treason against Alexander and was executed, after having implicated his father. Alexander may have believed the charge or feared vengeance from Parmenion; at any rate he had him put to death.

PARMIGIANO, pār'mé-jā'nô, or **PARMEGIANINO** (1503-40). An Italian painter, whose real name was Mazzuoli, or Mazzola, and who was called Parmigiano from his birth-place, Parma. He was the most talented of a group of mannerists, who attempted to amalgamate the schools of Rome and Parma. He early came under the influence of Correggio and became a successful imitator of his style. In 1522 he went to Rome, where his first manner underwent great modification, due to his study of the masterpieces of Michelangelo and Raphael. His Roman career was interrupted by the sack of the city in 1527 by the soldiers of Charles V. The picture of Saint Jerome, National Gallery, London, was painted at this time. Taking refuge in Bologna, after a residence there of three years, he returned to Parma in 1531. During this year he contracted to execute a series of frescoes in the Church of Madonna della Steccata. Receiving half payment in advance and failing to fulfill the terms of the agreement, he was imprisoned by the church authorities in 1537. Upon promising to complete the work, he was released from prison, but fled to Casalmaggiore, where he died August 24, 1540. Parmigiano's principal altar-piece is "Santa Margherita" in the Academy at Bologna. Probably the most popular production of the artist is "Cupid Making a Bow" (1536, Vienna), frequently attributed to Correggio. Consult Affò, *Vita del Mazzola* (Parma, 1784).

PARNAHYBA, pār'ná-ē'bá. The name of two rivers and of a town in Brazil. See **PARANAHYBA**.

PARNASSIENS, LES, lā pār'ná'syān'. A school of French poets, so named because they contributed to a lyric anthology known as *Le Parnasse Contemporain*. One of the first Parnassiens to come forward was Théodore de Banville (1823-91); but the real founder of the school was Théophile Gautier (1811-72), who formulated the doctrine of art for art's sake. Gautier's unhappy friend Baudelaire (1821-67) upheld this poetic dogma, but he died rather too early to belong to the Parnassian school, save by his tendencies. Under the leadership of Leconte de Lisle (q.v.), in whose house they gathered on Saturdays as early as 1856, a score of writers composed poems wherein they endeavored to suppress personal feeling, to avoid preaching, and to cultivate art for art's sake. Leconte de Lisle himself was called the impassive, but in him, as in others, one often feels an emotional lyric undertone, and this bursts forth in a truly lyric cry in *Les Monfrèurs*, a poem in which Leconte de Lisle utters his beliefs with a great lack of his habitual Olympic impassivity. The Parnassiens aimed

at great finish in thought and form, and many of them achieved their aim. Xavier de Ricard, Anatole France, Catulle Mendès, Armand Silvestre, François Coppée, Sully Prudhomme, Léon Dierx, and José Maria de Hérédia, to name the most distinguished Parnassiens, undertook also to rid French poetry of a false sentimentality, borrowed, they thought, from the Lake School (q.v.), and to combat the imitation of Lamartine.

PARNAS'SUS (Lat., from Gk. Παρνασσός). A mountain in Phocis, Greece. It has twin peaks, now called Gerantorachos and Lykeri (8070 feet), which rise from a rough plateau and form a conspicuous landmark in Eastern Greece. During all but the summer months the summits are covered with snow. From the plateau rise other lesser peaks, and on the side of a hill at the south above Delphi is the Corycian Cave, dedicated to Pan and the Muses. On the slope of Parnassus was the fountain Castalia (q.v.), whose waters were supposed to fill the minds of those who drank of them with poetic inspiration. The Thyiades are said by Pausanias to have celebrated the orgies of Dionysus on the highest summits. On the southern slope lay Delphi (q.v.), the seat of the famous oracle.

PARNELL, CHARLES STEWART (1846-91). An Irish statesman and Parliamentary leader. He was born at Avondale, in the County of Wicklow, Ireland, June 28, 1846, of an old Protestant family. He was the son of John Henry Parnell and Delia Tudor Stewart, daughter of Rear-Admiral Charles Stewart of the United States Navy. Parnell was educated in the University of Cambridge, but returned to Avondale without a degree. After traveling in the United States (1872-73) he became high sheriff of his county, and in 1875 he entered Parliament for Meath County. From the outset he displayed remarkable ability for leadership in politics and for parliamentary warfare. Reserved and dignified, with few of the ordinary graces of an orator, Parnell contrasted strikingly with the enthusiastic impulsive Irish debater of the type of O'Connell. But the very absence of these Irish qualities impressed upon the English the fact that now for the first time they had to reckon with a strong, well-directed Irish opposition.

In 1877, in conjunction with Biggar, Parnell brought together the hitherto disunited forces of opposition in a compact party of Nationalists, whose object was Home Rule for Ireland in all local affairs, including necessarily the restoration of the Irish Parliament. (See **HOME RULE**.) The method of political warfare followed by Parnell was bold and effective. He adopted extreme tactics of obstruction: to delay all public business as far as possible; to make combinations with any party that might be in opposition in order to embarrass the Government; to use the balance of power in such a way as to secure concessions as the price of votes; and, in a word, to make all legislation extremely difficult until the demands of Ireland should be considered and accepted. For the support of this policy Parnell looked to the Fenians of Ireland and of America, and to the Land League, which he helped organize in 1879, and of which he was the first president. The object of the League was not only to secure fair rents and

to transfer the ownership of the soil to the tenants, but also to bring about Home Rule. (See LAND LEAGUE.) Meantime Parnell carried out his Parliamentary warfare with singular tenacity and persistence, against the bitter opposition of both of the great English parties. The conservative traditions of the House of Commons were speedily set at naught; its rules were ingeniously perverted to defeat their own objects; every important piece of legislation was attacked, delayed, and in some cases defeated by the able combinations of the Irish party under its great leader, with some of the other elements of opposition. In 1877 and 1878 the Parnellites, as they began to be called, persistently opposed the bill for the annexation of the Transvaal, the flogging clauses of the Mutiny Act, and the Prisons Bill; and, joined by Joseph Chamberlain and leading Radicals, they carried the bill abolishing flogging in the army. Side by side with the development of this new policy the land agitation in Ireland grew and became a source of widespread public interest. To aid the movement, and to relieve those tenants who suffered by eviction, Parnell in the winter of 1879-80 made a visit to America, where he raised large sums by popular subscription. On his return he was simultaneously elected to Parliament from Meath, Mayo, and the city of Cork, the last of which he chose to represent. His claim to lead his party was formally ratified when in May, 1880, the Irish members of Parliament chose him leader by a vote of twenty-three to eighteen. Supported by powerful social and political organizations, and at last by the Catholic Church, and controlling the words as well as the votes of his followers with a strong will and an iron hand, Parnell was now a formidable power in English politics. Continuing the land agitation, he was arrested and imprisoned in October, 1881, on the charge of intimidation, and of obstructing the operation of the new Land Act. (See IRISH LAND LAWS.) He remained in Kilmainham jail until April, 1882, when he was released on parole.

At the general election of 1885 he was re-elected from Cork, and by a political bargain with the Conservative Party secured the election of a number of Conservative candidates, though soon afterwards he repudiated the agreement and threw his votes on the Liberal side (January, 1886), thus defeating the Conservative Administration of Lord Salisbury. Gladstone, who by this change succeeded to office, was now definitely committed to the adoption of a measure of Home Rule for Ireland, and henceforth the Irish supported the Liberal Party. On April 8, 1886, Gladstone had a bill introduced to give Home Rule, which ruptured the Liberal Party and led to the formation of the new Liberal Unionist Party (q.v.), and Gladstone's Administration was thereupon defeated and resigned in July, 1886. Nevertheless, Parnell introduced a bill for the relief of tenants, which, as a whole the Salisbury Government refused to accept, though many of its important provisions were subsequently incorporated into the Government's own measure. Toward the close of the session of 1887 a sensation was caused by the publication in the *London Times* of the fac-simile of a letter purporting to have been written by Parnell to a friend, palliating the murder of the permanent Under-Secretary for Ireland, Thomas Henry

Burke, in Phoenix Park, Dublin, in 1882. On the night of the publication of this document Parnell returned to the House of Commons, from which he had been absent, and denounced the letter as a base and infamous forgery. But when Sir Charles Lewis, a Conservative, moved that the publisher of the *Times* should be prosecuted for libel at the expense of the Government, the Irish members declined on the ground that they had no confidence either in the Government or in English juries. Some time afterwards this letter and others of a similar nature were found on investigation by a judicial commission to be the forgeries of a man named Pigott, who after the exposure fled from the country and died at Madrid by his own hand. Parnell brought suit for libel against the *Times*, and recovered £5000 damages. He was now at the very height of his prestige, but his downfall was near at hand.

For a long time rumors had been current in political circles connecting the name of Parnell with that of the wife of Capt. W. H. O'Shea, formerly member of Parliament for Galway, and long an enthusiastic follower of Parnell. These rumors were confirmed when in 1889 Captain O'Shea applied for a divorce from his wife on the ground of adultery with Parnell. The case was tried in November, 1890, and, as no defense was made, the divorce was granted, and Parnell was condemned in costs. This decision proved fatal to his reputation and political power. His offer to resign the leadership of the Irish party was at first declined, but soon it became known that Gladstone had written to John Morley that the continuance of Parnell's leadership would be disastrous in the highest degree to the cause of Ireland, implying that Parnell could no longer have the support and coöperation of the English Liberals. After this letter had been made public it was supposed that Parnell would renew his offer to resign. As he resolutely refused to give up the leadership, he was deposed by a vote of his Parliamentary colleagues. The result was a division of the Irish party into Parnellites and Anti-Parnellites. The fallen leader now bitterly denounced both Gladstone and his own late colleagues who had turned against him. His appeal to the people, however, was answered by the defeat of three Parliamentary candidates whom he had nominated. Nevertheless, he struggled with desperate energy to recover his leadership till his health broke down completely, in September, 1891. In July of that year he had married Mrs. O'Shea, and on the 6th of October following he died.

Consult: Hansard, *Reports*, 1875-91 (for his Parliamentary speeches); Lucy, *Diary of Two Parliaments, 1874-85* (London, 1885-86); *Diary of the Salisbury Parliament, 1886-92* (ib., 1892); *Annual Registers*, 1875-91; O'Conner, *The Parnell Movement, with a Sketch of Irish Parties Since 1843* (New York, 1890); Davitt, *The Times-Parnell Commission* (Speech, London, 1890); Larkin, *Parnell and the London Times* (Boston, 1890); MacDonald, *Diary of the Parnell Commission* (London, 1890); *Memorial Volume to Charles Stewart Parnell*, with a biography by Walsh (New York, 1892); Moore, *Parnell and His Island* (London, 1887); O'Brien, *Life of Charles Stewart Parnell* (London and New York, 1888); O'Shea, *The O'Shea-Parnell Divorce Case* (Boston, 1891); Mahoney, *Life of Parnell* (New York, 1886); Sherlocke,

Life of Parnell (Dublin, 1887); Clayden, *England Under Lord Beaconsfield* (London, 1880); *England Under the Coalition*, etc. (ib., 1892).

PARNELL, HENRY BROOKE, First Baron Congleton (1776-1842). A British politician, born in Ireland. He studied at Eton and at Trinity College, Cambridge, and in 1797 entered politics as a member of the Irish House of Commons. In 1802 he was elected to the British Parliament for Queen's County, which, with an interval of four years (1802-06), he continued to represent until 1832, when he declined to stand again. The next year he was elected from Dundee, which he continued to represent from that time until his elevation to the House of Lords as Baron Congleton of Congleton in 1841. He became Secretary of War in Lord Gray's Cabinet in 1831, but was dismissed the next year for refusing to support the Ministry on the Russo-Dutch War question. His chief interest was in financial and agrarian subjects, and in 1838 he strongly urged the abolition of the corn laws. He wrote a number of works, including *Observations Upon the State of Currency of Ireland* (1804; 3d ed. 1804); *An Historical Apology for the Irish Catholics* (1807); *Treatise on the Corn Trade and Agriculture* (1809); *On Financial Reform* (4th ed. 1832); and *A Treatise on Roads* (2d ed. 1838).

PARNELL, THOMAS (1679-1718). An Anglo-Irish poet, born in Dublin. He graduated at Trinity College, Dublin, and was ordained deacon, though under the canonical age. In 1706 he was appointed Archdeacon of Clogher; in 1713, prebendary to Saint Patrick's Cathedral, Dublin; and in 1716, Vicar of Finglas. He contributed to the *Spectator* and *Guardian*, and was the associate of Swift, Pope, Arbuthnot, and Gay, in the 'Scriblerus Club.' On the fall of the Whig Government, near the close of Anne's reign, he went over to the Tories, and stood in high favor with the Oxford Administration. But his prospects of advancement from that quarter were destroyed by the overthrow of the Tories on the death of the Queen. His disappointment at not obtaining better promotion, and the death of his wife (1711), threw him into deep melancholy, and he is said to have hastened his death by intemperance. He died at Chester in October, 1718. Besides the occasional papers written for Addison and his share in *Scriblerus*, Parnell helped Pope in the translation of the *Iliad*, and contributed to the first volume an *Essay on the Life, Writings, and Learning of Homer* (1715). His poems were collected by Pope in 1721. The volume contains twenty poems, among which are *The Hermit*, *A Night Piece on Death*, and *A Hymn to Contentment*. On these poems Parnell's reputation chiefly rests as a fluent and graceful verse-maker in the manner of Pope. They also point forward to the next generation—to Collins and Goldsmith. In 1758 appeared the *Posthumous Works of Parnell*. The volume adds nothing to his fame. Consult the *Life of Parnell* by Goldsmith, and the edition of Parnell's poems by Aitken in the Aldine series (London, 1894).

PARNY, pár'nó', EVARISTE DÉSIRÉ DES-FORGES, Vicomte de (1753-1814). A French poet, born in the Isle of Bourbon. In his childhood he went to Paris, became a soldier, and in 1773-75 he revisited his native land, and there loved a Creole whose praises he sang in the

Poésies érotiques (1778). His later epics have less literary merit. They are frivolous and obscene. Of these, *La guerre des dieux anciens et modernes* (1796) is characteristic. His Works were published at Paris in 1808 in five volumes. The latest edition of his *Poésies complètes* appeared in 1887.

PARODY (Lat. *parodia*, from Gk. *παρῳδία*, parody, from *παρά*, *para*, beside, beyond + *ὕδῃ*, *ôdê*, song, ode, from *αἰδέειν*, *aeidein*, *αἰεῖν*, *adein*, to sing). As understood by the Greeks in early times, a parody was a comic imitation of an epic poem or of some part of it. The rhapsodists, in reciting the *Iliad* or the *Odyssey*, were accustomed, it is said, to throw in humorous passages of their own, composed in the style and metre of the original, but on a trivial subject. From this use the term was extended to the comic imitation of any poem, and afterwards to the comic imitation of any variety of prose, such as history and fiction. Parody, like travesty, is a form of burlesque. The essence of burlesque is the treatment of a light theme in the style appropriate to a serious work. Such, for example, is Chaucer's *Nun's Priest's Tale*, wherein the hubbub caused by Master Reynard in the widow's household is described in language suggestive of the fall of Troy. The humor lies in the contrast between subject matter and the treatment of it. In the travesty, such as the clever *L'Enéide travestie* of Paul Scarron, the characters of the original are turned to a humorous account by some change in the incidents that results in a debasement of the original theme. In the parody, the theme and characters are greatly modified or completely changed, but the style of the original is closely followed in those peculiarities that easily lend themselves to ridicule.

Though the word parody has come to us from the Greeks, it is not to be supposed that they were the first people to feel the impulse toward this kind of satire. Parody belongs to the folk literature of many and perhaps all races. In very early literary stages, writers have laid hold of their legal and religious phrases for giving a humorous turn to the common affairs of life. All that can be said is that the parody as a distinct literary type of satire has been handed down from the Greeks, giving form to the folk parodies of the Western nations. The first Greek parodist, according to Aristotle, was Hegemon of Thasos (fifth century B.C.), who gained a prize at the Athenian games with his *Gigantomachia*, or *Battle of the Giants*. By others the invention of the form has been ascribed to Hipponax (fifth century B.C.). But these are doubtful traditions. At any rate, the best extant parody of the epic among the Greeks is *The Battle of the Frogs and the Mice*, running closely on the lines of a Homeric combat, and dating from the second or the third century before Christ. At a later period great renown was won, it is said, by a certain Cénonas, a Greek born in Italy, who burlesqued the public reciters of Homer by transforming Polyphemus into a sentimental lover, and by giving Ulysses the speech of the common people. The great master of parody was Aristophanes, into whose comedies were taken over whole passages of Euripides and many current phrases for the purpose of ridicule. Aristophanes was followed

by Lucian, who in *The Dialogues of the Gods* freely employed the language of Homer, and in *The True History* built up an extravagant romance on incidents from the *Iliad* and contemporary tales of adventure. That the Romans were fond of parody is known from Cicero, who in his *De Oratore* enumerates its several kinds. Catullus was a favorite with the parodist, and Vergil did not escape.

Among the Romans are found the first parodies of the legal testament, or will. It was a custom, as early as the time of Julius Cæsar, for men to satirize their enemies by scurrilous remarks about them in their wills. Out of the practice seems to have grown the humorous testament, in which some animal, a pig or an ass, bequeaths at death his property or qualities to posterity. These animal testaments, of which the earliest one extant goes back to the third century of our era, spread through the Latin races, appearing in French, Spanish, and Portuguese during the early Renaissance. Akin to them are the many imaginary testaments written on various occasions in later times. A fine specimen is *The Will* by John Donne, the Elizabethan poet. Closely related to the humorous testament is also the parody on the epitaph, which goes back to the Middle Ages. This kind of satire is seen in its perfection in the *Ballade des pendus* of François Villon, composed in anticipation of the gallows. Indeed, both the Lesser and the Greater Testament of Villon are parodies so excellent in their kind as to form a type. Almost equally famous is Goldsmith's *Retaliation* on the imagined death of his friends, including Burke, Garrick, and Reynolds.

For centuries the most fruitful source of parody was the Bible and the liturgy of the Christian Church. This was, of course, in line with the work of Lucian, though it was at first in no direct way connected with him. From the twelfth century onward, increasing greatly during the Reformation period, flourished parodies of the mass, the creed, the litany, the paternoster, and prayers and hymns to the Virgin. They were sometimes written in Latin, and at other times in the vernacular speech. In *Cynthia's Revels*, Ben Jonson introduces a light parody of the litany; and Lord Somers, who framed the *Declaration of Rights*, parodied the first four chapters of Saint Matthew. In 1817 William Hone, a London author and bookseller, was prosecuted for publishing parodies on the litany, the Athanasian creed, and the catechism, which he had employed for political satire. These are but a few examples taken from a class numbering hundreds.

The purely literary parody, aiming at good-natured banter, though not unknown to the ancients, is mainly a modern development from the harsh invective of the earlier times. It has long been expected that a popular poet or novelist will have his peculiar style and way of viewing things held up to ridicule. So kindly is this ridicule that not even the most sensitive author can receive other than pleasurable emotions from it. Shakespeare amused his audiences with the rant of the contemporary drama and the euphuism of John Lyly, and evidently was not hurt when friends like Beaumont and Fletcher paid him in his own coin. In more than one instance Shakespeare even parodied himself. The bombast and nonsense of Dryden's

tragedies received its just castigation in the Duke of Buckingham's *Rehearsal*. Among the parodies of Milton the *Splendid Shilling* of John Phillips (died 1707) is still reckoned the best, although the almost contemporary *Fanscomb Barn*, now easily accessible in the works of Lady Winchelsea (1903), is almost as good. Passing by Gray, Goldsmith, and Cowper, each of whom had his parodist, we come to the nineteenth century—the age *par excellence* of parody. The first romantic group of English poets, including, among others, Wordsworth, Keats, and Shelley, were especially exposed to ridicule. Then came Tennyson and Browning with marked mannerisms, and finally the so-called Preraphaelites, like Rossetti, William Morris, and Swinburne, with their florid imaginations, distorted female figures, and unreal landscapes. There could be no finer material for the parodist. In their *Rejected Addresses* (1812) Horace and James Smith burlesqued deliciously Wordsworth, Southey, Byron, and Scott. Following in the line of the Smiths are R. H. Barham's *Ingoldsby Legends* and the *Bon Gaultier Ballads*, the joint work of W. E. Aytoun and Theodore Martin. Among other clever verse-parodists were Thomas Hood, W. M. Thackeray, C. S. Calverley, Lewis Carroll, Sir Frederick Pollock, J. K. Stephen, and the numerous contributors to *Punch*, who have closely watched for absurdities of sentiment and style. From this list should be selected Calverley as undoubtedly the most felicitous parodist in the whole range of English literature. Especially successful was he in imitating Tennyson's *Brook* and Browning's *Ring and the Book* in *The Wanderers* and *The Cock and the Bull*. And the eccentricities of the Preraphaelites are finely exaggerated in the *Ballad*.

The English novel began its career with parody. Richardson had no sooner published *Pamela* than humorous continuations were placed upon the market. All of them are now forgotten except Fielding's *Joseph Andrews*, which begins with ridicule of Richardson's point of view and a close parody of his epistolary style. Sterne was likewise the sport of a score of humorists. Before publishing *Vanity Fair*, Thackeray paid his compliments to Bulwer, Disraeli, Lever, and G. P. R. James, and afterwards to Scott. The mine opened by Thackeray in these *Burlesques* was further worked by Bret Harte in two series of *Condensed Novels* dealing with the older novelists, and Mrs. Humphry Ward, Anthony Hope, Conan Doyle, Hall Caine, and Kipling. In like manner Owen Seaman in *Borrowed Plumes* (1902) burlesqued Mrs. Craigie, Miss Fowler, Marie Corelli, George Meredith, Maurice Hewlett, Henry James, and other novelists of the day.

Parody has been considerably cultivated by American writers with at least fair success. Of colonial parodists the most important is doubtless Joseph Green of Boston, the witty rival of Mather Byles, the punning parson. The Revolutionary satirists naturally made use of parody, a good illustration being John Witherspoon's parody of the *Petition of Rivington*, the Tory printer. After the Revolution the 'Hartford Wits' essayed parody and the mock-heroic in *The Echo* and *The Anarchiad*. The absurdities of the Della Crusceans and the pretensions of the new Democratic-Republican Party furnished materials to parodists and satirists, but the first

elaborate parody of real consequence, Irving's *Knickerbocker's History of New York*, changed under its author's hands into a masterpiece of humorous narration. With the next generation came authors original enough to be parodied not only in America, but in England; for example, Willis, Longfellow, and Poe. It was even found worth while to parody, in a volume modeled on the *Rejected Addresses*, versifiers whose names are now scarcely remembered. The Civil War gave an impetus to the writing of parodies. Some clever ones are to be found in the works of professed humorists like D. R. Locke ("Petroleum V. Nasby") and R. H. Newell ("Orpheus C. Kerr"), but the most important and sustained is Richard Grant White's *New Gospel of Peace*. Of recent years Walt Whitman is naturally the writer who has best lent himself to parody. Bret Harte (q.v.) and Bayard Taylor, in *The Echo Club and Other Literary Diversions*, are probably the most important writers of parody with regard to both quantity and quality. For the early history, consult, with its bibliography, Delepierre, *Essai sur la parodie* (London, 1871). A popular history of parody with examples from modern literature is given by Martin in *On Parody* (New York, 1896). For a larger collection, consult Hamilton, *Parodies of the Works of English and American Authors* (London, 1884-89). Some good specimens of recent verse-parody may also be found in Miles, *The Poets and Poetry of the Century*, vol. ix. (ib., 1897), and in other anthologies. See also the articles on the writers here mentioned, and the article on BURLESQUE.

PAROLE (Fr. *parole*, word, from Lat. *parabola*, comparison, speech, parable). When a military or naval officer is released from close confinement, or allowed any extraordinary privilege on the sole security of his word of honor, he is said to be on parole. On guard, or any other post, where precautions against an enemy are necessary, a certain word is previously agreed upon, which is known only to the officers of the guard and of the day, and such other officers as for special reasons may be intrusted with it. It differs from the countersign (q.v.) in that the latter is given to all sentries and men of the guard, while the parole is confided entirely to officers of the guard and those in similar authority.

PAROQUET. See PARRAKEET.

PAROS (Lat., from Gk. Πάρος). An island of the Cyclades, in the Grecian Archipelago. It is situated west of Naxos, from which it is separated by a channel from four to six miles wide. Greatest length, fifteen miles; greatest breadth, nine miles; area, about ninety-five square miles. Population, in 1896, 7740. The island is chiefly a mountain mass, rising in the centre in the ancient Marpessa, now Mount Saint Elias, to a height of nearly 2500 feet. In the valleys the vine and grain are cultivated, but the chief importance of the island in ancient times was due to the marble, and especially the highly esteemed *Lychnites*, which was much sought by sculptors. Parikia, on the west coast, on the site of the ancient Paros, is the principal town. Ancient tradition attributed the early colonization of the island to Cretans, who called it Minoa; later it was settled by Ionians. It early enjoyed prosperity from its marble and its

numerous sculptors. Later it submitted to Persia, and was unsuccessfully attacked by Miltiades after the battle of Marathon. After the Persian wars it joined the Delian League, and shared the fortunes of the neighboring islands. Like other Cyclades, it passed under the rule of the Ptolemies of Egypt, and in B.C. 197 was presented to the Athenians by Rome. Since then it can scarcely be said to have had a separate history. It was celebrated in literature as the native place of the poet Archilochus, and is also known from the discovery of the famous Parian Chronicle. See ARUNDEL MARBLES.

PAROTID GLAND. See SALIVARY GLAND.

PARQUETRY (Fr., inlaid flooring, from *parquer*, to floor with small pieces of wood, from *parquet*, inlaid floor, diminutive of *parc*, inclosure, park). A kind of wood mosaic used for flooring and sometimes for wainscoting or furniture. In the more elaborate kinds of parquetry, veneers are used, but it is much more generally composed of blocks of wood often of different colors, laid down so as to combine and form a geometric pattern. The patterns are usually bounded by straight lines. The pieces are laid flush and flat on the upper surface. For this purpose the edges are usually grooved so as to fit snugly into each other, though other methods of laying are also followed.

PARR (so called probably from the parr-marks or cross-bars on the sides). A young salmon before its first migration to the sea, and when its sides still show indistinct bars. Compare SMOLT; see SALMON.

PARR, CATHARINE (1512-48). The sixth and last Queen of Henry VIII. of England. She was the daughter of Sir Thomas Parr, of Vendl, Westmoreland. Married first to Lord Burgh, and afterwards to Lord Latimer, she was wedded, not without misgivings, to Henry VIII., on July 12, 1543. She was distinguished for her learning and knowledge of religious subjects. Her influence was for good; she persuaded Henry to restore the right of succession to his daughters; wished to educate them and Prince Edward, and interested herself on behalf of the universities. In 1544, during the absence of Henry at the siege of Boulogne, she acted as Regent of the kingdom. After Henry's death she married (1547) Sir Thomas Seymour, and died after childbirth the following year.

PARR, Mrs. LOUISA (maiden name TAYLOR) (c.1848?-). An English novelist, born in London. She passed her early life in Cornwall. Marrying a physician in 1869, she settled at Kensington. Before this she had written a story entitled *How It All Happened* (in *Good Words*, 1868). This graceful story, translated into French, appeared also in the *Journal des Débats*. Her first three-volume novel, *Dorothy Fox* (1870), was well received. But she first gained her audience with *Adam and Eve* (1880), which depicted with faithfulness the quaint fishing village of Polperro in Cornwall. Among subsequent novels are *Loyalty George* (1888); *The Squire* (1892); and *Can This Be Love?* (1896).

PARR, SAMUEL (1747-1825). A once notable English scholar, born at Harrow-on-the-Hill. He was sent to Emanuel College, Cambridge,

in 1765; but the death of his father, two years afterwards, compelled him to withdraw and to accept an assistant-mastership at Harrow, where he remained five years. In 1776 he was appointed master of Colchester School, where he was ordained priest, and obtained the curacies of Hythe and Trinity Church. Next year he became master of Norwich School; but in 1786 settled at Hatton in Warwickshire, where he spent the rest of his life. In 1787 he published an edition of Bellenden, to which he prefixed his celebrated preface, which is as remarkable for its uncompromising advocacy of Whig principles as for the scrupulous Ciceronianism of its Latinity. Parr was a man of vast learning, but his scholarship was not of high order. Consult De Quincey's essay, *Dr. Samuel Parr on Whiggism in Its Relations to Literature*.

PARR, THOMAS. An English centenarian, known as 'Old Parr.' In 1635 he was brought by the Earl of Arundel to London and presented at Court as then 152 years of age. He was long a favorite chap-book character, but assertions of his extreme age have been investigated and contradicted by W. J. Thoms and Sir G. C. Lewis. The chief source of information concerning Parr is a curious pamphlet by John Taylor, entitled *The Olde, Olde, Very Olde Man* (1635). See LONGEVITY.

PARRAKEET (Fr. *perroquet*, from Sp. *periquito*, diminutive of *perico*, parrot, from *Pedro*, Lat. *Petrus*, Gk. Πέτρος, Peter, from πέτρος, rock; also explained as from It. *parochetto*, diminutive of *parocco*, parish priest, jestingly applied to the bird). Any of many small kinds of parrots, especially the long-tailed East Indian and Australian species of the genus *Palæornis* and its allies. The American parrakeets are chiefly of the genus *Conurus*, one species of which is found within the limits of the United States, and not elsewhere. At the beginning of the nineteenth century the Carolina parrakeet (*Conurus Carolinensis*) was found throughout the Eastern and Central United States as far north as Nebraska, Wisconsin, and central New York. It was not merely a summer visitor, but occurred also in winter, so that it was remarkably hardy for a parrot. At the beginning of the twentieth century the species was almost extinct, and survived only in the most inaccessible parts of Florida and Indian Territory. It is a beautiful bird, and also noisy, gregarious, and tame, so that it has been an easy victim. It is a trifle more than a foot long, bright green in color, with the head and neck yellow, forehead, cheek, and bend of wings orange. It feeds on seeds, nuts, and so on, and is very destructive to fruit. On account of the damage it did in orchards, it was ruthlessly killed in early days. Its nesting habits have never been authentically described, and there is some dispute as to whether its eggs are laid in a hole in a tree as is customary with parrots. One of the most beautiful groups, combining gracefulness of form with splendor of plumage, is that to which the Alexandrina or ring parrakeet (*Palæornis Alexandri*) belongs. It is about the size of a common pigeon, green, with a red collar, and is a native of the East Indies. It is said to have been brought to Europe by Alexander the Great's expedition to India, and to have been the first

parrot known to the Greeks and Romans, by whom it was highly prized, as it still is, not only for its beauty, but for its docility and its power of imitating human speech. Immense flocks live in some of the cocoanut groves of Western Ceylon, and fill the air with deafening screams. The ring parrakeet has many congeners, natives chiefly of the East Indies, which exhibit much variety of splendid plumage, among which the East Indian rose-ringed (*Palæornis torquata*) is one of the most familiar; its general color is green, the neck of the male ornamented with a rose-red, black-edged collar.

Much like them in length and form of tail, but with longer and stronger legs, is the small ground-parrakeet (*Pezoporus formosus*) of Australia and Tasmania. This bird inhabits thickets and runs much on the ground, but occasionally takes a short low flight. It makes no nest, but lays its eggs in a hole in the ground. Its colors, dark green above, and yellowish below, are less brilliant than in many of the parrot tribe, but the bird is finely marked and mottled. Its flesh has a very strong game flavor. There are numerous other Australian species, distributed in several genera, some of which exhibit great splendor of plumage. Most familiar is the grass, shell, or zebra parrakeet (*Melopsittacus undulatus*), a very beautiful little bird, which has long been one of the favorite cage-birds in all parts of the world, and often sells under the dealers' name 'budgerigar' (q.v.). It is small, slender, and long-tailed. It has a yellow head, with three black cheek-spots surmounted by a blue patch; the back is yellow with black transverse markings; the wing-quills brown with green outer webs and yellow margins; the rump and under parts green, the tail green, bounded with yellow, but with the two central quills blue. (See Plate of PARROTS and PARRAKEETS.) In the vast inland plains of Australia this parrakeet is to be seen in flocks of many hundreds feeding on the seeds of the grasses, which afford food also to many other small 'grass parrakeets,' such as those of the genus *Neophema*.

PARRAL, pär-räl', or HIDALGO DEL PARRAL. A city of the State of Chihuahua, Mexico, situated on the Parral, 120 miles south of Chihuahua (Map: Mexico, F 4). The town possesses very old and productive silver mines that are now in the hands of Americans. It is in the midst of the wine-making district of Mexico, and is noted for its fine aguardiente. A United States consular agent is stationed here. Population, 6000.

PARRAMATTA, pär'-mät'tä, or PARAMATTA. A town of New South Wales, Australia, pleasantly situated near the western extremity of Port Jackson, on a small river of the same name, 14 miles west of Sydney, with which it is connected by steamer and railway (Map: New South Wales, F 3). The houses are mostly detached, and the streets are wide and regular, the principal one being about a mile in length. It is the centre of an extensive fruit-growing district, and has important manufactures of 'Colonial tweeds,' 'Parramatta cloths,' and salt. The great reservoir of the Sydney water-works is located here. Formerly called Rosehill, Parramatta is, with the exception of Sydney, the oldest town in Aus-

tralia. The first grain raised in the colony was grown here, and the first grants of land made. Population, in 1891, 11,700; in 1901, 12,568.

PARRAS DE LA FUENTE, pā'r-rās dā lā fwān'tā. A town of the State of Coahuila, Mexico, situated near the east shore of Lake Parras (Map: Mexico, H 5). The town lies in a fertile valley, and is surrounded by orchards and vineyards. Its chief manufactures are wines and brandies, for which the town is celebrated. Population, in 1895, 8326.

PARRATT, WALTER (1841—). An English organist and conductor, born at Huddersfield. His first organ appointment was near Huddersfield (age eleven). The next year he was appointed organist of Saint Peter's Church, London, and studied with George Cooper. He also occasionally accompanied an anthem at the service in Saint Paul's Cathedral. In 1854 he returned to Huddersfield, where he was in great request for organ recitals throughout the north of England. In 1861 he accepted an appointment at Worcester, where he was also private organist to the Earl of Dudley. In 1872 he became organist of Magdalen College, Oxford. On the retirement of Sir George Elvey as the organist of Saint George's Chapel, he was appointed to fill the vacant position. He was knighted by the Queen in 1892, and received the appointment of private organist to Her Majesty, and the following year became master of the Queen's music, continuing those offices under King Edward VII. He is more famous for his work in that direction than for his compositions, which latter, however, while not numerous, are of a high order of merit. They include music to the *Story of Orestes*, many anthems and services, and a few songs. He edited *Madrigals* for the Bach Choir, and *Choral Songs by Various Writers and Composers* (1889), and contributed ten important articles to Grove's *Dictionary of Music and Musicians* (1879-89).

PARRHASIUS (Lat., from Gk. Παρρῆσιος). One of the greatest painters of ancient Greece, the son of Evenor, himself an artist. He was a native of Ephesus, but, like his elder contemporary Zeuxis (q.v.), practiced his profession in many places, and seems to have received Athenian citizenship as a reward for his picture of Theseus, since later writers sometimes call him an Athenian. He lived near the end of the fifth century B.C., but exact dates are not known. Certainly apocryphal is the story of Seneca that for his painting of Prometheus he tortured a captive from Olynthus, as the artist could scarcely have been living at so late a date (B.C. 347) if he were a celebrated painter during the lifetime of Socrates, over fifty years before. (Cf. Xenophon, *Memorabilia* iii. 10.) His art is known to us only from ancient criticism, and chiefly from a passage in Pliny, *Hist. Nat.*, xxxv., 67, where he is praised as the first to introduce accurate proportions into painting, and as especially successful in his drawing and rendering of contours. It seems that he was the first successfully to employ light and shade in such a way as to suggest the round, as distinguished from the relief. His painting of the Athenian Democracy (*Demos*) was held to express in a wonderful way the variety of disposi-

tion which marked that very variable person. Other works of his were a "Hermes," believed to be his own portrait; a "Heracles," which claimed to show the hero as he had appeared to the artist in a dream; a "Naval Commander in Full Armor;" "Ulysses Feigning Madness;" "Æneas, Castor, and Pollux;" "Dionysus and Virtue;" "Meleager, Heracles, and Perseus;" "Thracian Nurse with a Child in Her Arms;" "Priest with a Child Bearing Incense;" "Two Boys;" "Healing of Telephus;" "Contest for the Armor of Achilles;" "Philoctetes on Lemnos;" and others. For recreation he is said to have painted licentious little pictures, one of which, "Meleager and Atalanta," was a great favorite of the Emperor Tiberius, who chose it rather than a million sesterces.

PARRICIDE (Lat. *parricida*, OLat. *paricidas*, murderer of his parent, of a magistrate, or of a free citizen, assassin, probably from *par*, equal + *cædere*, to kill; associated in popular etymology with *pater*, father). One who kills his father, or a man who stands in the place of a father, as a father through adoption. The term is derived from the Roman law, where the crime of *parricidium* included the murder of many near relatives besides the father, as a grandfather, son, brother, sister, and others. By the *lex Pompeia de Parricidiis* (B.C. 52), the murder of an ascendant, as a father or grandfather, or a son, was punished in most severe manner, the parricide being sewed up in a leather sack, along with a live dog, viper, cock, and ape, and cast into the sea or a near-by river. In England and the United States the punishment of a parricide does not differ from that of a murderer of a stranger. See MURDER. Consult the authorities referred to under CRIMINAL LAW; CIVIL LAW.

PARRIS, SAMUEL (1653-1720). A New England clergyman. He was born in London, went in youth to Massachusetts, and studied at Harvard College, but did not graduate. After being a successful merchant in Boston, he entered the ministry, and was pastor of the church at Danvers, Mass. (then a part of Salem), in 1689-96. He is remembered from the fact that the delusion of Salem witchcraft originated in his family in 1692, his daughter and his niece accusing Tituba, a South African slave living as a servant in the family, with bewitching them. Mr. Parris beat her and compelled her to confess herself a witch. The delusion and persecution thus commenced lasted sixteen months. Mr. Parris having been a zealous prosecutor in the witchcraft cases, his church brought charges against him. He acknowledged his error, but was dismissed. He preached afterwards at Stow, Concord, and Dunstable. Consult his *Life* by Fowler (Salem, 1857).

PARRISH, EDWARD (1822-72). An American pharmacist, born in Philadelphia, and member of a distinguished family of physicians. He was principal of the Philadelphia School of Pharmacy, where he became professor of materia medica in 1864. He is best known through a non-official preparation, the compound syrup of phosphate of iron, popularly known as Parrish's chemical food. He published *Practical Pharmacy* (Philadelphia, 1856; 5th ed. 1884); *The Phantom Bouquet* (Philadelphia, 1863); and



1 LESSER LEMON-CRESTED COCKATOO - PSITTACUS SULPHUREUS
 2 PENNANT'S PARAKEET - PSITTACUS PENNANTI
 3 GRAY-HEADED MADAGASCAR LOVE BIRDS - PSITTACUS CANUS
 4 PURPLE-CAPPED LORY - PSITTACUS ATRICAPILLUS

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Education in the Society of Friends (Philadelphia, 1866).

PARRISH, MAXFIELD (1870—). An American painter and illustrator, born in Philadelphia. He was a pupil of the Pennsylvania Academy of Fine Arts, and of Howard Pyle. He became widely known by his decorative posters and designs for magazine covers. His work is usually in the flat tints used by a number of the modern illustrators, and is remarkable for strong, delicate line, clever gradation of tone, and the rich detail of the background. His illustrations, which include those for *The Golden Age* of Kenneth Grahame, *Mother Goose in Prose*, and *Knickerbocker's History of New York*, are full of charm and humor. Among his paintings are "The Sandman" and "The Bulletin Board." He became a member of the Society of American Artists in 1897, and received honorable mention at the Paris Exposition of 1900.

PARRISH, STEPHEN (1846—). An American landscape painter and etcher, born in Philadelphia, Pa. He first exhibited at the Pennsylvania Academy in 1878, and a year afterwards at the National Academy in New York City. Among his pictures are "Low Tide," "In Winter Quarters," "Evening," and "The Road to Perry's Peak." His subjects are usually large, open expanses of country—often winter scenes—treated with much poetic feeling. His etchings include the series of plates, "Cape Ann to Marblehead," and many other American seaboard scenes.

PARROCEL, pá'rô'sèl'. A family of French painters, the first of whom was BARTHÉLEMY (c.1600-c.60), a painter of religious subjects. The most important was JOSEPH (1646-1704), the battle painter, born at Brignolles. He studied under his father and elder brother, Louis, and afterwards was the pupil of Le Bourguignon in Rome. He was made a member of the Academy in 1676, his reception picture being "Louis XIV. Repulsing a Sortie of the Maestricht Garrison" (Louvre). He is said to have known nothing of actual soldiering, but he had a vigorous brush and considerable skill in composition. There are also pictures by him at Versailles, and in Notre Dame and the Invalides, Paris. He left several etchings after his own designs, which include forty-eight scenes from the life of Christ. Other painters of this name were his son CHARLES (1688-1752), a battle painter; his nephew, PIERRE (1670-1739), whose subjects were mostly religious; and IGNACE FRANÇOIS (1704-81), son and pupil of Pierre, an historical and genre painter.

PARROQUET. An alternative spelling for 'parrakeet' (q.v.). In the United States the group is represented by the Carolina parroquet or parrakeet.

PARROT (probably from Fr. *Perrot*, *Pierrot*, diminutive of *Pierre*, Peter). A bird of the group Psittaci, which is related to the cuckoos and plantain-eaters, and includes two families, the Psittacidae and Trichoglossidae, together numbering about 500 species. Most of them are natives of the tropics, and especially of the Australian and Malayan regions, and about 100 species occur in New Guinea alone. South America has about 150 species, and Africa and Southern Asia the remainder. Few inhabit or even enter the

temperate zone, the most northerly one, perhaps, being the now nearly extinct Carolina parrakeet (q.v.) of the United States. The determining feature in the family is the beak, which is short, stout, and greatly arched, the upper mandible hooking over the lower, and movably hinged to the skull. The feet are short and strong, and the toes are two before and two behind. The wings are likely to be rather short and in some groups rounded; and the tail may be short and broad as in the true parrots, or very long and pointed, as in the parrakeets, noticeably broad in others, and so on. Most parrots are gaudily colored, but some are soberly clad; and there is likely to be a crest—very prominent in the cockatoos and less so in some others—or other modifications of the feathers of the head, as in the facial disks of the owl-parrots or kakapos (q.v.). The sexes are usually much alike.

Most parrots are forest-birds, although a few are of terrestrial habits and are styled ground-parrots, and a few others, like the grass-parrakeets, inhabit grassy or brushy plains. As a rule, also, they are gregarious, and many species go in large flocks. Their food with few exceptions is vegetable—plantains, papaw-apples, figs, and tamarinds being varied by flowers, buds, leaves, palm-nuts, and other hard fruits, grass-seeds, and grain. This supplies so much moisture that little drinking seems necessary. Exceptional foods are the bulbs and tubers for which cockatoos dig, while some species search the bark of trees for insects, or extract honey and insects from flowers with their brush-tipped tongues. (See LOBY.) Lastly, the kaka (q.v.) has acquired a taste for flesh. They gather this food by climbing about the branches like the nimblest of acrobats, using their beaks freely in support of their bodies, and manipulating their food with their claws as no other bird ever does.

The voices of parrots as a rule are harsh, and the great macaws and cockatoos scream most discordantly. Some, however, utter low and sweet twittering notes. Many have great facility in imitating other sounds or human speech, and some learn to articulate words and phrases with much distinctness, if given patient training. There is a popular notion that this process may be aided by slitting the tongue—a practice as useless and foolish as it is barbarous. It is not certain that the tongue has anything more to do with the enunciation of parrots than in the case of other birds, where it plays no part in utterance. The tongue is always large, round, and fleshy. In the subfamily Nestorinæ (the kakas) it is fringed; and in lories it has a brush of hairs toward the tip.

The typical, and perhaps the best-known, parrot is the African gray parrot (*Psittacus erithacus*) of equatorial Africa, which is ashy gray, with black wing-quills, a red tail, and whitish, naked face. It is in high esteem among most of the African tribes, who rear it from the nest as a house pet, enjoy its flesh, and seek its feathers as ornaments, some setting apart the red tail feathers for their chiefs as insignia of rank. Long ago these parrots were carried to Europe, and afterwards to all parts of the world, and have shown themselves not only hardy, long-lived, and affectionate, but the clearest talkers of the whole tribe. A closely allied but much darker West African species is unable

to talk at all. In their native wilds these parrots go about in flocks during the day, and return at night to certain 'roosts.' They eat various fruits and nuts, especially palm-nuts. They breed in holes in trees, often in companies, and aid one another in defending their homes. All parrots nest in holes in trees except a few aberrant ones, like some in New Zealand, which lay their eggs in holes or hollows of the ground or among rocks. All lay white eggs. Fossil representatives of this tribe carry its history back to the Lower Miocene Age.

BIBLIOGRAPHY. The latest monographer of the parrot family is Count Salvadori. For his papers and those of other systematic ornithologists, consult Newton, *Dictionary of Birds* (New York, 1893); also Evans, *Birds* (ib., 1900). For descriptions and treatment of these birds as pets, consult Greene, *Parrots in Captivity* (London, 1884), three royal octavo volumes with colored plates.

See Plates of PARROTS AND PARRAKEETS; MACAWS AND COCKATOOS.

PARROT-FISH, or LOBO. Any of many species of the family Scaridae, particularly of the genus *Scarus*. The form is oblong and massive, with large scales. They are fishes of brilliant colors in general, and some have wonderful splendor, and have received their name partly on this account and partly on account of a fancied resemblance in their jaws to a parrot's bill. They are mostly herbivorous, some feeding on corals, and are not good food fishes. Most of them are natives of the tropical seas. One species in the Mediterranean (*Scarus creticus*) is the 'scarus' of the ancients, about which many wonderful stories were told as to its love, its wisdom, its ruminating, etc. Several species inhabit tropical American waters, and are known in the West Indies as 'loros,' 'viejas' (i.e. old wife), 'guacamaias,' etc.

PARROTT, ROBERT PARKER (1804-77). An American soldier and inventor of ordnance, born at Lee, N. H. He graduated at West Point in 1824, and was assigned to the artillery. Until 1829 he remained at the Military Academy as an instructor, then performed garrison duty for several years, and in 1836 took part in the operations against the Creeks. He was promoted to be captain on January 13th of that year, but resigned from the service in the following October to become superintendent of the West Point Iron and Cannon Foundry at Cold Spring, N. Y., a position which he held until 1867. While there he invented the famous Parrott cannon used by the Federal Army and Navy during the Civil War. Captain Parrott was first judge of the Court of Common Pleas in Putnam County from 1843 to 1847, and was superintendent of schools at Phillipstown from 1848 until 1856. For a description of the Parrott gun, see ARTILLERY; and ORDNANCE.

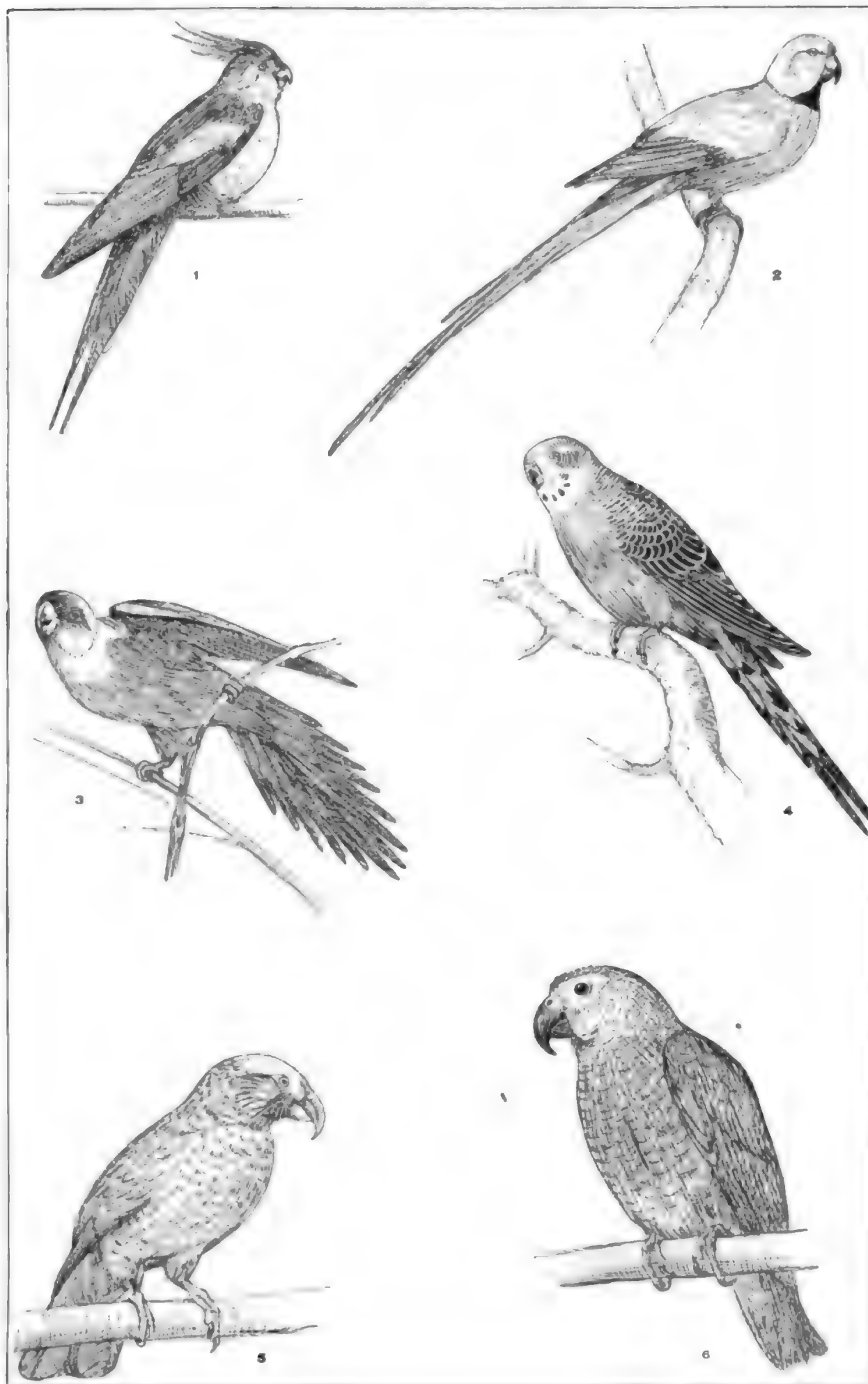
PARRY, CHARLES CHRISTOPHER (1823-90). An American botanist, born in Worcestershire, England. He was educated at Union College, and afterwards practiced medicine in Davenport, Iowa. His study of the botany of the district resulted in his appointment to the geological survey of the Northwest (1848), then to the survey of the Mexican boundary (1849-52), and he was successively botanist to the Pacific Railroad survey of the 35th parallel and to the De-

partment of Agriculture from 1867 to 1871. His publications include: *Botanical Observations in Western Wyoming* (1874); *Botanical Observations in Southern Utah* (1875); *Revision of the United States Pacific Coast Species of *Arctostaphylos** (1883); *Revision of the Genus *Chorizanthe** (1884); and *The North American Genus *Ceanothus** (1888).

PARRY, CHARLES HUBERT HASTINGS (1848-). An English composer, born at Bourne-mouth. At the age of seven he was sent to a private school at Malvern. His earliest attempts at music, in the form of chants and hymn-tunes, date from this time. In 1860 he was sent to Twyford School, and took lessons from the village organist; while there he came under the influence of Samuel Sebastian Wesley, the organist of Winchester Cathedral. In 1861 he entered Eton. He studied composition under Elvey and often acted as composer, organist, or vocalist for the musical society of the college. In 1867 he entered Exeter College, Oxford, where he came under the notice of Sir John Stainer, and became the founder of the University Music Club. He obtained in 1874 his degree of master of arts, and took advanced study in music under Bennett and MacFarren, together with an extended course under Dannreuther. Upon leaving Oxford he was anxious to adopt the profession of music, but his family opposed the plan. After three years in a business house, however, he devoted himself entirely to music. His first success as composer was with his *Intermezzo Religioso* (1868). Other compositions include: *Prometheus Unbound* (1880); *Symphony No. 1 in G* (1882); *The Glories of Our Blood and State* (1883); the oratorio *Judith* (1888); *Ode on Saint Cecilia's Day* (1889); *The Lotus Eaters* (1892); and *Hypatia* (1893). He was appointed Choragus of Oxford University in 1883, and in the same year was granted the degree of musical doctor by Cambridge, followed in 1884 by Oxford, and in 1891, by Dublin. He was appointed director of the Royal College of Music in 1894, and was made a knight by Queen Victoria in 1898.

PARRY, SIR WILLIAM EDWARD (1790-1855). A British Arctic explorer and naval officer, born at Bath, on December 19, 1790. He joined the British Navy as midshipman in 1806, rose to the rank of rear-admiral, was in the hydrographic service from 1823 to 1829, and retired from the navy in 1852. He is best known as an Arctic explorer. In command of the ships *Griper* and *Hecla* he left England in 1819 to seek the Northwest Passage. He passed up Baffin Bay, explored and named Barrow Strait, Prince Regent's Inlet, and Wellington Channel, and reached Melville Island in September of that year, having crossed longitude 110° W., thereby winning a reward of £5000 offered by Parliament. He returned to England in November, 1820, and published a narrative of his expedition. He sailed again in 1821 with the *Fury* and *Hecla* to make the Northwest Passage, and reached Repulse Bay, which he proved to be land-locked instead of a strait leading to the west as was supposed. He wintered on Melville Peninsula, where he made a study of the Eskimos, discovered Hecla and Fury Strait the next summer, but was baffled by ice and compelled to spend the succeeding winter at the east entrance to Hecla and Fury Strait. The expedition underwent many hard-

PARROTS AND PARRAKEETS



1. COCKATIEL (*Calopsitta Novæ-Hollandiæ*).
2. ROSE-RINGED PARRAKEET (*Palæornis torquata*).
3. CAROLINA PARRAKEET (*Conurus Carolinensis*).

4. BUDGERIGAR (*Melopsittacus undulatus*).
5. KAKA (*Nestor meridionalis*).
6. AFRICAN GRAY PARROT (*Psittacus erithacus*).

ships and was so enfeebled in the following summer that it was compelled to return to England, where it arrived in October, 1823. In May, 1824, Parry left with the same ships to make another attempt to discover the long-sought passage, but after a winter in the ice and the loss of the *Fury*, the expedition returned home in October, 1825. Parry then obtained the Admiralty's consent to attempt to reach the North Pole by the Spitzbergen route. He sailed on the *Hecla* for Spitzbergen in May, 1827, left his ship in Trurenberg Bay on June 21st, and started for the north with two boats, fitted with steel runners to serve as sledges, 28 men, and supplies for 71 days. The advance was extremely difficult, the party exchanging from floe ice to water several times each day, and the southward drift of the ice deprived Parry of many of his hard-won miles to the north. The highest point attained was in latitude 82° 45' N., which secured for England a new record of highest latitude and remained the highest north for forty-eight years. Parry died on July 8, 1855, after serving two years as governor of Greenwich Hospital. His best-known books are *Journal of a Second Voyage for the Discovery of the Northwest Passage*, which appeared in 1824, and *Narrative of an Attempt to Reach the North Pole in Boats* (1827).

PARRY ISLANDS. A group of large islands in the Arctic archipelago of North America, lying chiefly north of the 75th parallel of latitude (Map: America, North, G 2). The chain extends westward from Baffin's Bay, south of Ellesmere Land, being bounded on the south by Lancaster and Melville sounds. The principal members of the group are North Devon, Grinnell Land, and Cornwallis, Bathurst, Melville, and Prince Patrick islands. All the islands are irregular in outline, with numerous fiords and headlands. The coasts are rocky and steep, while the interior is covered with glaciers. They are uninhabited, and their vegetation is very scanty, though sufficient in summer to support herds of reindeer and musk-oxen. One of the earliest explorers of the group was Parry, who wintered on Melville Island in 1819. The discoveries in these regions, however, were mainly accomplished during the search for Sir John Franklin.

PARSIFAL, pār'sé-fál. A festival music-drama by Richard Wagner. The outline of the music was finished in 1870, the orchestration in 1882, and the first performance was given in Bayreuth, July 26, 1882. The story is based upon the Arthurian legend of Perceval and the Holy Grail, and particularly on the metrical version by Wolfram von Eschenbach. (See **PERCEVAL**.) The scene is in or near the Castle of the Holy Grail (Monsalvat, Spain). The principal characters are: Parsifal; Amfortas, who has been one of the Knights of the Grail, but who has lost the Holy Spear, been wounded by it, and has fallen into the power of Klingsor, a magician hostile to the knights; and Kundry, one of the beautiful women through whom Klingsor hopes to gain authority over the knights (as he has over Amfortas) by tempting them to break their vows of chastity. In the first act the inexperienced Parsifal is brought to the castle by one of the knights, witnesses the adoration of the Grail, but does not appreciate its significance, and is cast out by the knights. In

the second act Parsifal withstands Klingsor's various attempts to overcome him, even Kundry is unsuccessful, and he finally wins from the magician the Holy Spear and starts on his search for the Castle of the Grail, whose importance he now realizes. In the third act, after a lapse of many years, Parsifal meets Kundry and one of the knights. Kundry has repented, and after baptizing her Parsifal is led by the knight to the castle. There he heals the old wound of Amfortas by touching it with the Holy Spear (the only possible cure); Kundry dies in happiness, and Parsifal is hailed as King of the Knights of the Grail. The musical history of the opera is given in the article on **RICHARD WAGNER**.

PARSIMONY (Lat. *parsimonia*, *parcimonia*, frugality, from *parcere*, to be frugal, to spare), **THE LAW OF**. The statement in explicit terms of the demand of thought that principles of explanation should not be unnecessarily multiplied.

PARSIS, pār'séz, or **PARSEES** (Pers., Hind. *Parsi*, Persian, fire-worshiper). The modern Zoroastrians, especially in India, where, in 1901, they numbered 94,190. Less than a hundred years after the Arab invasion in the seventh century, and the fall of the Iranian kingdom and faith, a considerable number of Zoroastrians left Persia to gain greater religious liberty, and moved as a community with their priests down to the city of Ormuz, on the Persian Gulf. After residing there some fifteen years, they determined to seek the shores of India, and they landed first on the island of Diu, off the coast of Kathiawar. Here they remained for nineteen years until circumstances brought them farther south. They landed in 716 at Sanjan, some distance to the north of the modern Bombay, and settled among the Hindus, after complying with certain simple regulations. In 775 a second band seems to have joined these pioneers, and together they formed a community, which flourished for more than five hundred years. In 1315 the Mohammedans who were invading India attacked the Parsis of Sanjan, who had made an alliance with their Hindu protectors. The allies were defeated, Sanjan was destroyed, and the Parsis were forced to seek refuge in the Bharhut hills, where they kept alive their sacred fire and preserved their ancient rites. In the sixteenth and seventeenth centuries the Zoroastrians spread quite widely through Gujarat, settling in Surat, Navsari, Bombay, and other places. The Parsi settlement in Bombay began as early as the time of the Portuguese occupation (1530-1661). The Bombay Presidency has remained the centre of the Parsi population of India, although representatives of the community are to be found as far northward as Peshawar, as far east as Calcutta, and as far to the south as Madras, or even Ceylon. Almost all the Parsis are well-to-do, and a large proportion of them wealthy. They are often called the Jews of the East.

The Parsis have in general remained faithful to the tenets of their ancient creed. But in consequence of emigration from Persia, and because also of their contact with the Hindus and others, some changes have crept into their customs. Nor have they kept free from sectarian controversy. As early as 1686 there is evidence of a vigorous dispute, as to supremacy of position, between

the priests of Navsari and the original clerical leaders of Sanjan. Early in the eighteenth century another dispute arose with regard to the dating of the calendar, which in India gradually fell a month behind the Persian Zoroastrian calendar, because of failure properly to introduce the intercalary month. This resulted in dividing the Parsi community into two sects, Shenshabis and Kadmis. The Shenshabis adhered to their customary Indian reckoning of months, without the intercalation, but the Kadmis adopted the Persian reckoning with the month duly inserted; thus the Shenshabhi calendar remains still a month behind the Kadmi. They are generally united on the main tenets with regard to their god Ormazd (q.v.), their prophet Zarathushtra (see ZOROASTER), and a belief in angels and archangels. They follow the same general rites, feasts, fasts, manners, and customs. In theology they are strongly monotheistic to-day. At present, however, a belief in the resurrection of the body seems less pronounced among them than their sacred texts would appear to warrant. As to the doctrine of spiritual authority, the infallibility of their Dasturs is unhesitatingly questioned by the less strict conformists, but all unite in acknowledging the religious leadership of those priestly heads.

If we may judge from the old Greek accounts of the Persian faith, the Parsis, from time immemorial, have kept up the idea of ceremonial purification. Scrupulous care is taken to preserve the elements, earth, fire, and water, from defilement, especially from dead matter. Nor would a strictly orthodox Parsi to-day spit into the fire or blow out a light, any more than in the days of Cyrus, although in practical matters they often have to make concessions, and Parsis may even serve in the fire department of Bombay. Many who are less strict have taken to smoking tobacco, although this is not in keeping with the tenets of their faith. To the designation 'Fire-worshippers,' which is so often applied to them, they strongly object, for their religion teaches the presence of Ormazd behind the fire, which stands merely as one of the emblems of his power. As in the days of the Avesta, they still wear the sacred shirt and girdle (now called *sādrah* and *kusti*), and their priestly class are conspicuous for their white flowing robes.

Some of the present Parsi observances connected with birth and marriage may show slight traces of influence from the Hindus, but the Parsi rites connected with death have remained most individual and striking. As is well known, they expose the bodies of their dead on *Dakhmas*, or Towers of Silence, to be devoured by vultures. In this they adhere strictly to the precepts of the Avesta, although through force of circumstances, or otherwise, they are occasionally obliged to forego this manner of disposing of the dead. As a community, their moral status is ranked very high. In matters of education, especially female education, they are very advanced for Orientals. In all that relates to progress and civilization they are inclined largely to follow European examples. There is a growing tendency among them to spread a knowledge of their ancient sacred literature, and numerous editions or reprints of Avesta and Pahlavi texts and translations are yearly published

by them. For acts of charity, benevolence, and generosity they are conspicuous. On the Parsis of Persia, see GHEBERS.

Consult: Karaka, *History of the Parsis* (London, 1884); Haug and West, *Essays on the Parsis* (3d ed., ib., 1884); Modi, "The Religious System of the Parsis," in *The World's Parliament of Religions*, vol. ii. (Chicago, 1893); Bharucha, *Zoroastrian Religion and Customs* (Bombay, 1893); Seervai and Patel, *Gujarāt Parsis from Their Earliest Settlement to the Present Time* (ib., 1898); Menant, *Les Parsis, Histoire des communautés Zoroastriennes de l'Inde* (Paris, 1898).

PARSLEY (dialectic *parsil*, from OF. *persil*, *pierre essil*, Fr. *persil*, It. *petrosello*, *petrosellino*, *parsley*, from Lat. *petroselinum*, from Gk. *πετροσέλινον*, rock-parsley, from *πέτρος*, *petros*, rock + *σέλινον*, *selinon*, sort of parsley). *Carum*. Annual or biennial smooth branching, tripinnate-leaved herbs of the natural order Umbelliferae. Common parsley (*Carum Petroselinum*), a native of the south of Europe, is grown from seed sown in good garden soil, and is used for flavoring soups, garnishing meats, etc. Varieties with curled leaflets are generally preferred to those with plain leaflets. Hamburg parsley is a variety with large white carrot-like roots which are used in much the same way as the carrot or parsnip.

PARSLEY FAMILY. A popular name for the natural order Umbelliferae (q.v.).

PARSLEY PIERT. A rosaceous plant. See LADY'S-MANTLE.

PARSNIP (ME. *parsnip*, *pasnepe*, from OF. *pastenague*, *pastenade*, Fr. *pastenade*, *panais*, Sp., Port., It. *pastinaca*, from Lat. *pastinaca*, *parsnip*, from *pastinum*, sort of two-tined dibble), *Peucedanum*. A genus of annual, biennial, and perennial herbs of the natural order Umbelliferae, with carrot-like fleshy roots and pinnate leaves. The common parsnip (*Peucedanum sativum*), a native of Europe, and Northern Asia, is a biennial, with angular-furrowed stems two to three feet high, ovate leaflets, white roots, which are aromatic, mucilaginous, sweet, but slightly acrid. Cultivation has greatly modified the qualities of the roots, rendering them much more bland, and greatly increasing their size and fleshiness, thus improving their edible qualities. The parsnip delights in a very open rich soil, but will succeed in clayey soils far too stiff for the carrot. The mode of cultivation of the parsnip scarcely differs from that of the carrot. The parsnip is used chiefly in winter, whether for the table or for feeding cattle, for which it is highly valued, especially in Europe. It is improved rather than injured by frost; but is apt to become rusty if allowed to remain too long in the ground, and to become acrid after it has begun to grow again in the spring. Another species, the cut-leaved parsnip or *sekakul* (*Pastinaca Sekakul*), or *Malabaila pumila* of some botanists, with pinnatifid cut leaflets, a native of India, Syria, and Egypt, cultivated in the Levant, is very similar in its uses to the common parsnip. See PLATE OF ONIONS, ETC.

PARSON (OF. *persone*, Fr. *personne*, from ML. *persona*, person, curate, parson, Lat. *persona*, person, actor's mask). Strictly, one who

has full possession of all the rights of a parochial church, as the representative or impersonator of the Church, which is an invisible body. The term is colloquially applied in a loose sense to any clergyman.

PARSON BIRD, or **TICU**. A small, noisy forest-dwelling bird of New Zealand (*Prosthemadera Nova-Zelandiæ*, of the family *Meliphagidæ*). Its plumage is black, excepting two small outgrowths of white feathers, one on each side of the throat, which suggest the 'bands' of a



THE PARSON BIRD.

clergyman in the pulpit robes of the Church of England. It "utters a wild song, laughs, coughs, sneezes, and mimics generally." Consult Buller, *Birds of New Zealand* (London, 2d ed., 1888). See Plate of CREEPERS.

PARSONS. A city in Labette County, Kan., 137 miles south by west of Kansas City, on the Missouri, Kansas and Texas and the Saint Louis and San Francisco railroads (Map: Kansas, G 4). One of the State insane hospitals has been located here, and five of the buildings are in process of erection. Among other prominent structures are the high school, the Missouri, Kansas and Texas railroad depot, the Catholic Church, Rasbach Hotel, the business college, the Masonic building, and the railroad Y. M. C. A. There are two fine parks—Forrest and Glenwood. The Missouri, Kansas and Texas maintains here car and machine shops, and its general offices for the State. The industrial establishments include also flouring and feed mills, grain elevators, a creamery, foundry, handle factory, chicken-feed factories, etc. Natural gas is generally used for fuel and lighting. Founded and incorporated as a third-class city in 1871, Parsons became a city of the second class in 1873. The government is administered by a Mayor, elected every two years, and a council. Population, in 1890, 6736; in 1900, 7682.

PARSONS, ALBERT ROSS (1847—). An American musician and archæologist, born at Sandusky, Ohio. He studied music with several American teachers; with Moscheles, Reinecke, Papperitz, and Richeter in Leipzig, 1867-69, and with Tausig, Weitzmann, and Kullak in Berlin, 1870-71. He became a very successful teacher and composer, and his songs are especially popular. "Night Has a Thousand Eyes," "Break, Break," and "Three Fishers" have been extensively sung throughout America and Europe. During his career as a teacher he originated the 'synthetic method' for pianoforte; he translated Wagner's *Beethoven* (1870); wrote *Parsifal*; *New Light from the Great Pyramid* (1893), a study in cosmic religion and prehistoric Christianity; and edited Kullak's *Complete Works of Chopin*. He held several important New York

church organistships; in 1889 was elected president of the Music Teachers' National Association, and subsequently acted as president of the American College of Musicians of the University of the State of New York, and vice-president of the Metropolitan College of Music.

PARSONS, ALFRED WILLIAM (1847—). An English painter, born at Beckington. He studied at Heatherley's, and at the South Kensington art schools, and afterwards worked by himself from nature. He first exhibited at the Royal Academy in 1871. His best known pictures are water-colors of English scenery. They are carefully drawn and brilliant in color. His works include "When Nature Painted All Things Gay" (1887), bought by the Chantrey bequest; "A Mid-May Morning," "The First Frost," and "The Village by the Links." He received a gold medal for water-color and a silver medal for oil painting at Paris in 1889, two medals at Chicago in 1893, and a second-class gold medal at Munich in 1893. He also worked in black and white, and his illustrations include those done with E. A. Abbey for *Old Songs* and *A Quiet Life*; *The Warwickshire Avon*; *Wordsworth's Sonnets*; and *The Danube from the Black Forest to the Black Sea* (1891).

PARSONS, CHARLES (1821—). An American painter and illustrator, born in Manchester, England. He studied at the National Academy of Design in New York City, and afterwards worked in lithography. From 1861 until 1889 he had charge of the art department of Harper and Brothers, New York City. His work includes landscapes and marines, which are usually in water-color, and, like his illustrations, are notable for their picturesque qualities. He was elected an associate of the National Academy of Design in 1860, and a member of the American Water-Color Society.

PARSONS, FRANK (1854—). An American educator, born at Mount Holly, N. J. He graduated at Cornell in 1873, and in 1897 became professor of history and political science at the Kansas Agricultural College. In 1900 he was appointed professor of political science and economics at Ruskin College, Missouri, and, in 1892, lecturer on law at Boston University. His publications include: *Our Country's Need* (1894); *The Drift of Our Time* (1898); *The New Political Economy* (1899); and *Direct Legislation* (1900).

PARSONS, or PERSONS, ROBERT (1546-1610). An English Jesuit and controversialist, born at Nether Stowey, Somersetshire, June 24, 1546. He is said to have been the son of a blacksmith. Educated at Saint Mary's Hall and Balliol College, Oxford, he was elected fellow of Balliol (1568) and subsequently dean (1574). Parsons had declared to Dr. Clarke that the story of his being a Catholic was slander, but in 1574 he left Oxford for Rome, where he was received into the Society of Jesus (1575), and ordained priest (1578). In 1580 he was sent with Edmund Campion to England to help the secular clergy. He made many converts among the nobility. Having set up a printing press, which was moved about from place to place, he issued, in conjunction with Campion, many pamphlets, among which were *A Brief Discourse Containing Certain Reasons why Catholics Refuse to Go to*

Church (1580), and Campion's more famous *Decem Rationes* (1581). In 1581 Campion was caught and executed, but Parsons escaped to Normandy. His great energies were now devoted to the restoration of the Catholic Church in England. Going to Spain, he urged on the attempted invasion of Philip II., which resulted in the disaster of 1588. He also labored at the Catholic courts of Europe to save Mary, Queen of Scots. A skillful organizer, he founded schools for English Roman Catholics at Eu in Normandy (1584), at Saint Omer (1592), and at several places in Spain. Appointed rector of the English College in Rome in 1597, he exerted immense influence. Parsons died in Rome, April 15, 1610. He wrote a clear and vigorous English style, which was commended by Swift and Gibbon. Consult Foley, *Records of the English Province of the Society of Jesus* (5 vols., London, 1877-79).

PARSONS, SAMUEL HOLDEN (1737-89). An American soldier and judge, born at Lyme, Conn. He graduated at Harvard in 1756, studied law at Lyme, Conn., with Governor Matthew Griswold, his uncle; began practice in 1759; and was, for eighteen years, a member of the Connecticut Assembly. In 1774 he removed to New London and became a member of the Connecticut Committee of Correspondence. At the outbreak of the Revolutionary War he took command of the Sixth Connecticut regiment, was present at the siege of Boston and at the battle of Long Island, and planned the attack on Ticonderoga, being promoted for his services to the rank of brigadier-general in August, 1776, and of major-general in 1780. At the close of the war he practiced law at Middletown, Conn. In 1785 he was a member of a commission appointed to treat with the Miami Indians; in 1788 he sat in the convention which ratified, for Connecticut, the Federal Constitution; and in 1789 he became on Washington's appointment, the first judge of the Northwest Territory. He settled near Marietta, Ohio, and soon afterwards, on behalf of Connecticut, bought from the Indians about Lake Erie their claim to the 'Western Reserve.' He was drowned in the Big Beaver River while returning from this expedition. Within recent years letters have been discovered which seem to convict Parsons of treason in supplying the British with information during the Revolutionary War, but the evidence is not conclusive. Parsons published a paper on the "Antiquities of the Western States," in vol. ii. of the *Transactions of the American Academy*. Consult Loring, *A Vindication of General Parsons* (1888).

PARSONS, THEOPHILUS (1750-1813). An eminent American jurist. He was born at Byfield, Mass., February 24, 1750, and graduated at Harvard in 1769. From 1770 to 1773 he taught school at Falmouth, now Portland, Maine, at the same time studying law, and was admitted to the bar in 1774. He began the practice of his profession at Falmouth, which was laid waste by a British squadron in October, 1775; and Parsons, whose prospects for professional success at Falmouth were ruined by this disaster, returned soon afterwards to Byfield, his native town. There, for some years, he studied under Judge Edmund Trowbridge, of the Massachusetts Superior Court. Parsons finally re-

moved to Newburyport, where he soon acquired an extensive practice. In 1778 he was active in the discussion of the new Constitution of Massachusetts, then recently framed by the Legislature. Parsons was strongly opposed to the adoption of that instrument; he was a member of the 'Essex Junto,' which comprised a large number of the citizens hostile to the new Constitution; and the pamphlet called *The Essex Result*, which had a great influence in bringing about the defeat of the Constitution, is attributed to him. In 1779 he sat in the convention which drew up the Constitution which with some changes still exists as the fundamental law of Massachusetts. In 1788 he was a member of the State convention called to ratify the Federal Constitution, which he warmly supported, and the so-called *Proposition* in favor of its adoption, though offered by John Hancock, was drawn up by Parsons. He settled in Boston in 1800. From 1806 until his death he was Chief Justice of the State Supreme Court. His judicial opinions have not been fully reported, but those preserved in the early Massachusetts reports and in his *Commentaries on the Law of the United States* (1836) show great ability and learning, especially in the department of real property and marine insurance. He died at Boston, October 30, 1813. A memoir (Boston, 1859) was prepared by his son, Theophilus. Consult also a sketch by Knapp (Boston, 1821).

PARSONS, THEOPHILUS (1797-1882). An American jurist and legal author; born at Newburyport, Mass., in 1797. He graduated at Harvard in 1815, was admitted to the bar, and began to practice in Taunton. Soon afterwards he removed to Boston, where he became the founder and editor of the *United States Literary Gazette*. He was also a frequent contributor to the *North American Review*. In 1847 he was appointed Dane professor of law in the law school of Harvard University, an office which he filled with distinction for a quarter of a century. His works are characterized by accuracy and practical usefulness to the profession, rather than by profundity of knowledge or great legal acumen. They were consequently very successful in winning the favor of the profession and have, through successive revisions, retained their position as useful legal hand-books. His best known works are: *Treatise on the Law of Contracts* (1853; 8th ed. 1893); *Elements of Mercantile Law* (1856); *Law of Partnership* (1867; 4th ed. 1893); *Marine Insurance Average* (1868). He was a Swedenborgian, and he produced a number of works maintaining the doctrines of the New Jerusalem Church. The most important are *Essays*, in three series; *Deus Homo* (1867); and *The Infinite and the Finite* (1872).

PARSONS, THOMAS WILLIAM (1819-92). An American poet and translator of Dante, born and educated in Boston. In 1836 he went to Italy, where his studies in the literature of that country resulted in his well-known translation of the first ten cantos of Dante's *Inferno* (1843). This part of the *Divina Commedia* he completed in 1867. He translated much of the *Purgatorio* and a few fragments of the *Paradiso*, but he never completed the work. He later took up dentistry as a profession, and practiced in Boston and in London. The last twenty years of his life were

spent in or near Boston. Parsons owes his fame almost wholly to his interpretation of Dante. Most of this translation is in rhymed couplets. It may be said without exaggeration that Parsons has come nearer to Dante than any other translator in English, nor is his best work rivaled by foreign translators. Aside from his Dante translations, his work includes: *Ghetto di Roma* (1854); *The Magnolia, and Other Poems* (1867); *The Old House at Sudbury* (1870); and *The Shadow of the Obelisk, and Other Poems* (1872). His best-known poem, *On a Bust of Dante* (first published in the *Boston Advertiser and Patriot* in 1841), like most of his verse is characterized by depth of feeling and dignity and delicacy of expression. He is the Poet of Longfellow's *Tales of a Wayside Inn*. Parsons died in Scituate, Mass., September 3, 1892. His poems appeared in a definite edition in 1893.

PARSONS' CAUSE. The name of a celebrated case decided by the court of Hanover County, Va., in December, 1759; remembered chiefly because of a speech made before the court by Patrick Henry (q.v.). From the earliest history of the colony the salaries of the clergy in Virginia had been paid in the form of tobacco, long the colony's chief staple. Owing to fluctuations in the value of tobacco, the actual amount thus paid had varied widely, the clergy receiving the advantage of a rise in price and correspondingly suffering the disadvantages of a fall. In 1748 the Legislature of Virginia passed an act fixing the salary of the clergy at 16,000 pounds of tobacco, and George II. formally approved the act. In 1758, when the price of tobacco was unusually high, the Legislature passed an act, to be in force for twelve months, similar to a previous act of 1755, which had lapsed, and which had provided that the salary of the clergy might be paid in paper currency instead of tobacco, at the rate of two cents per pound, a price below the market value of tobacco at that time. Upon the protest of the clergy the act of 1758 was disallowed by the King, and various clergymen forthwith brought suit against their vestries for the salaries legally due them for the year 1758. One such suit was brought by the Rev. James Maury before the court of Hanover County, and Patrick Henry, then a young, almost unknown lawyer, was engaged by the defendants as counsel. The Court decided against the validity of the act of 1758, such act having been disallowed by the Crown, but the jury, influenced by an impassioned speech by Henry, returned a verdict of only one penny damages. The speech made by Henry was the first in which he attracted general attention, and was sufficiently radical to be considered incendiary and treasonable by the conservative element in the colony. According to the report of Maury, Henry argued that since the act of 1758 was an act of general utility, it could not be annulled by the King, and asserted that "a king by disallowing acts of this salutary nature, from being the father of his people, degenerates into a tyrant, and forfeits all rights to his subjects' obedience." Consult Tyler, *Patrick Henry* (Boston, 1887), in *The American Statesmen Series*.

PARSON'S TALE, THE. The last of Chaucer's *Canterbury Tales*, and, like "Melibæus," written in prose. It is a discourse on penitence,

from the Vulgate text of Jeremiah, vi. 16, and is mainly an adaptation from Frère Lorens, *La somme des vices et des vertus*, published in 1279, through the English translation entitled *The Aynbite of Inweyt* (remorse of conscience). It contains many quotations from the Latin Fathers, and was probably once a separate treatise written before 1380. It has been inferred from the closing Retraction that Chaucer became a Wicliffite, but leading authorities consider this view far-fetched.

PARSONSTOWN, or BIRR. A town in King's County, Ireland, on the Brosna, 43 miles northeast of Limerick (Map: Ireland, D 3). It is an important corn market, a considerable centre of inland commerce, a military station, and the seat of a union workhouse, and is one of the handsomest and best built towns in Ireland. It has several fine churches and chapels, a nunnery, a statue of the Duke of Cumberland, a bronze statue of the Earl of Rosse, a town hall, a library, literary institute, a model school, and other educational institutions. The principal attractions are the castle, the observatory, containing a great telescope, 52 feet long, and the laboratory of the late Earl of Rosse (q.v.), still maintained in active use by the present Earl. Birr had its origin at an early period in a monastery founded by Saint Brendan, and was the scene of many important events, both in the Irish and in the post-invasion periods. Population, in 1901, 4438.

PART (OF., Fr. *part*, from Lat. *pars*, part; connected with Lat. *parare*, to prepare, Gk. *τροφειν*, *eporon*, I prepared). In music, when a piece of music consists of several series of sounds performed simultaneously, each series is called a part. In a composition a distinction is made between *real parts* and *auxiliary parts*. *Real parts* are those that progress through an entire composition as so many individual voices. A vocal fugue may be written for three, four, or five voices. It has, therefore, three, four, or five *real parts*, even if one or more voices rest for a number of bars. *Auxiliary parts* are in reality but detached tones serving to mark a strong accent by doubling some or all tones contained in the *real parts*. It is evident that in vocal music no *auxiliary parts* can occur. But in writing for keyed instruments or full orchestra composers make frequent use of such auxiliary tones. In a composition for pianoforte, for example, let us say four *real parts* are used. In certain places the composer desires more sonority and there he writes six or even more tones to be struck simultaneously. Any number above four tones constitutes the *auxiliary part*, for such voices are added only occasionally. Care must be taken not to introduce *auxiliary parts* too closely together, as the ear is apt to conceive them as *real parts*, and consequently to demand adherence to the strict rules of progression exacted in the *real parts*. A splendid example of the use of *auxiliary parts* is furnished by the opening bars of Beethoven's A Major Symphony, where the strings are used in *auxiliary parts* to give a strong accent to the first beat of the 1, 3, 5, and 7 measures, while the *real parts* are given to the wood-wind.

In this example the oboes have a *real part* throughout; the clarinets enter with a *real part* in the third bar; the flutes in the sixth; the

horns in the fifth; the bassoons in the seventh bar. The violins throughout have only *additional* parts or notes. The detached notes of the other instruments before their participation in the *real* parts are also considered additional parts.

four singers could sit opposite, facing each other in pairs.

Soprano	Alto	Tenor	Bass
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This was a decided improvement. Such part-

Flutes. *ssa.* *ssa.* *ssa.*

Oboes.

Clarionets in A.

Bassoons.

Horns in A.

Violins.

PARTANNA, pār-tān'nā. A town in the Province of Trapani, Sicily, 38 miles southwest of Palermo (Map: Italy, G 10). It is on a hill which commands an extensive view, and is interesting because of the remains of Greek works of art found here. Ruins of several Saracenic castles are still to be seen. There is a trade in grain, wine, and oil. Population (commune), in 1881, 13,144; in 1901, 14,059.

PARTANT POUR LA SYRIE, pār'tān' pōōr lā sē'rē' (Fr., departing for Syria). A ballad by Count de Laborde (1809). A young warrior, Dunois, by his bravery in Syria, wins a battle and gains the daughter of his lord. Queen Hortense composed music for the ballad, which became extremely popular long after her death, during the Second Empire.

PART-BOOK. In music, a book containing an entire part of a composition for a single performer. Before the seventeenth century scores were practically unknown. The individual voices or parts of a polyphonic composition were printed in separate books, just as are the separate parts of an orchestral composition used by the members of a modern orchestra. In order to simplify the interpretation of the music, part-books were also so arranged that all the parts were printed in a single book, but not in score. The soprano and alto appeared on the left-hand page, while the tenor and bass were printed on the right-hand page.

Soprano	Tenor
Alto	Bass

The music was so arranged that all parts turned at the same time. Jacques Moderne in 1539 printed a part-book in such a manner that the

books containing all the parts were printed in very large type for the convenience of the performers; whereas the single part-books were generally printed in very small type.

PARTHENIUS (Lat., from Gk. Παρθένιος). A Greek grammarian and poet, who lived at Rome in the first century B.C. He taught Vergil Greek, and was an intimate friend of the elegiac poet Cornelius Gallus, to whom he dedicated his *Erotic Experiences* (Περὶ ἑρωτικῶν παθημάτων), the only work of his which has survived. This was a collection of thirty-six brief stories of unhappy lovers, compiled from ancient poets, and was intended to furnish Gallus with themes for his epic and elegiac poems. The work contains interesting quotations from the Alexandrine poets, and is valued as a precursor of the Greek novels. It has been edited by Westermann in his *Μυθολογία* (Brunswick, 1843), and by Hirschig, in the *Scriptores Erotici Graeci* (Paris, 1856). According to the Ambrosian manuscript of Vergil, the latter's poem *Moretum* was an imitation of Parthenius's Greek work of the same title.

PARTHENOGENESIS (Neo-Lat., from Gk. παρθένος, *parthenos*, virgin + γένεσις, *genesis*, production, from γίγνεσθαι, *gignesthai*, to become). The essential phenomenon of sexual generation is the union of a male with a female cell. Within the past half century, however, comparatively numerous cases have been discovered where unfertilized eggs have developed into an adult organism. Such cases in certain animals are known to be in a degree regular, normal methods, and the phenomenon is called agamous, virgin reproduction, or 'parthenogenesis,' the name proposed by R. Owen. The most

typical case of parthenogenesis is that of the aphid or plant-louse. The species is represented in the aphides by eggs alone. (See HOP INSECTS.) In the spring females alone hatch, and no males appear until at the close of summer. Bonnet discovered that a virgin aphid may become the parent of millions of aphids, like itself, there being nine generations through the summer. Duval obtained eleven generations in seven months, while Kyber even observed that a colony of *Aphis dianthi*, which had been brought into a constantly heated room, continued to propagate for four years in this manner, without the intervention of males. At the approach of cold weather males appear; they mate with the females, the latter laying eggs. There are thus two sets of females, the parthenogenetic and the normal oviparous forms. The queen bee also lays eggs in the drone or male cells of the honeycomb, which are unfertilized and give rise to males.

Cases of parthenogenesis are known to occur rarely in other Hemiptera than aphids, namely in bark-lice, and in the silk-worm, and 25 or more other species of moths. Among Hymenoptera, besides the honey bee and some wild bees (as *Halictus*), the currant worm (*Nematus ventricosus*) and twelve other species of saw-flies have been known to lay parthenogenetic eggs; also many gall-flies; in several species of ants, and in wasps (*Polistes*), the parthenogenetic eggs produce males. Among beetles, *Gastrophysa raphani* and a species of caddis-fly are at times parthenogenous; also certain mites and other insects, and in the crustaceans *Apus*, *Artemia*, and *Limnadia*.

It was formerly supposed that these parthenogenetic eggs were different from normal eggs, and they were called 'pseudova' by Huxley, but this view is untenable, since these 'pseudova' arise just like ordinary eggs and develop like them, as they undergo cleavage of the yolk and form germ-layers. R. Hertwig claims that parthenogenesis is "a sexual reproduction in which a degeneration of fertilization has taken place, and the facts of parthenogenesis show that under change of conditions the normal mode of sexual reproduction (amphigony) may be modified for the benefit of the species."

PÆDOGENESIS. The larva or maggot of a certain gall-gnat fly is known to produce young which is developed within the body of the larva from a 'germ-ball' essentially agreeing with an ovary in appearance. The asexual larvæ begin life as egg-like bodies developed from the germ-ball, just as eggs are developed in the little tubes of which the ovary is an aggregation. Both Wagner and Leuckart agree that the processes of embryonic growth agree in all essential points with the ordinary phenomena of development in a



PARTHENOGENESIS.

Larva of a gall-gnat (*Cecidomyiidae*) with pædogenetie daughter-larvæ.

fecundated egg, and exactly as in the case of *Aphis* parthenogenesis. The only difference consists in the germ chambers of the cecidomyid larvæ separating from the germ-stock, and moving freely about in the cavity of the body, while

in the aphids, in which there is no metamorphosis, the germ-stock is a true ovary. It thus appears that the free ovary or germ-mass of the parent maggot becomes prematurely developed, and the growth of young is thus greatly accelerated. The maggots live under the bark of the apple tree in Germany, Denmark, and Russia, the phenomena occurring in two species of Cecidomyiidae (*Miastor metrolous* and *Oligarces paradoxus*). Here also belongs the case of larval reproduction in *Amblystoma*.

CHRYSSALLOGENESIS. This term is applied by Packard to a form of pædogogenesis which occurs in the chrysalis of a gnat of the genus *Chironomus*. In 1860 Grimm discovered the pupa of a species of this gnat laying eggs. In autumn other pupæ changed to flies without laying eggs, while the fly was observed to deposit a larger number of eggs than the spring pupa. It is thus seen to be a seasonal phenomenon, dependent on the temperature. Grimm also found that on removing from the perfectly developed insect, before it has left the pupa case, the eggs which otherwise would have been fertilized, and nurturing them in water, the development of the larvæ took place in them also, but lasted a little longer (about six days).

METAGENESIS. This term was proposed by Owen in 1848 in his *Parthenogenesis*, and afterwards more fully in his *Lectures on the Comparative Anatomy and Physiology of the Invertebrate Animals* (London, 1858). His examples are the alternation of generations of the distomes, the hydroids, medusæ, and even the metamorphoses of the echinoderms, the gemmation of Nais and other annelids, as well as the metamorphoses of the fish-lice (*Atheres*, etc.), which he says "is a slightly modified parthenogenesis;" again, he regards the phases they pass through as "much more those of a metagenesis than a metamorphosis." (See ALTERNATION OF GENERATIONS.) In his paper on the agamic reproduction of *Aphis*, Huxley employs the term 'agunogenesis,' which he says occurs "when the produced 'zoïd' is capable of development into an independent organism without the influence of an act of conjugation with another zoïd. The producing zoïd may be devoid of sexual organs, as in the Salpæ, many Hydrozoa, and many Trematoda," in fact in the great majority of cases of agamogenesis; and to this kind of alternation of generations he applies Owen's term 'metagenesis,' restricting the term 'parthenogenesis' to cases where the parent ('protozoïd') possesses sexual organs (ovaries), and its buds have all the histological characters of ova. Metagenesis is defined by R. Hertwig as "alternation of generations in the narrower sense." It is the alternation of at least two generations, of which one reproduces only asexually, by division or budding, the other either exclusively, or at least to a great extent, sexually. The first generation is called the 'nurse;' the second, the 'sexual animal.' The best example is furnished by the mode of reproduction of Hydromedusæ. See HYDROZOA.

HETEROGONY. This differs from metagenesis by the fact that the asexual generation is replaced by parthenogenesis. For example, in certain Crustacea (*Daphniidæ*) only females occur in the summer time, which increase by unfertilized eggs. Then males appear for a short time, which fertilize the winter eggs which are

now produced, from which again parthenogenetic generations arise (R. Hertwig).

CAUSES OF ASEXUAL REPRODUCTION. Taking all these cases together, asexual reproduction or parthenogenesis in general is seen to be due to budding or cell-division in the egg. The asexual aphids bud out from the ovary. It was for a long time held, says Hertwig, that the cells from which the cercariæ arose were not eggs, but 'internal buds,' 'germinal granules.' The fact seems to be that normal reproduction with growth and parthenogenesis are but extremes of a single series. The asexual mode of reproduction is most probably due to temperature and other changes in the conditions of life, as change of food, and, in parasitic animals, change of host (Packard). The phenomenon takes place in the summer, and in almost every case ceases at the approach of cold weather.

The case of dimorphism of a thread-worm has been incorrectly regarded as heterogony, but it is simply due to changes of temperature. Thus in low temperature filaria-forms directly arise from the young of *Rhabdonema* (*Anguillula*) *intestinalis*; but in the summer, heat indirectly forms a *Rhabditis* form. Wasman was able, during three summers, to induce parthenogenesis in the workers of *Formica sanguinea* and their slaves (*Formica picea*) by artificially warming the nests. Abundant food favors parthenogenesis, though in *Phylloxera* the stoppage of the food supply causes parthenogenesis to occur. See *Temperature Species*, under EVOLUTION.

ARTIFICIAL PARTHENOGENESIS. Experiments by Herbst, R. Hertwig, T. H. Morgan, and especially by Loeb, show that the unfertilized eggs of the sea-urchin may be so stimulated by chemical solutions as to undergo the earlier phases of development. Herbst experimented with potassium chloride and lithium chloride, but found that while the larvæ developed, they were monstrous and finally perished. Hertwig and also Morgan showed that if unfertilized eggs be treated by weak solutions of sodium chloride, magnesium chloride, or strychnine, they exhibit some of the preparatory changes of yolk-division, and might actually divide, though without producing an embryo. Loeb finally succeeded in rearing large numbers of perfect larvæ from eggs which, without fertilization, are first treated with a weak solution of magnesium chloride, and then transferred to normal sea-water. It thus appears that experiments carried out under rigidly controlled conditions show that the egg, without union with a sperm-cell, is capable of complete development. In commenting on these discoveries E. B. Wilson (*International Monthly*, July, 1900) remarks that even in normal fertilization we must regard the stimulus to development as being given by a specific substance or substances carried by the spermatozoön. The experiments lead us to suppose that the chemical salts used "are individually poisonous to the egg, but are normally so balanced as to neutralize one another's injurious effects and maintain the equilibrium of the egg. If this armed neutrality be disturbed, the egg responds, undergoing degenerative changes, and dying if the change be too violent, passing through an abnormal development and giving rise to monstrous embryos if the new conditions be less unfavorable, but under appropriate stimulus being, as it were,

released from bondage, and rendered free to run its normal course of development."

IN PLANTS. Among plants an embryo is frequently formed by a budding outgrowth from tissues outside of the egg, and to such a phenomenon the term parthenogenesis has often been wrongly applied. The general term covering all cases of the appearance of embryos without fertilization, when that process is ordinarily required, is apogamy (q.v.), parthenogenesis being that form of apogamy in which the embryo comes from an unfertilized egg. In tracing the origin of sex among plants, it seems evident that the sexual cells (gametes) are derived from such cells as the sexless swimming spores (zoöspores) of the algæ. These spores have the power of producing new plants, so that when sexual cells, without pairing in the process of fertilization, independently produce new plants, it is simply the resumption of an ancestral power. The most primitive sexual cells show no distinction of sex, and in such cases parthenogenesis is very common. In the higher development of sexuality, however, the pairing gametes are very unlike, becoming the sperm and egg, and in such cases parthenogenesis is more rare, and occurs only in connection with the egg.

By the process of fertilization the egg is induced to divide, and this is the beginning of an embryo. Certain eggs may be artificially induced to divide by other means than fertilization, and to produce embryos. Just what the stimulus is which induces the egg to divide is yet undetermined, but it seems probable that natural parthenogenesis results from the same general conditions that obtain in artificial parthenogenesis.

As might be expected, parthenogenesis in plants is most common among the algæ and fungi, there being well-known cases, as the water molds (*Saprolegnia*), in which the eggs are never fertilized, and parthenogenesis is the normal method of embryo formation. Among the higher groups of plants, however, it is the exception, and among seed-plants (spermatophytes) probably the very rare exception. But three cases of real parthenogenesis among seed-plants have been determined, though doubtless there are others. These are in certain species of *Antennaria* (*Compositæ*), of *Alchemilla* (*Rosacæ*), and of *Thalictrum* (*Ranunculacæ*).

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PARTHENON



1. METOPE — Centaur and Laphia.



2. FRIEZE — Athenian Cavalry.



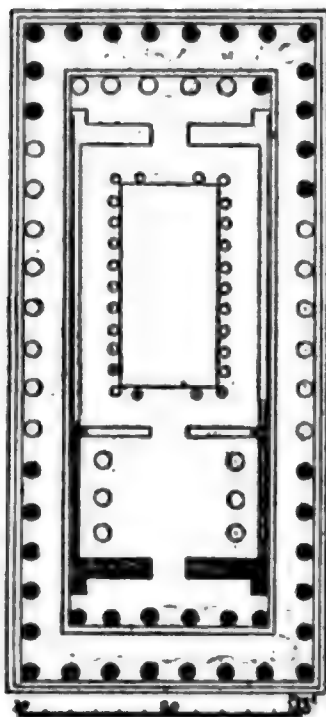
3. EAST PEDIMENT — The Three Fates (so called).

4. THE VARVAKEION STATUETTE, a copy of the Athena Parthenos.



bei den Insekten (Frankfort, 1858); Von Baer, *Ueber Prof. Nic. Wagners Entdeckung von Larven, die sich fortpflanzen, Herrn Ganins verwandte und ergänzende Beobachtungen und über die Pädogenese überhaupt* (Saint Petersburg, 1865); Taschenberg, *Historische Entwicklung der Lehre von der Parthenogenesis* (Halle, 1893). This last named work contains a full bibliography up to and including 1892.

PARTHENON (Lat., from Gk. *παρθένον*, from *παρθένος*, *parthenos*, virgin). A celebrated temple of the virgin goddess Athena, on the Acropolis of Athens. The highest triumph of Greek Doric architecture, it was the work of the architect Ictinus, while the sculptures are generally believed to have been designed by Phidias. The building was a Doric octostyle peripteros with 17 columns on the long sides. It was 100 by 225 Attic feet (about 101 by 228 English feet), and from the top of the stylobate to the gable



PLAN OF PARTHENON.

about 59 feet. Back of the outer row of 8 columns, at either end of the temple, are 6 columns, forming the fronts of the *pronaos* and *opisthodomos*. The main hall of the temple, called the *hekatompados*, was 100 Attic feet in length, and contained the great gold and ivory statue of Athena by Phidias. Back of this was another room, entered from the *opisthodomos* only, and called the *parthenon*. In the building the most delicate refinements were introduced in order to correct optical distortions. The lines of the stylobate, cornice, and columns were delicately curved, though with such nicety that much can be detected only by the most careful measurement. That these refinements were carefully calculated from the start is shown by the cutting of the rock on which the crepidoma rests to allow of the proper curvature in the lines of the stylobate. The whole building was of carefully selected white Pentelic marble, with the exception of the tiles of the roof, for which Parian marble was employed. (See Colored Plate under ARCHITECTURE.) Begun about B.C. 447, the temple was sufficiently completed to permit the installation of the statue in B.C. 438. It continued in use till the end of the fifth or possibly the sixth century of our era, when it was transformed into a Christian church, dedicated at first to Saint Sophia and later to the Virgin. After the capture of Athens by the Turks (A.D. 1458) it became a mosque, and a minaret was built in the southwest corner. It was, however, but little damaged, and in 1674 the sculptures were drawn by Jacques Carrey and other artists in the suite of the Marquis de Nointel. In 1687, during the siege of Athens by the Venetians, the Turks used it as a powder magazine, and on

September 26th a Venetian bomb fell through the roof, causing an explosion which killed 300 persons, and completely destroyed the central portion of the buildings. Early in the nineteenth century Lord Elgin secured permission to remove the sculptures to London. (See ELGIN MARBLES.) Apart from its value in the history of architecture, the Parthenon is of the greatest importance for the history of Greek sculpture. The two pediments were filled with colossal sculptures in the round, those in the east representing the birth of Athena from the head of Zeus, and those in the west the contest of Athena and Poseidon over Attica. The ninety-two metopes, all of which were sculptured, represented the struggle between the gods and the giants on the east, and the Athenians and Amazons on the west. On the south was the battle between the Centaurs and Lapithæ, and on the north the capture of Troy and the victory over the Persians. But the great glory of the temple was the long frieze which ran entirely around the outer wall of the cella and over the columns at either end, wrought in low relief in the most perfect style of the noble art of the fifth century. It represented the great Panathenaic procession, in which all classes of Athenians assembled to do honor to the goddess. The effect of the sculptures and architecture was enhanced by the use of color and metal to bring out the details. The metopes show marked stylistic differences, both in design and execution, and cannot all be attributed to the mind of a single artist, nor can it be supposed that the other sculptures were the work of a single hand, though they seem to most critics to show the influence of one master mind. They are characterized by a severe simplicity, scorning anything that savors of sensationalism or prettiness, but full of life and vigor in the animation of the frieze, of calm dignity in the figures of the gods, and everywhere marked by harmony and beauty in the lines and almost perfect technical skill in the treatment of the material. (See PROPYLEÆ and ATHENS.) In addition to the treatises on Greek sculpture cited under GREEK ART, consult: Michaelis, *Der Parthenon* (Leipzig, 1871), the standard work; Penrose, *Principles of Athenian Architecture* (2d ed., London, 1889); Magne, *Le Parthénon* (Paris, 1895); and the unfinished work of Laborde, *Le Parthénon* (Paris, 1848), containing Carrey's drawings.

PARTHENOPE, pār-thén'-ô-pé (Lat., from Gk. *Παρθενόπη*). (1) The daughter of Stymphalus, beloved by Hercules. (2) A siren who drowned herself for love of Ulysses. She was cast up by the sea at Naples, which was named for her.

PARTHENOPE'AN REPUBLIC (from *Parthenope*, the ancient name of the city of Naples). The name given to the State into which the Kingdom of Naples was transformed by the French Republicans, January 23, 1799. It only lasted until the following June, when the invading army was forced to retreat.

PARTHIA (Lat., from Gk. *Παρθαία*, *Parthyaia*, from *Παρθαίοι*, *Parthyaioi*, *Πάρθοι*, *Parthoi*, *Parthians*). An ancient empire founded out of part of the territories of the old Persian Empire, lying to the southeast of the Caspian Sea. The original inhabitants were probably of Turanian stock, related to the great

tribes of Central Asia, whence have come the Huns, Mongols, Turks, and Magyars. The Parthians were distinguished by primitive simplicity of life and extreme bravery, though at the same time they were much given to bacchanalian and voluptuous pleasures. They neglected agriculture and commerce, devoting their whole time to predatory expeditions and warfare. They fought on horseback, and after a peculiar fashion. Being armed solely with bows and arrows, they were rendered defenseless after the first discharge, and, to gain time for adjusting a second arrow to the bow, turned their horses and retired, as if in full flight, but an enemy incautiously pursuing was immediately assailed by a second flight of arrows; a second pretended flight followed, and the conflict was thus carried on till the Parthians gained the victory or exhausted their quivers. They generally discharged their arrows backward, holding the bow behind the shoulder, a mode of attack more dangerous to a pursuing enemy than to one in order of battle. They were conquered by Cyrus in the sixth century before Christ, and their country was organized into a satrapy under Darius. Parthia was included in the conquests of Alexander the Great and after his death formed a part of the Seleucid Syrian kingdom, until about A.C. 250 the people revolted successfully under Arsaces, founder of the dynasty of the Arsacidæ (q.v.), who maintained a most tyrannical despotism. The capital of the Parthian monarchy was Hecatompylos ('the city of the hundred gates'). The dominion of Parthia rapidly extended to the Euphrates and the Indus, and it became a most powerful and flourishing empire; Seleucia, Ctesiphon—the capital of the Persian emperors of the Sassanidæ—and other celebrated cities date their rise from this period, and soon eclipsed, in size and splendor, the ancient Hecatompylos. In spite of repeated attacks on the part of the Romans, the Parthians maintained their independence (see CRASSUS, MARCUS); and though Trajan, in A.D. 115-117, seized certain portions of the country, the Romans were soon compelled to abandon them. In 165, however, the Romans took from Parthia considerable territory. The final struggle with Rome took place in 217, when a desperate drawn battle at Nisibis made both parties desirous of peace. The Parthian kingdom was then weakened by dissension, and in 226, during the reign of Artabanus IV., the last of the Arsacidæ, a revolt headed by Ardshir, son of Babegan, broke out in Persia, and the Parthian monarch, beaten in three engagements, lost his throne and life, the Persian dynasty of the Sassanidæ (q.v.) taking the place of the Arsacidæ. Some scions of the Parthian royal family continued for several centuries to rule over the mountainous district of Armenia, under the protection of the Romans, and made frequent descents upon Assyria and Babylonia; but their history is obscure and of little importance. Consult: Rawlinson, *The Sixth Great Oriental Monarchy* (London, 1873); *The Story of Parthia* (New York, 1889).

PARTICIPLE (Lat. *participium*, participle, a sharing, from *particeps*, partaking, from *pars*, part + *capere*, to take). In grammar, a word partaking of the characteristics of a verb and an adjective. Like the verb, it governs nouns or pronouns, and, like the adjective, it agrees in gender, number, and case with the noun or

pronoun which it modifies. The double function of the participle is illustrated in such sentences as *μὲνῃμαι αὐτὸν τοῦτο ποίῃσαντα*, 'I remember him doing this;' *Flaminio restitit agrum dividendi*, 'he resisted Flaminius dividing the territory.' Participles are either active or passive, and are of various tenses, as present, past (aorist), perfect, and future. In English the active participle coincides in form with the abstract verbal noun, as *going*. The two words must be sharply distinguished in speech, as, *he is building the house*, but, *forty and six years was this temple in building* (whence such colloquial and archaic forms as *a-building*).

PARTICK. A town and western suburb of Glasgow, Scotland, with numerous shipbuilding yards, flour mills, cotton factories, and bleach-fields, and 1500 feet of wharfage along the Kelvin River (Map: Scotland, D 4). A large proportion of the inhabitants occupying extensive ranges of handsome villa residences are engaged in business in Glasgow. Population, in 1851, 3132; in 1891, 36,538; in 1901, 54,274.

PARTICULAR BAPTISTS. See BAPTISTS.

PARTIES. In law, in a general sense, those who have personal connection with an affair, or transaction, or who are united in interest in any act or thing; in a specific sense, litigants in a legal action or proceeding. In cases in equity all persons who have a material interest in the subject matter of the proceeding, whether legal or equitable, must be made parties, and persons whose interests are antagonistic cannot be joined as complainants. In an action at law there are generally two parties, or classes of parties, the plaintiff, or complainant, and the defendant, but variations occur, as in attachment cases, in actions *in rem*, etc. In general, any person not under legal disability of some kind, such as an alien enemy, an idiot or an infant, may become a party plaintiff, or may be made a party defendant. For such persons as are under legal disability of any kind the law appoints or allows others to act for them, either in their names or on their behalf. Consult: Dicey, *Treatise on the Rules for Selection of Parties*, etc. (Jersey City, 1886); Barbour, *Summary of the Law of Parties to Actions*, etc. (Albany, 1884); and the authorities referred to under PLEADING; EQUITY; LAW, etc. See also ACTION; DEFENDANT; PLAINTIFF; INFANT; INSANITY; ALIEN.

PARTING. See CLEAVAGE OF CRYSTALS.

PARTINGTON, MRS. A character similar to Mrs. Malaprop in her wrong use of words. Its origin was probably the person of that name described by Sydney Smith in a speech on the position of the House of Lords in reference to the Reform Bill, as attempting to keep back the Atlantic Ocean with her mop.

PARTINICO, pār'tē-nē'kō. A town in the Province of Palermo, Sicily, on the Palermo-Trapani Railroad, 14 miles southwest of Palermo (Map: Italy, H 9). Corn and fruit are produced in the vicinity, and there are manufactures of wine, oil, linen, and woolen goods. Population, (commune), in 1881, 21,000; in 1901, 23,729.

PARTITION (Lat. *partitio*, division, from *partiri*, to divide, from *pars*, part). A division of lands, tenements, and hereditaments, or of goods and chattels, by or for the benefit of per-

sons who have an undivided common interest in them so that each becomes the sole owner of one part or portion of the property. Compulsory partition was first allowed in the early common law as to co-parceners, who became joint owners of real estate by inheritance, on the theory that as they became joint owners by operation of law, and without their consent, they should be entitled to have it divided if their ideas as to management were not in accord. But as estates held in joint tenancy and tenancy in common were ordinarily created by the voluntary act of the parties, or with their consent, the old rule was that they could only be dissolved in the same way. In the course of time, however, the common-law rules were changed by statute, and since the reign of Henry VIII. all estates held in common have been subject to partition. The English law has continued to be the common law of the United States.

Originally, compulsory partition was obtained by means of a writ of partition, issued from a court of law, but subsequently the courts of chancery assumed jurisdiction; and in most States the action is now considered more in the nature of an equitable action because of the character of the relief obtained. Compulsory partition is now confined almost exclusively to real estate, as personal property, when left by a decedent, is sold and the proceeds distributed by the executors or administrators; and it is seldom held in common except by virtue of a partnership relation, in case of the dissolution of which the sale of the property, or an accounting, is resorted to as the most convenient method of adjusting the rights of the partners.

Where the common owners of property agree upon a partition, it is usually effected by exchanging deeds, each conveying and releasing to the other all his right, title, and interest in and to the portion which the latter is to receive. It is held in some States that a parol partition followed by actual possession of the respective portions of the parties is valid, on the ground that a conveyance is not necessary under the statute of frauds, as each party owned every portion in common with the others, but this is a most doubtful and unsatisfactory method.

Where the parties do not all agree that there should be a partition, and upon the shares to which each should be entitled, one or more of them may commence an action for partition. All parties having any possible interest in the property who do not join as plaintiffs should be made parties defendant. In some cases where the owners in common are all friendly, it is agreed that partition shall be made by the court, and one or more will consent to be made parties defendant, in order to give the proceeding the form of a litigated action. A few States permit all the parties in interest to join in an *ex parte* application to the court for partition, that is, to apply by a petition in the name of all, no one being made party defendant. In all 'friendly' suits the costs are apportioned among the parties according to their respective interests.

The respective proportions or interests of the various parties are first determined, and the court then decides upon the division which will be equitable and just to all. The courts generally favor a division of the property itself where that is possible from its nature and situation. In

some cases the courts may make a division of real estate among the interested parties, and order those who receive parcels of greater value than the others to make a certain compensation to the latter. This is sometimes called 'owelty (equality) of partition.' In the actual division and apportionment of lands, values of the respective portions are considered as well as area, and where the action is brought in a court of equitable jurisdiction each party will be allotted the portion which seems best adapted to his interests. A partition sale is conducted on the same principles as any other judicial sale. See REAL PROPERTY; JOINT TENANCY; JOINT TENANTS. Consult the authorities referred to under REAL PROPERTY and EQUITY.

PART-MUSIC, or PART-SONG. A composition for at least three voices without instrumental accompaniment. The voices may be *equal* (all male or all female) or *mixed*. It is immaterial whether the words are sacred or secular.

PARTNERSHIP (ME. *partener*, *parcener*, OF. *parcener*, from ML. *partionarius*, having a portion, from Lat. *partitio*, division). An unincorporated association of two or more persons who have agreed to combine their labor, property, and skill, or some of them, and who, in accordance with this agreement, carry on a lawful trade or business with a view to profit. The term is often used in popular speech, and sometimes in legal documents, with a different signification. We find the first charter of the Levant merchants (granted 1581) designating the grantees as partners; but the association was in truth a corporation, not a partnership. In an early New York case, the Court of Chancery was called upon to decide whether the members of a steamboat company, who had styled themselves partners in their articles of agreement, were partners or part owners (q.v.); and the decision was that they were part-owners. It is to be borne in mind, therefore, that partnership is a technical term in legal nomenclature. Persons may be called partners, and even call themselves by that name, without constituting a partnership. On the other hand, they may deny that they are partners, and believe that they are not partners, while in fact the partnership relation does subsist between them. How are we to determine, in a particular case, whether a partnership exists or not?

THE TEST OF PARTNERSHIP. Ordinarily the answer to the foregoing question is not difficult, if we apply the definition given above. First, we inquire whether the association is incorporated. If it is, then it is not a partnership. If it is not, we are next to ask whether the association is a voluntary one; for the law does not institute the relation of partners between persons against their will. Property may be left to children by a parent. This does not make them partners. Each has a right to say whether or not he will combine his interest with the interests of the others in carrying on a common business. The reason for this rule will be apparent when we consider a little later the authority possessed by each partner to sell firm property and to bind his co-partners by contracts and even by torts. It follows from this necessity of a binding agreement between the parties that they must possess legal capacity to contract, and

that the partnership agreement must be of such nature and form as to be legally enforceable. An infant is not bound by a partnership contract. Convicts, alien enemies, and, as a rule, corporations, are prohibited from entering partnerships. Judges are often debarred by statute from becoming partners in law firms. At common law married women were incapable of binding themselves by contract, and consequently could not become partners. Even when the parties have contractual capacity, their partnership contract may be worthless, either because its object is illegal or against public policy, or because its form does not comply with the Statute of Frauds. (See FRAUDS, STATUTE OF.) Courts have properly refused to enforce partnership agreements for highway robbery, for conducting gambling establishments or houses of ill-fame, cornering markets, and for creating monopolies.

The third question to ask is whether the parties are carrying on a business in common. A land-owner often lets his premises to a tenant 'to farm on shares.' This arrangement does not make them partners. Owners in common of a building agree that one of them shall have the general management of it and provide funds for necessary repairs, so as to make it habitable by tenants, and to divide the rent. Such an agreement does not amount to a partnership. If, however, they agree to supply the building with furniture at their joint expense, and to let furnished rooms to various tenants, they may well be held to intend the carrying on of a business in common. The presumption that common owners of land or of interests in land, as well as of common owners of chattels, are not partners in their use of it, is due to the fact that such ownership was recognized and the relations of the owners defined by the common law long before the institution of partnership came before English courts for consideration. While it is now possible and even common for partnerships to exist for buying and selling real estate or for renting it, the courts usually require that the intent of joint owners to throw such property into a fund as partnership stock shall be distinctly manifested. Such intent will not be presumed.

Still a fourth question to be answered before a decision as to the partnership character of an association can be reached is whether it was entered into with a view of profit. The earliest form of partnership known to English law was that of ordinary merchants. Its sole object was pecuniary gain. Hence the courts of England and of this country have had no hesitation "in declaring that societies and clubs, organized and maintained for the promotion of temperance, for the enforcement of particular laws, for musical culture among their members, for the propagation of political, social, or religious doctrines, or even for mutual protection or insurance, are not partnerships, even though they may have for one of their objects the accumulation of property to be owned and enjoyed in common."

Formerly, the sharing of the profits of a business was thought to constitute one a partner, at least toward those dealing with the business, whether he was a co-owner in the enterprise or not. This view has been discarded in England and in most of our jurisdictions. A person may share the profits, as a servant or agent, as a lender of money, or as the lessor of property,

without becoming a partner. Sharing the profits of a business is *prima facie* evidence that one is a partner; but it is no longer deemed conclusive. It may be overcome by evidence that the sharers are not carrying on the business in common—that they are not its joint proprietors.

CLASSES OF PARTNERSHIP. Various classifications have been made by writers and judges. A general partnership is one organized for the conduct of a business in accordance with the general usages of trade. A particular partnership is confined to a single transaction or enterprise. Joint-stock companies are a form of general partnership at common law, in which the members are allowed to transfer their shares, without dissolving the firm, and the control of which is vested in a few designated managers. Mining partnerships are substantially joint-stock companies. All of these forms are again classified as ordinary partnerships, in contra-distinction to limited partnerships.

LIMITED PARTNERSHIPS. This species was introduced into this country from the law of France. It has never gained a foothold in England, although strenuous efforts were made to develop it there after it had proved successful with us. Such efforts have ceased since the organization of joint-stock companies has become popular under modern British statutes. New York was the first of our States to provide by legislation for limited partnership. Connecticut followed this example closely, and now nearly every State has a statute upon the subject. The distinctive characteristic of a limited partnership is the conjunction of at least one general partner, who is liable for all the debts of the firm as every member of an ordinary partnership is, with one or more special partners, whose liability is limited to their contribution to the capital of the firm. In a few States limited partnership associations are authorized. These differ from the regular limited partnership in that their capital alone is responsible for their debts; none of the partners is subject to any personal liability. Both of these institutions, it will be observed, are creatures of statute. Accordingly, if the statutory provisions are not complied with, all the members of the association are liable as general partners. It is impossible to describe with fullness, in this connection, the statutory requirements for the formation of a limited partnership, for they are different in the various States. The chief requirements, however, are these: A certificate must be signed, acknowledged, registered, and published by the partners, stating the name under which the partnership is to be conducted; the general nature of the business to be done; the names and residences of the various members with a designation of the general and of the special partners respectively; the amount of capital contributed by the special partners; and the times at which the partnership is to begin and to end. An affidavit must also be made and filed in the proper office, stating that the sums specified in the certificate to have been contributed by the special partners have been actually and in good faith paid in cash. In some States the capital of the special partners may be contributed in property other than cash.

KINDS OF PARTNERS. In addition to the two kinds of partners designated by limited partnership legislation—the general partner and the

special partner—we have three others, which must be briefly described. The active or ostensible partner is one who frankly avows his membership in the firm, and thereby actively and openly promotes its business. The dormant partner is one who conceals from the public his connection with the firm. In England, and in a few of our States, he may take part in the conduct of firm affairs, without losing his status; but the view prevailing generally in this country is that he must take no part in the business—that both secrecy and inactivity are included in the term 'dormant.' The third kind goes under various names. Sometimes he is called the 'nominal' partner; at others the 'holding-out' partner. Still again he is described as the *quasi* partner, or partner by estoppel. Each of these designations indicates that he is not a partner at all; but still he is liable, as if he were a partner, to those persons who have acted upon his representations that he was a partner and who would be harmed if he were permitted to show the truth of his non-partnership.

THE NATURE OF A PARTNERSHIP. After a partnership has been formed the association is generally spoken of as a firm, and the name in which it does business is called the firm name. Unless a statute forbids, the firm may adopt any name it pleases and may change it at will, or it may go without a name. Occasionally the Legislature prohibits the use of 'and company' or '& Co.' unless such terms represent an actual partner; or it forbids the assumption of a corporate name. Even in the absence of a statute, a partnership is not at liberty to choose a firm name which will operate as a fraud upon the public or upon others trading under substantially the same name. Accordingly, if a business has been conducted successfully under the name of the 'Guinea Coal Company,' another firm will not be allowed to carry on the same line of trade in the name of the 'Pall Mall Guinea Coal Company,' especially if it has its envelopes, letter heads, and business cards so printed as to resemble those of its competitor.

The law merchant treats the firm as a legal entity—as a sort of artificial person much like a corporation. When the partners make their contribution to firm capital they cease to own it as individuals, and title passes to the firm. The firm becomes their debtor for the capital. They lend money to the firm, or borrow from it. The firm, in other words, has its own property, its own creditors, and its own debtors. This conception of the firm prevails very generally among the mercantile classes both in England and in this country. It is always observed by partnership bookkeepers. To some extent it has been recognized by State and Federal statutes, permitting the firm to sue and be sued as an association, and to be declared 'a bankrupt.' The entity theory of partnership, however, has never received full judicial sanction by English or American courts. And American judges, who, in construing mercantile contracts, have given effect as far as possible to the mercantile conception of partnership, have declared "that the firm is not recognized by lawyers as distinct from the members composing it." It follows from this view that if lands are purchased by a firm, the deed should name the partners as grantees; and if the partnership sells lands, the deed

should name the partners as grantors, and they and their wives should execute and acknowledge the conveyance precisely as though they were tenants in common (q.v.) of the property.

But this conception of a firm, as a mere association of individuals, is not applied consistently in any jurisdiction. For example, we have said that an infant, because of his contractual incapacity, is not bound by his agreement to become a partner, nor by the partnership agreement with third persons. Yet, after he has entered a firm and taken part in its management, he is not allowed to withdraw his capital until firm debts are paid. That is, he may escape personal responsibility for partnership obligations, but the firm ownership of firm property prevents his taking away any money or goods which he had contributed to the firm. Again, a partner's share in the firm is not the interest of a tenant in common in specific articles. It is only a *chose in action*—a right to his proportionate share of the net proceeds of firm property upon a final settlement. Accordingly, if the creditor of one partner gets a judgment against him and levies upon firm property, he cannot sell and give perfect title to any particular articles. All that he can dispose of is the judgment debtor's interest therein, which may be something or nothing, and which is nothing whenever the firm is insolvent, or the debtor partner has exhausted his interest in the firm property.

THE POWERS OF PARTNERS. Each member of a normal partnership is the general agent of the firm and of his copartners in carrying on the ordinary business of the firm. He can sell and give a perfect title to firm property, can collect debts, and can subject the firm and his copartners to most extensive obligations both in contract and in tort.

How extensive a general partner's agency is depends upon the nature of the firm's business. His implied authority may be summarized as follows: If the partnership is a trading or commercial firm, he may sell or pledge any of its property; he may buy on credit such property as it is accustomed to deal in; he may borrow money, and issue in the firm name negotiable paper; he may hire servants and agents; and he may render the firm and each copartner liable in tort by wrongful acts or omissions in the ordinary course of the business of the firm. Moreover, his admissions and representations made concerning the firm affairs and in the ordinary course of its business are receivable as evidence against the firm and his copartners when sued as such.

This implied agency of a partner may be withdrawn from him by his consent, as where the partnership articles confer the power of management upon particular members. It may be taken from him without his assent by a majority acting in good faith. Such limitations upon a partner's agency must be brought to the knowledge of those dealing with the firm, or they will not be affected by them.

DUTIES OF A PARTNER. The most important of these is his observance of the utmost good faith toward his copartners. Not only must he give the firm the benefit of every advantageous bargain he can make in the business, but he must devote the whole of his time and energies, dur-

ing business hours, to the promotion of its interests, unless he has stipulated in the partnership contract for exemption in these respects. Moreover, if his copartners have been compelled to pay more than their shares of the firm debts and expenses, he is bound to contribute toward their indemnity.

DISSOLUTION OF PARTNERSHIP. This may result by operation of law, or from the acts of the parties, or from judicial decree. The happening of any event which makes it unlawful for the business of the firm to be carried on, or for the particular contracting members to continue as partners, dissolves the firm at once, as does the death or the bankruptcy of a partner. The partnership may terminate by reason of an agreement made in advance that it shall terminate at a fixed date, or at any time by mutual consent. In the United States one partner may break up a firm against the wishes of his copartners, subject to his liability to damages for breach of his partnership contract. A court will ordinarily decree a dissolution, at the request of a partner, upon the insanity or permanent incapacity of a member of the firm, or for the misconduct of one of the defendant partners, or when it appears that the business can only be carried on at a loss. As soon as a firm is dissolved, the agency of the partners ceases, except so far as this is necessary to winding up the firm's affairs. Sometimes a particular member is agreed upon as liquidating partner, to whom exclusive authority in settling firm matters is confided.

DISTRIBUTION OF FIRM ASSETS. In winding up a partnership its assets are to be applied as follows: First, to paying the general creditors of the firm; second, to paying to each partner ratably what is due from the firm to him for advances as distinguished from capital; third, paying to each partner ratably what is due from the firm to him in respect of capital; fourth, the distribution of the residue, if any, shall be among the partners in the proportion in which profits are divided. If losses have been sustained, these are to be paid first out of profits, next out of capital, and lastly, if necessary, by the partners individually in the proportion in which they were entitled to share profits. Of course, these rules may be varied, so far as their application to partners is concerned, by provisions in the partnership articles.

Consult: Bates, *The Law of Partnership* (Chicago, 1888); Bates, *The Law of Limited Partnership* (Boston, 1886); Parsons, *A Treatise on the Law of Partnership* (ib., 1893); Burdick, *The Law of Partnership, Including Limited Partnerships* (ib., 1899).

PAR-TON, ARTHUR (1842—). An American painter, born at Hudson, N. Y. He was the pupil of W. T. Richards in Philadelphia, and was elected to the National Academy in 1884. The coloring in his landscapes is usually in a low key, but his later work, with quite as much quality, has more vigor. His pictures include: "Mountain Brook" (1875); "Nightfall" (1881); "In the Gloaming" (1885); and "Palisades in Winter."—His brother ERNEST (1845—), born at Hudson, was his pupil, and also a landscape painter. Among his works are "Silver and Gold" (1882) and "Last of October" (1886), both characteristic of his refined poetic style of painting.

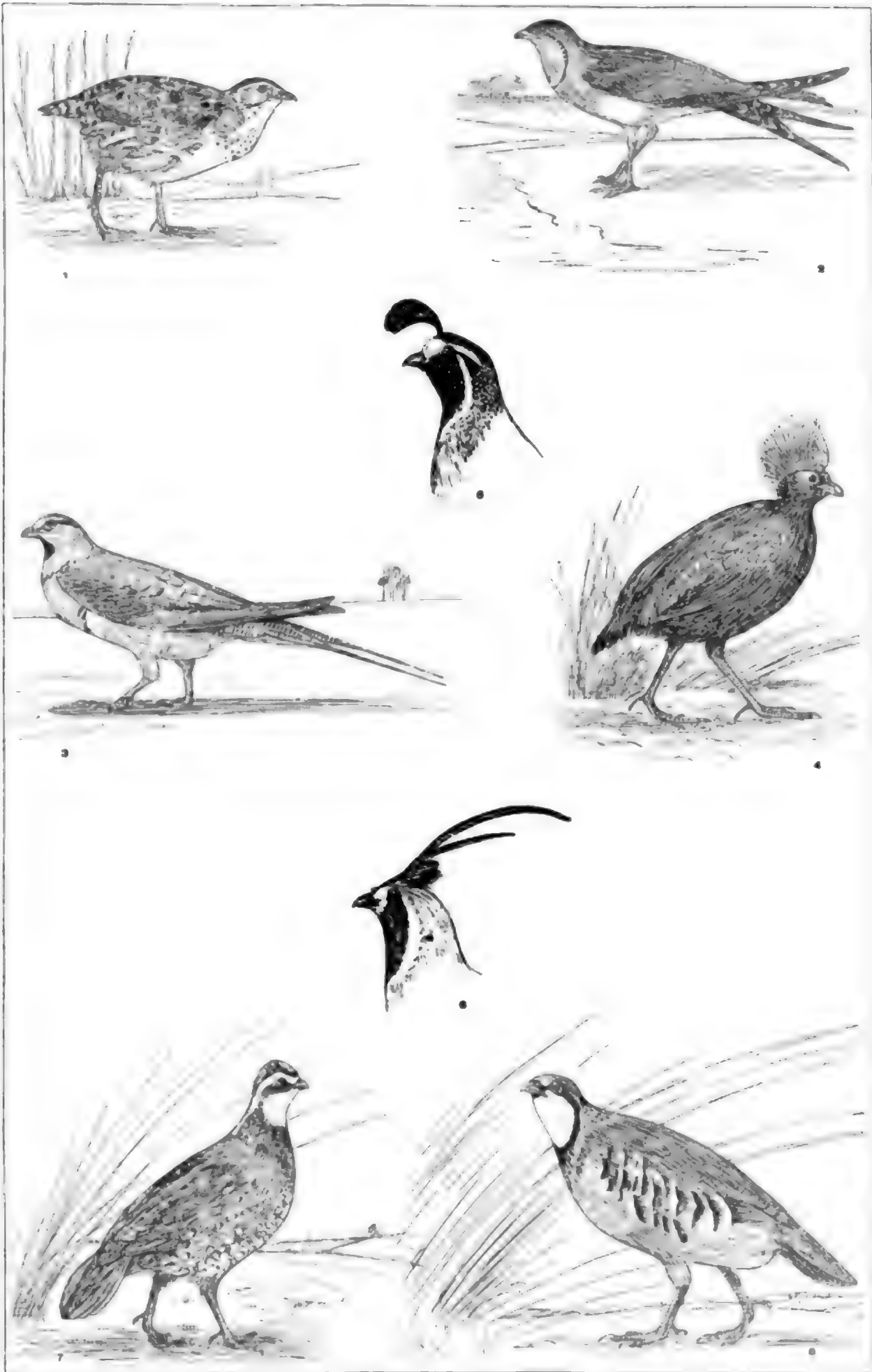
PARTON, JAMES (1822-91). An American biographer, born in Canterbury, England, February 9, 1822. Parton was brought to the United States in 1827, and was educated in New York City and White Plains, N. Y. He taught in Philadelphia and New York, and began a long literary career by journalistic work on the *Home Journal*. His first book was a *Life of Horace Greeley* (1855), which gained immediate success. He afterwards devoted himself wholly to authorship and to lectures on political and literary topics, residing in New York until 1875, and afterwards at Newburyport, Mass. His principal publications were: *Life and Times of Aaron Burr* (1857); *Life of Andrew Jackson* (3 vols., 1859-60); *General Butler in New Orleans* (1863); *Life and Times of Benjamin Franklin* (1864); *Famous Americans of Recent Times* (1867); *The Words of Washington* (1872); *Fanny Fern*, a memorial to his wife (1873); *Life of Thomas Jefferson* (1874); *Caricature and Other Comic Art in All Times and Many Lands* (1877); *A Life of Voltaire*, his most meritorious production (1881); *Noted Women of Europe and America* (1883); and *Captains of Industry, a Book for Young Americans* (1884 and 1891). In 1856 he married Sara Payson Willis (born at Portland, Me., July 9, 1811; died at Brooklyn, N. Y., October 10, 1872), sister of the poet N. P. Willis, a popular authoress who wrote under the name of 'Fanny Fern.' She left, by a former marriage to Charles H. Eldridge, a daughter, whom Parton afterwards married.

PART OWNER. In its broadest sense, any person who owns property in common with another or others, except partners. Specifically, one of the coowners of a ship.

Part owners of a ship may transform this ownership into a partnership title by agreement. Such transformation, however, will not be presumed; it must be proved. So long as they remain part owners, they manage the vessel by, and delegate their interests to, various agents, of whom the principal are the ship's husband and the master. Formerly the ship's husband was generally in fact a part owner, but he need not own an interest in the vessel in order that his authority extend to all matters connected with its equipment, repair, and management. A majority of the part owners have the right to use the ship for a particular voyage against the will of the minority. When the majority exercise this power, however, a court of admiralty may require them to secure the minority owners to the extent of their shares. Consult: Lindley, *The Law of Partnership* (London, 1895); Kent, *Commentaries on American Law* (Boston, 1896).

PARTRIDGE (OF. *perdris*, *perdriz*, *pertrix*. Fr. *perdrix*, It. *perdice*, *pernice*, from Lat. *perdix*, from Gk. *περδίξ*, partridge). A popular name for various gallinaceous birds, or other birds superficially like them, the precise application of which depends not only on the country, but on the part of the country where the term is used. The name was originally given, and properly belongs, to birds of the grouse family, of the genus *Perdix*, all of which are confined to the Old World. They have a short, strong bill, naked at the base; the upper mandible convex, bent down at the tip; the wings and tail short, the tarsi as well as the toes naked, the tarsi not spurred. In North America the term is hardly

PARTRIDGES, ETC.



1. COMMON EUROPEAN QUAIL (*Coturnix communis*).
2. PRATINCOLE (*Glareola pratincola*).
3. SAND GROUSE (*Pterocles alchata*).
4. CROWNED WOOD QUAIL (*Rollulus roulroul*).

5. CALIFORNIA VALLEY QUAIL (*Lophortyx Californica*).
6. CALIFORNIA PLUMED or MOUNTAIN QUAIL (*Oreortyx pictus*).
7. AMERICAN QUAIL or BOB-WHITE (*Colinus virginianus*).
8. RED-LEGGED PARTRIDGE (*Caccabis rufa*).

applicable properly, as our larger Gallinæ are grouse, while the smaller ones are preferably known as quails, although not precisely the same as the true quails (*Coturnix*) of the Old World. In the Northeastern United States the ruffed grouse (see GROUSE) is almost universally called 'partridge,' while in the Southern States the common quail (q.v.) receives that name, and the grouse is known as 'pheasant.' The term seems most properly applied in America to the small game-birds of the Pacific Coast, such as Gambel's partridge, and the 'mountain' and 'valley' partridges of California. In South America tinamous (q.v.) are called 'partridges.'

The true partridge of the Old World is typified by the common gray partridge (*Perdix cinerea*) of Great Britain and Europe generally, which is the most plentiful of all the game-birds in Great Britain, and becomes increasingly plentiful as cultivation is extended. On the Continent of Europe it is abundant in almost all suitable districts from Scandinavia to the Mediterranean, and is found also in the north of Africa and in Western Asia. It varies considerably in size; those found in rich lowlands are generally the largest, and about 12½ inches in entire length, while those which inhabit poorer and more upland districts are rather smaller. The female is somewhat smaller than the male. The upper parts of both are ash-gray, finely varied with brown and black; the male has a deep chestnut crescent-shaped spot on the breast, which is almost or altogether wanting in the female. The partridge is seldom found far from cultivated land. It feeds on grain and other seeds, insects and their larvæ and pupæ, and the pupæ of ants are generally the food sought at first for the young. The nest is usually on the ground, among brushwood and long grass, or in fields of clover or corn, and generally contains from 12 to 20 eggs. Until the end of autumn the parent birds and their brood keep together in a covey; late in the season several coveys often unite into a pack, when it becomes much more difficult for the sportsman to approach them. The flight of the partridge is strong and rapid for a short distance, but the bird does not seem to be capable of long-sustained flight. The eggs of partridges are often hatched, and the young birds reared, by the domestic hen, the chief requisite being a plentiful supply of ants when the birds are very young. Partridges thus reared become very tame, but they seldom breed in the aviary. Other species occur in Asia.

Of a different genus is the red-legged or French partridge (*Caccabis rufa*), a native of Southern Europe and now plentiful in the south of England, where it has been introduced. It is rather larger than the common partridge, stronger on the wing, and less easily approached by the sportsman, while it is also less esteemed for the table. The upper parts are of a reddish ash color; the throat and cheeks white, bounded by a collar of black, which expands in black spots on the breast; and the sides exhibit bars of black. The plumage is smooth. Two other species nearly allied to this are found in Southern Europe. India has a number of species, the habits of which much resemble those of the common partridge, the best known of which is the chukor (q.v.). In India, however, the name is extended by sportsmen to a large variety of small game-

birds, more or less like the true partridge, such as the bamboo-partridges, hill-partridges, and francolins (of which the 'black partridge'—*Francolinus vulgaris*—of the Eastern Mediterranean region is a familiar example). In Australia one of the bush-quails (*Pedionomus*) is so called; and in South Africa the 'redwing' partridge of the colonists is a francolin (*Francolinus Le Vaillanti*).

Consult general and local ornithologists cited under BIRD; especially Morris, *British Game-Birds* (London, 1891); Allale, *Sport in Europe* (ib., 1901); Lloyd, *Game Birds and Wildfowl of Sweden* (ib., 1867); Walsingham, "Shooting," in *Badminton Library* (ib., 1889); Bryden, *Nature and Sport in South Africa* (ib., 1897); Shelley, *Birds of Egypt* (ib., 1872); Seebohm, *Birds of Asia* (ib., 1901); Sharpe and Hudson, *Argentine Ornithology* (ib., 1888); Coues, *Birds of the Northwest* (Washington, 1874); Mayer (editor), *Sport with Gun and Rod* (New York, 1892); Sandys and Van Dyke, *Upland Game Birds* (ib., 1902); and writings of American naturalists and sportsmen generally. See COLORED PLATES OF GAME BIRDS, with article GROUSE, and of EGGS OF WATER AND GAME BIRDS.

PARTRIDGE, ALDEN (1785-1854). An American educator, born at Norwich, Vt. He graduated at the newly founded Military Academy at West Point in 1806, was commissioned first lieutenant of engineers, and was assigned to duty there as assistant professor of mathematics. From 1813 to 1816 he was professor of engineering. In 1818 he resigned from the army, and in 1820 returned to Norwich, where he founded the American Literary, Scientific, and Military Academy, better known as the Norwich Military Academy. The success of this undertaking was immediate, and in 1834 the State granted it a charter as the Norwich University. At the invitation of other States, Partridge founded similar military schools at Portsmouth, Va., Pembroke, N. H., Harrisburg, Pa., and Brandywine Springs, Del., and devoted much time to organizing and drilling their militia.

PARTRIDGE, JOHN (1644-1715). A famous London astrologer and almanac-maker. Bound apprentice to a shoemaker, he nevertheless learned by himself Latin, Greek, and Hebrew, and seems subsequently to have studied medicine at Leyden. He wrote a treatise on the *Old Principles of Astrology* in 1697. In 1680 he had begun to issue an almanac called *Merlinus Liberatus*, which, after a short suspension, was regularly published from 1689. This masterpiece of equivocation soon became exceedingly popular. As a parody upon it Jonathan Swift issued at the beginning of 1708, *Predictions . . . by Isaac Bickerstaff, Esq.*, in which it was foretold that Partridge would "infallibly die upon March 29th next, about 11 at night, of a raging fever." On March 30th Swift published a pamphlet in which the prediction was said to be accomplished. In vain Partridge tried to convince the public that he was still alive. Swift followed up the humorous attack in an *Elegy on the Death of Mr. Partridge* (1708) and the *Vindication of Isaac Bickerstaff* (1709). Partridge was so completely crushed that not another *Merlinus* appeared till 1714. Partridge's *Almanac*, issued by the Stationers' Company in 1711, has appeared

regularly ever since. The name Isaac Bickerstaff (q.v.), which Swift took from a sign in Long-acre, soon spread far and wide. It was appropriated by Steele in the *Tatler* (1709).

PARTRIDGE, WILLIAM ORDWAY (1861—). An American sculptor and author, born in Paris. He was educated at Columbia University, in New York City, and studied modeling under Galli in Florence, and Welonski in Rome. He first became known by his portrait busts, which include "An Old Woman," in the Corcoran Gallery, Washington, and bas-reliefs of Sir Henry Irving (1892) and Edward Everett Hale (Salon, 1893). One of his first large works, the bronze statue of Hamilton in front of the Hamilton Club, Brooklyn, N. Y., is a striking conception of the great statesman in a moment of dramatic interest. It exhibits in a marked degree the restraint that characterizes all his productions. Another notable work is the "Shakespeare," unveiled at Lincoln Park, Chicago, in 1894. His bronze equestrian statue of General Grant (1896) in Brooklyn is a model of unity and technical ability. His largest ideal work is the Kauffman Memorial at Washington. Other busts include a noble "Madonna" (1897), Whitman, Lincoln, Whittier, "Dreams," and "Midsummer Night's Dream." Mr. Partridge also became well known as a lecturer and writer on art and letters and municipal improvements. His publications include: *Art for America* (1894); *Song Life of a Sculptor* (1894); *The Technique of Sculpture* (1895); *The Angel of Clay* (1900), a novel; and *Nathan Hale* (1902). For a time he was professor of fine arts at Columbian University, Washington, D. C.

PARTRIDGE-BERRY, or CHECKER-BERRY. Members of the genus *Mitchella*, of the natural order Rubiaceæ (madder family), represented by one species in America and one in Japan. The



PARTRIDGE BERRY (*Mitchella repens*).

American species, *Mitchella repens*, which extends from Canada to Mexico, is a small trailing evergreen, with a branching stem, a foot or more long, usually covering the ground. It is named in honor of Dr. John Mitchell, a Virginian botanist, correspondent of Linnæus. Its favorite

habitats are dry, sandy knolls in piney woods, but it may be found in most dry woods. Its leaves are smooth and shining, round-ovate, opposite with short petioles, and traversed with light lines; flowers in pairs with ovaries united. The fruit is a beautiful scarlet berry crowned with the calyx teeth of the two flowers, each with four small seed-like and bony nutlets. The berry, which is about the size of that of the winter-green, but almost tasteless, remains on the plant during the winter. Blossoms appear in June and July.

PARTRIDGE DOVE, or PARTRIDGE PIGEON. An Australian pigeon of the genus *Geophaps*, approaching in character and habits to the gallinaceous birds, and particularly to partridges. The plumage has a bronze tinge and lustre on the wings, which resembles that of the closely allied bronzewings (q.v.). There are several species. They live mostly on the ground, and rise with a whirring noise, like the pheasant when disturbed. They are highly esteemed for the table. *Geotrygon montana*, a species of another genus, bears the name 'partridge dove' in the West Indies. It also seeks its food chiefly on the ground, although it affects well-wooded districts.

PARTRIDGE-WOOD. A very pretty, usually reddish, variously streaked hard wood from the West Indies and Brazil, where it is used in shipbuilding. In choice specimens the layers of wood are curled upon one another so as to resemble the feathers of the partridge; hence its name. Its chief use in other countries is for cabinet-work, parasol-sticks, fans, and other small articles. It is said to be yielded by *Andira inermis*, a leguminous tree.

PARTS OF SPEECH. See the section on *Parts of Speech*, under GRAMMAR.

PARTURIENT APOPLEXY. A disease of live stock. See MILK FEVER.

PARTURITION. See OBSTETRICS.

PARTY NAMES (OF., Fr. *partie*, from ML. *partita*, party, part, Lat. *partita*, fem. sg. of *partitus*, p.p. of *partiri*, to divide). The following is a partial list of the political groups which have existed in the United States, some of which, however, were never definitely organized as parties.

Abolitionists.—Those who strove to secure the abolition of slavery. (See article on this title.) *Adamites.*—The political supporters of John Quincy Adams. The expression was current from about 1821 to 1832. *American Party.*—A party which originated in New York in 1835, and which was organized as a national party about 1852. Its purpose was expressed in the motto, 'America for Americans.' Later it became known as the 'Know-Nothing Party.' The name was also applied to two other parties in the history of the United States. (See AMERICAN PARTY, and KNOW-NOTHINGS.) *Anti-Federalists.*—The name applied to those who opposed the adoption of the Constitution of the United States and who later opposed the liberal construction of that instrument. (See ANTI-FEDERALISTS.) *Anti-Imperialists.*—(See IMPERIALISM.) *Anti-Masons.*—A party which originated in New York in 1826, its chief principle being hostility to the Masonic Order. (See ANTI-MASONS.) *Anti-Nebraska Party.*—A party formed in 1854 after the enactment of the Kansas-Nebraska Bill (q.v.) and

composed mainly of Northern Whigs, who were opposed to the repeal of the Missouri Compromise. *Anti-Renters*.—The name applied to those in New York who opposed the collection of rent from the tenants occupying the old patroon estates. The movement flourished during 1839-47. (See ANTI-RENTISM.) *Barnburners*.—The radical wing of the Democratic Party in New York for several years after 1844. They were arrayed against the *Hunkers* (q.v.) or the moderate wing. (See BARNBURNERS.) *Black Republicans*.—The name applied, chiefly in the South at the close of the Civil War, to those supporting the Republican Party, on account of their sympathy for the negro. *Bourbons*.—Originally applied to the Southern Democrats of the old school, but now used of any reactionary who adheres obstinately to tradition. *Bucktails*.—A political faction originating in New York in 1815, and opposed to the administration of Governor Clinton. They were so called from the habit of wearing bucktails in their hats. *Carpet-Baggers*. See article on this title. *Constitutional Union Party*.—A party organized in 1860 and composed mainly of former Southern Whigs. (See CONSTITUTIONAL UNION PARTY.) *Copperheads*.—The name applied by the Republicans during the Civil War to the Democrats of the North who did not believe in prosecuting the struggle with the South, and some of whom sympathized with the cause of the Confederates. (See COPPERHEAD.) *Coöperationists*.—The term applied at the time of the secession controversy in the Southern States to those who favored the secession of their own State only in the event of 'coöperation' of their sister States. *Court Party* (old and new).—The term applied to the supporters of two rival superior courts in Kentucky. (See KENTUCKY.) *Democratic Republicans*. See DEMOCRATIC PARTY. *Democrats*.—See article on DEMOCRATIC PARTY. *Dough-faces*.—The name sneeringly applied by John Randolph of Roanoke, about 1820, to Northern members of Congress who supported the slavery interests by their votes. *Drys*.—Another term for those favoring the prohibition of the liquor traffic. (See PROHIBITION.) *Federalists*.—See article on this title. *Free Soilers*.—A party which first came into prominence in 1848. It was made up of men opposed to the extension of negro slavery. (See FREE SOIL PARTY.) *Gold Democrats*.—A party of disaffected Democrats who refused to support the regular party platform and candidates in 1896. They adopted a platform favoring the gold monetary standard and nominated J. M. Palmer, of Illinois, for President. *Grangers*.—See article on this title. *Greenbackers*.—A party advocating the issue of an irredeemable paper currency. It was prominent during the decade from 1876 to 1886. (See GREENBACK PARTY.) *Half-Breeds*.—The moderate wing of the New York Republicans, 1881-85, opposed to the *Stalwarts* (q.v.). *Hunkers*.—See BARNBURNERS. *Jacksonites*.—The followers of Andrew Jackson, 1825-29, opposed to the *Adamites*. *Know-Nothings*.—See article on this title. *Liberals or Liberal Republicans*.—Those Republicans who opposed the reelection of President Grant in 1872, and favored a more liberal policy as regards the Southern question. (See LIBERAL-REPUBLICAN PARTY.) *Liberal Party*.—A party which was formed about 1840 for the purpose of securing the abolition of slav-

ery. (See article on this title.) *Lily Whites*.—The term applied to white Republicans in the South who favor the exclusion of negroes from the party. *Loco Focos*.—A popular nickname given to a faction of the Democrats in New York about 1835. (See article on this title.) *Loose Constructionists*.—The term applied frequently to the Federalists and later to the Whigs, on account of their advocacy of a liberal interpretation of the Constitution of the United States. *Mahonists*.—A party in Virginia consisting of the followers of Gen. William Mahone, who bolted from the Democratic Party in 1878. (See READJUSTERS.) *Middle-of-the-Road Populists*.—See POPULIST PARTY. *Mugwumps*.—See article on this title. *National Republicans*.—See WHIG PARTY. *Native Americans*.—See AMERICAN PARTY and KNOW-NOTHINGS. *Nullifiers*.—Those who advocated the right of a State to suspend within its own boundaries the operation of a law of the United States. Only in South Carolina, 1828-32, did this become the basis of a party organization. (See article on NULLIFICATION.) *People's Party, or Populist Party*.—A political party first organized on national lines in 1892. (See article on POPULIST PARTY.) *Prohibitionists*.—Those who advocate abolition of the liquor traffic. Since 1872 there has been a national Prohibition Party. (See PROHIBITION.) *Radicals*.—The name applied after the Civil War to the extreme wing of the Republican Party as regards its policy in dealing with Southern questions. (See REPUBLICAN PARTY.) *Readjusters*.—A local party in Virginia in 1878 headed by Gen. William Mahone, and favoring a conditional repudiation of the State debt. (See article on READJUSTERS.) *Repudiators*.—A party in Mississippi which advocated the repudiation of a large number of Union bank bonds, the payment of which the State had guaranteed. (See article on REPUDIATION.) *Relief Party*.—The name applied to the supporters of a movement in Kentucky which had for its purpose the enactment of measures by the Legislature for relieving the people of economic and financial burdens. 'Relief' parties were common in other States from 1830 to 1860. (See KENTUCKY.) *Republicans*.—See article on this title. *Scalawags*.—The name applied to native Southerners during the reconstruction era who affiliated with the Republican Party. *Silver Grays*.—The conservative wing of the Whig Party (q.v.). *Silver Party*.—A party made up chiefly of disaffected Republicans in 1896, who favored the free coinage of silver. It indorsed the Democratic nominees for President and Vice-President in that year. *Socialists, or Socialist-Labor Party*.—This first appeared as a national movement in 1892, when it nominated candidates for President and Vice-President, and adopted a platform advocating a socialistic policy in governmental affairs. *Stalwarts*.—A wing of the Republican Party in New York from 1880 to 1885, led by Roscoe Conkling, and representing the 'machine' politics of the party. (See article on this title.) *Strict Constructionists*.—The name given to those who advocated the strict interpretation of the Constitution of the United States. *Union Labor Party*.—A movement which first became national in 1888. It nominated candidates for President and Vice-President and adopted a platform of principles. *Union Leagues*.—Organizations of a political character in the Southern States for a time after

the Civil War, composed chiefly of negroes and white Republicans. *Washingtonians*.—The term early applied to the Prohibition Party. (See PROHIBITION.) *Whigs*.—See WHIG PARTY. *Woman's Rights Party*.—A party which first appeared as a national movement in 1884. Both in that year and in 1888 it held national conventions and nominated candidates for President and Vice-President, pledged to advocate the general introduction of female suffrage.

PARTY WALL. A wall dividing adjoining properties and owned in common by the owners of the properties or so that they have common rights in its use and maintenance. By the English common law, where the wall is partly on both lots, the adjoining proprietors are regarded as tenants in common of the wall, and probably of the land on which it stands, during the existence of the wall. In the United States, if the wall stands so that it is partly on both lots, the owner of each lot retains the fee in the part of his land covered thereby, and also owns the portion of the wall standing on his lot, subject, however, to the easement of support incident to a party wall, in favor of the adjoining owner, and he has reciprocal rights in the other portion of the wall.

A party wall may, like any other easement, be created by grant, by prescription, or twenty years' user, and in a few States by virtue of statutes authorizing a person to build a party wall between his land and that of another and exact contribution from the latter under certain circumstances. The weight of authority in the United States is to the effect that statutes of the nature above referred to are unconstitutional, as taking private property without compensation, especially as it is for private purposes. In the few States where such statutes exist they are held valid as a legitimate exercise of the police power. Neither owner of a party wall has a right to extend the front and rear walls of his building farther than to the middle of the party wall, nor can either maintain a window therein, even if the other party is not using his side. Either owner may increase the height of a party wall, provided the wall is thick enough "to bear the increased weight, or may increase its thickness on his own land." When a party wall becomes unsafe or dangerous, either party may repair it, even to the extent of rebuilding it, without causing injury to the other; but the one repairing or rebuilding cannot in general require the other to pay his proportionate share of the cost thereof. In most jurisdictions it is held that if the wall is totally destroyed by any cause the easement is at an end, and neither party can rebuild without the consent of the other. Consult the authorities referred to under EASEMENT and REAL PROPERTY.

PĀRVATĪ (Skt., mountain-born). In Hindu mythology, the beneficent aspect of the wife of Siva (q.v.). She was a reincarnation of Uma (q.v.), and was born as a daughter of Himavānt or the Himalaya Mountain, from which circumstance she received her name. According to another account, she was the daughter of the combined glances of Brahma (q.v.), Vishnu (q.v.), and Siva, and was born on Mount Kailāsa in the Himalayas. She was then white, red, and black, the colors of Brahma, Vishnu, and

Siva respectively, but at Brahma's request divided herself into three forms, of which the white, Sarasvatī, was the wife of Brahma; the red, Lakshmi (q.v.), the wife of Vishnu, and the black, Parvatī, the wife of Siva. Parvatī plays little part in Hindu mythology, manifesting her power chiefly under her aspects of Durga (q.v.) and Kali (q.v.). Consult Wilkins, *Hindu Mythology* (2d ed., London, 1900), and see for illustration, Plate of HINDU DEITIES in the article INDIAN MYTHOLOGY.

PARVIN, THEOPHILUS (1829-98). An American obstetrician. He was born in Buenos Ayres, was a graduate of the universities of Indiana and of Pennsylvania, and, after a dozen years' practice in Indianapolis, became professor in the Ohio Medical College (1864). From 1869 to 1872 he taught in the medical department of the University of Louisville; then was professor of obstetrics and infantile diseases in Indiana Medical College, and in 1883 was chosen to a like chair in Jefferson Medical College, Philadelphia. He wrote *The Science and Art of Obstetrics* (1886), and edited *Winchel on the Diseases of Women* (1887).

PASADENA. A city in Los Angeles County, Cal., 10 miles northeast of Los Angeles, on the Southern Pacific, the Atchison, Topeka and Santa Fé, and the Salt Lake railroads (Map: California, D 4). It is an attractive residential place and a well-known winter resort, its healthful climate and beautiful situation contributing to its popularity. Green Hotel, Maryland Hotel, Hotel La Pintoresca, and Raymond Hotel, are among the most prominent buildings of Pasadena. There are also the Throop Polytechnic Institute, and a public library that contains over 20,000 volumes. The Pasadena Academy of Sciences possesses a valuable museum of archaeology and natural history. The city has voted (1903) \$300,000 for parks and other improvements, besides \$100,000 for a new high school building. Pasadena was settled in 1874 by a colony from Indianapolis and soon became known for its horticultural enterprise. It is the centre of extensive fruit-growing interests, the cultivation of oranges and lemons being especially prominent. There are large packing houses, many drying establishments, a large cannery, and manufactures of woodwork, boots and shoes, and brick. Pasadena was first incorporated in 1886. It is governed, under a charter of 1901, by a mayor, elected every two years, and a unicameral council. Population, in 1890, 4882; in 1900, 9117.

PASARGADĒ (Lat., from Gk. Πασαργάδαι, possibly from OPers. *Pārsa-vardana, city of Persia, equivalent in meaning to Persepolis). The ancient capital of Persia, before the foundation of Persepolis. Its site is generally supposed to have been on the Plain of Mughab northeast of Persepolis, where there is an ancient tomb which the best authorities all believe to be the tomb of Cyrus. The neighborhood was the burial place of the Achaemenian kings and the ancient tribe called Pasargadæ dwelt in the vicinity. The region was the home of the royal family of the Achaemenidæ. Consult Curzon, *Persia and the Persian Question* (London, 1892); and the authorities referred to under PERSEPOLIS.

PASCAGOULA, pās'kă-gōō'lă. A river of Mississippi, formed by the junction of the Leaf

and the Chickasawhay, both flowing southward through the southeastern part of the State (Map: Mississippi, H 9). It empties through a beautiful estuary into Mississippi Sound at Scranton, near the Alabama boundary. With its main headstream, the Chickasawhay, it is 250 miles long, and navigable 100 miles for small steamers. It is the outlet for the lumber cut in the large pine barrens through which it flows.

PASCAL, pá'skál', BLAISE (1623-62). A distinguished French philosopher, mathematician, and author, born at Clermont-Ferrand. He came of an Auvergnat family, ennobled in 1478, and for generations occupied in the civil service. His mother died in his infancy, and his father moved in 1631 to Paris. Here he was educated by his father, and showed remarkable precocity in mathematics. In 1641 the family removed to Rouen, where for a number of years Pascal was engaged in scientific studies, especially in physics. In 1648 his sister Jacqueline was attracted to the Jansenist convent at Port-Royal, and Pascal frequently accompanied her there, till their father took them both to Clermont, where Pascal remained for two years. In 1650 the family returned to Paris, and the next year the father died; Jacqueline joined Port-Royal, but Pascal remained in Paris till 1654, when he followed her thither. His decision to embrace the austere life of Port-Royal is said to have been caused by a carriage accident, though it is quite clear from minor writings of this period, such as *Prière pour demander le bon usage des maladies* (1648), and *Lettres sur la mort du père de M. Pascal* (1651), that the Jansenist faith and what is uncritically called Pascal's skepticism were already firmly fixed in his mind. From this moment he gave himself utterly to Port-Royal, continuing to believe in and labor for the progress of science, though sure that mental and moral certitude could be found only in revelation. He was not then a theologian, and he never acquired more than a superficial acquaintance with the Fathers of the Church. Yet, with the equipment of his unsurpassed literary instinct and scientific training, he entered on his famous controversy with the Jesuits in the eighteen *Lettres provinciales*. They were published clandestinely and pseudonymously in 1656 and 1657. The title of the collected letters reads: *Lettres écrites par Louis de Montalte à un provincial de ses amis et aux RR. PP. Jésuites; sur la morale et la politique de ces pères*. Subsequently the collection was entitled simply *Les provinciales*. It is evident that they were written under intense excitement, stimulated by the supposed miraculous cure of his niece through contact with a relic of the crown of thorns at Port-Royal. The letters were immensely popular and successful, but brought down both ecclesiastical and civil censures upon the unknown author. They are perhaps the greatest masterpieces in the literature of irony; there is no trace of declamation or of indignation, only a contemptuous smile, an insinuation of sarcasm, which in the latest letters yields occasionally to a stern but not impassioned invective, less effectual and less agreeable than the earlier manner. Pascal's style is unsurpassed in graceful energy and brilliant wit. It lacks tenderness and melody, but has the characteristically French virtues of being sharp, clear-cut, compact, and yet full in its utterance. He is the first French prose-writer thoroughly at home with

rhetorical tools. There has been gradual adaptation to new needs, but French prose has neither made nor needed to make a great advance since the *Lettres provinciales*. Considered, however, from the point of view of honest controversy, they cannot be praised so highly. At best they are special pleadings, and do not represent the general spirit of the Jesuit Order. Accurate scholarship has pointed out numerous passages which misquote or misapply the authors quoted, or distort an *obiter dictum* of some obscure Jesuit, sometimes even a proposition condemned by the Society, into its official teaching. His colleagues at Port-Royal, especially Nicole, furnished materials and collected references, and others were taken from a Calvinist collection published at Geneva in 1632. Pascal's part was that of the earnest and convinced barrister who pleads a case from materials put into his hands by others. He himself said, it is true, that he had read Escobar through twice, and had never used a passage from any author without having looked it up with its context. The real issue, however, is not between Jesuits and Jansenists, but between Puritanism and Probabilism. Pascal leads an ascetic reaction against the naturalism of the sixteenth century as we find it, on the one hand, in Rabelais and Montaigne, and, on the other, in Ronsard and the Classicists. This double movement of the Renaissance the Jesuits had sought to reconcile with Christianity by their ethics. Against this Pascal makes a Puritan and Augustinian protest, somewhat as Calvin had made it in a previous generation. The critic Brunetière thinks that Pascal made a mistake in scoffing at casuistics, while he attacked Probabilism, and that in seeking to ruin the moral credit of the Jesuits he directed a blow against religion itself, which might have had serious consequences had it not been in some degree parried by Pascal's second great work, *Pensées sur la religion et sur quelques autres sujets* (1670).

For Pascal had not yet finished *Les provinciales* when he conceived the idea of supplementing this destructive work of criticism by a constructive *Apologie de la religion chrétienne*, by which, of course, he meant Jansenism. At this he worked serenely, though with much physical suffering, and some self-inflicted refinements of asceticism, until his death, in 1662. He left it little more than a series of disconnected fragments, published with omissions, alterations, and some errors of mere carelessness in 1670. A more exact text, edited by Faugère, appeared in 1844. The general idea of the work is obvious if we conceive it to be a book of Jansenist apologetics. Pascal urges the wretchedness of man in himself and in his environments, the impotence of reason, the protest of despair, the invincible hope of better destiny, the solution of the difficulty in the doctrine of original sin, and the consequences of the acceptance of that doctrine, namely, expiation and redemption, dogmas foreshadowed in the Old Testament, confirmed by miracles, forming the essentials of Christianity, and credible by an effort of will.

Pascal's work in mathematics was also of considerable importance. He was the first one to attempt a philosophy of mathematics. When only sixteen years old, he wrote a work on the *Geometry of Conics* (1639), most of which is lost, though a fragment has been restored from his correspondence with Leibnitz. It contained

two important theorems, the one which is known as Pascal's theorem (see CONCURRENCE AND COLLINEARITY), and another, due to Desargues, that if a straight line cut a conic in P and Q, and the sides of an inscribed quadrilateral in A, B, C, D, we have the following relations: $PA \cdot PC \cdot QA \cdot QC = PB \cdot PD \cdot QB \cdot QD$

In 1665 he published his arithmetical triangle, a device for determining the coefficients of the expansion $(a + b)^n$. (See PASCAL'S TRIANGLE.) The theory of probabilities (see PROBABILITY) assumed form under the hands of Pascal and Fermat (q.v.). Pascal's last work dealt with a curve called by him the roulette, and known later as the cycloid (q.v.). The best study of his scientific works is Desloves, *Etude sur Pascal et les géomètres contemporains* (Paris, 1878).

There are modern editions of *Les provinciales* by Lesieur (1867), Sacy (1877), Soyres (1880), Derôme (1880-86), Brunetière (1896), and others. Of the *Pensées* may be mentioned here the modern editions by Molinier (1877-79), Guthlin (1896), Michaut (1896), and Brunschvicg (1897). With the *Pensées* are usually included the chief minor works, *Entretien avec M. De Sacy*, *Discours sur la condition des grands*, *L'esprit géométrique*, *Préface d'un traité du Vide*, and the Letters to Mlle. de Roannez. Both *Les provinciales* and the *Pensées* have been frequently translated. An elaborate and, it is hoped, definite edition is being prepared by Boutroux. A full bibliography may be found in Petit de Julleville, *Histoire de la langue et de la littérature française* (Paris, 1896 et seq.). There are biographies and studies of Pascal by Condorcet (1776), Bossuet (1779), Sainte-Beuve in his *Port-Royal* (5th ed., 1887), Maynard (1850), Cousin (5th ed., 1858), Bertrand (1891), Souriau (1898), and Boutroux (1900). Consult also: Tulloch, *Pascal* (London, 1878); Vinet, *Studies on Pascal* (Eng. trans., Edinburgh, 1859); Nasmyth, *Pascal* (New York, 1892); Clark, *Pascal and the Port-Royalists* (ib., 1902); Parsons, *Studies in Church History* (ib., 1896); Dreydorff, *Pascal, sein Leben und seine Kämpfe* (Leipzig, 1870).

PASCAL'S THEOREM. See CONCURRENCE AND COLLINEARITY.

PASCAL'S TRIANGLE. A device studied by Pascal for the determination of the coefficients of the expansion $(a + b)^n$, where n is any positive integer. The triangle is constructed in the following way:

1	1	1	1	1	1	•	•
1	3	3	4	5	6	•	•
1	6	6	10	15	21	•	•
1	4	10	20	35	56	•	•
1	5	15	35	70	126	•	•
1	6	21	56	126	252	•	•
•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•

where every number is equal to the sum of the numbers to the left and immediately above it, the figures in the n th diagonal extending up-

ward from left to right in the coefficients of the expansion $(a + b)^n$.

PASCHAL, pās'kal. The name of two popes. **PASCHAL I.**, Saint, Pope 817-824. The chief general importance of his pontificate lies in his relations with Louis le Débonnaire, who in 817 gave him concessions, the record of which forms the earliest extant document concerning the temporal possessions of the Roman See. In 823 he crowned Louis's son Lothair as 'Augustus' or co-regent with right of succession to the Empire. His letters are in Migne, *Patrologia Latina*, cii. Consult Simson, *Ludwig der Fromme* (Leipzig, 1874-76).—**PASCHAL II.**, Pope 1099-1118, Raniero di Bieda. As a monk of Clugny, he came to Rome on business for his Order, and on account of his usefulness was detained there. Gregory VII. made him a cardinal. On his election to the Papacy, he was opposed by an antipope claiming the title of Clement III., and three others followed before the schism was extinguished. His administration was marked by vehement conflicts with the civil power which concentrated in the question of investiture (q.v.). The Emperors Henry IV. and Henry V. and King Henry I. of England were his principal opponents; Philip I. of France was also excommunicated for his illegal union with the wife of Fulk of Anjou, but finally submitted and was reconciled.

The name of Paschal was also borne by two antipopes. One opposed Sergius I. from 684, but in 687 was deposed and shut up in a cloister, where he died in 692. The other, who took the title of Paschal III., was set up in 1164 by the faction of Frederick Barbarossa and died in 1168. He is chiefly remembered for having canonized Charlemagne at the instance of Frederick.

PASCHAL CHRONICLE (Lat. *Chronicum Paschale*). A chronicle compiled in part from the Paschal canons (rules for the Easter festival) of various districts and towns, and containing a summary of events in chronological order from Adam to A.D. 629, which was the twentieth year of Heraclius. It was at one time named also *Alexandrinum*, because then attributed to a writer of Alexandria. The name of the author, however, is not known. It at first extended, according to the opinion of some, only to A.D. 354, in the reign of Constantius, the continuation of it with additions to the first part being the work of a later compiler. Others, however, regard it all as the work of one man. The manuscript in which it now exists (in the Vatican) is Byzantine work of the eleventh century. It is sometimes called also *Fasti Siculi*, because it was found in an old library in Sicily, from which it was taken to Rome. Notwithstanding its numerous faults, both of matter and style, it contains much valuable chronological information. There is a convenient edition in two volumes (Bonn, 1832).

PASCHASIUS (pās-kā'sī-ūs) **RADBERT'US.** A distinguished theological writer of the Carolingian Age. He was born about the end of the eighth century, near or in Soissons. In 814 he joined the Monastery of Corbie, of which he was subsequently elected abbot. He was a member of the Synod of Paris, and took part in the Assembly of Chiersey in 849. Two years afterwards he resigned his position as abbot and devoted himself entirely to literary work. The

most important of his writings are *De Corpore et Sanguine Domini*, which caused a prolonged controversy on the doctrine of the Lord's Supper; *Expositio in Lamentationes Jeremiæ*; and *De Fide, Spe et charitate*. His works were published collectively at Paris in 1618 under the editorship of Girmond.

PASCO, pā'skō, CERRO DE. A city of Peru. See CERRO DE PASCO.

PAS-DE-CALAIS, pā-de-kā'la' (Fr. for Strait of Dover). A department in the north of France, embracing most of the old Province of Artois and part of Picardy, bounded on the north by the Department of Nord and the Strait of Dover, and on the west by the Strait of Dover and the English Channel (Map: France, J 1). Area, 2606 square miles. Population, in 1896, 906,249; in 1901, 955,391. The surface is level, with the exception of a ridge of hills running from the southeast to the northwest, ending in Gris-nez Cape (q.v.), and forming the watershed between the North Sea and the English Channel. The highest point (695 feet) is reached a little to the southwest of Desvres. The rivers, which are of no considerable length, are the Scarpe and Lys in the basin of the North Sea, and the Authie and Canche belonging to the basin of the English Channel. The rivers are navigable within the department, and are connected by canals. The coast-line is 80 miles in length, and the shores are in certain parts low and sandy; while for several miles on either side of Gris-nez cliffs similar to those of Dover front the sea. The climate is mild, but variable. The soil is fertile—all the usual cereal and leguminous crops being produced in abundance. Fishing is actively carried on along the coast, particularly in the neighborhood of Boulogne. Coal of an indifferent quality is obtained, excellent stone is quarried, and considerable quantities of turf are cut. The industrial establishments are numerous and important, including iron foundries, glass works, potteries, tanneries, bleach works, and mills and factories of various kinds. Boulogne and Calais are the principal ports. Capital, Arras.

PASDELOUP, pā'd'-lōō', JULES ÉTIENNE (1819-87). A French musical conductor, born in Paris. At ten years of age he entered the Paris Conservatoire, and in 1834 won the first prize for his piano-playing. He held a Government position after 1848, but three years later began the formation of an orchestra composed of conservatory students whom he trained to produce the symphonies of the best French and foreign composers. This was the beginning of the 'concerts populaires' which from their foundation in 1861 truly merited their name. The Legion of Honor and other marks of distinction were conferred on him, and his Sunday concerts were subsidized by the Government and were carried on for more than twenty years. Pasdeloup managed the Lyric Theatre (1868-70) and was an instructor at the Conservatoire in 1847-50, and again in 1855-68.

PASEWALK, pā'ze-vālk. A town of Pomerania, Northern Prussia, situated on the Ucker, 22 miles northwest of Stettin (Map; Prussia, E 2). It contains several churches, and a bronze statue of Frederick III. erected in 1895. The manufactures include tobacco, starch, flour, oil,

and plaster, and there are iron foundries and saw-mills. Population, in 1900, 10,209.

PASHA, pā-shā' (Turk. *pāsha*, from Pers. *pāshā*, *pādshāh*, king, from *pād*, protector, master (connected with Skt. *pati*, Lith. *patis*, lord, Lat. *potis*, able) + *shāh*, OPers. *xšāyaθiya*, king, connected with OPers. *xšātra*, Av. *xšaθra*, Skt. *kṣātra*, kingdom, from *kṣi*, to rule), or **BASHA**. A title used in the Ottoman Empire, originally bestowed upon members of the royal family only. It is now used also for high civil and military officers. Of the latter there are three grades, symbolized by the number of horse-tails formerly borne before them on occasions of state. Three tails signify general-in-chief, two tails general, and one brigadier. The actual symbols were abolished by Mahmud II. (1808-39), but the grades still exist. Admirals also have the title pasha. Civil officers of the rank of Vizier, provincial governors, and others also receive the title. The province governed by a pasha is known as a pashalik or vilayet. The authority of the pasha in his province was formerly absolute, but he is now held in check by local councils, and the Sultan may at any moment remove the pasha and even put him to death.

PASHIUBA PALM. See **IRIARTEA**.

PASHKOFF, pāsh'kōf, VASILII ALEXANDROVITCH (?-1902). A Russian religious reformer, founder of an evangelical sect, called after him the Pashkovski. An officer of the Imperial Guard and with high connections, he was brought to accept Lord Radstock's views of primitive Christianity (1874); founded an association for the encouragement of religious reading (1876), which was abolished about ten years later; and did a simple and unassuming evangelical work in which he met with great success, especially among his own class. Almost his entire fortune he spent in wise charity. During the reign of Alexander II., with whom Pashkoff was personally intimate, the work was uninterrupted; but in 1884 he was forced into exile, first from Saint Petersburg and then from Russia, the immediate occasion being his attempt to unite the Stundists and Baptists of the south with his own northern sect by means of a simple creed. He afterwards lived in Austria, England, and France.

PASHTU, pāsh'tōō, or **PUSHTU**, pōōsh'tōō. See **AFGHAN**.

PÁSIG, pā'ség. The outlet of the Laguna de Bay (q.v.), in Luzon, Philippine Islands. See **MANILA**.

PÁSIG. The capital of the Province of Rizal, in Central Luzon, Philippines (Map: Luzon, F 8). It is situated near the northwestern corner of the Laguna de Bay, seven miles east of Manila. The city was burned during the insurrection of 1897, and only a few well-built stone houses remain, the majority of the people living in bamboo or nipa huts. Population, 22,000.

PASINI, pā-sē'nè, ALBERTO (1820-99). An Italian landscape and figure painter, born at Busseto, near Parma. He came to Paris about 1840 and first studied lithography. Afterwards he became a pupil of Cicéri, Isabey, and Théodore Rousseau. He traveled much in the East, particularly Turkey and Persia, and took most of his subjects from those countries. His pictures are full of atmosphere and color, and as characteristically Oriental as those of Gérôme.

He was awarded the medal of honor at the Paris Exposition of 1878. An excellent example of his work is the "Entrance to a Mosque," in the Metropolitan Museum, New York City.

PASIPHAE, pā-sif'ā-ē (Lat., from Gk. Πασίφαια). In Greek mythology, the daughter of Helios and sister of Circe. She was the wife of Minos, but, in consequence of his neglect to perform a certain vow, Poseidon rendered her enamored of a bull, and she became the mother of the Minotaur. See MINOS; MINOTAUR.

PASITH'EA (Lat., from Gk. Πασιθέα). The wife of Hypnos, and one of the Graces.

PASKEVITCH, pās-kā'vich, IVAN FEODOROVITCH, Count of Erivan, Prince of Warsaw (1782-1856). A Russian field-marshal, born at Poltava. He belonged to a Polish family, was a page of the Emperor Paul, and, entering the army in 1800, served in the campaign of Austerlitz. He fought subsequently against the Turks. He was also actively engaged in the campaign of 1812, was present at the battle of Leipzig in 1813, and participated in the conflicts under the walls of Paris. In 1826 he gained a great victory over Russia the advantageous Peace of Turkmanchai and in the following year conquered Persian Armenia and captured Erivan. He obtained for Russia the advantageous Peace of Turkmanchai (1828). For these services he was created Count of Erivan. In 1828 and 1829 he made two campaigns against the Turks in Asia, taking Kars, Erzerum, and other important places. In 1831 Paskevitch, now a field-marshal, succeeded Diebitsch (q.v.) as commander of the Russian forces in Poland; he put an end to the revolt within three months after his appointment, taking Warsaw after a desperate resistance, September 8, 1831. He was made Governor-General of Poland, and such was the vigor and severity of his rule that the eventful year of 1848 passed without any attempt at revolution. When Russian intervention in Hungary had been resolved upon in 1849, Paskevitch marched into that country at the head of 200,000 men. The Hungarian main army, unable to make head against the double foe, laid down its arms at Világos, August 13th. In 1854 Paskevitch took the command of the Russian army on the Danube; but after an unsuccessful siege of Silistria he resigned his command and retired to Warsaw, where he died, February 13, 1856.

PASMA (Neo-Lat., from Gk. πάσμα, a sprinkling, from πάσσειν, *passein*, to sprinkle). A non-official healing powder, which is regarded as very serviceable in burns, ulcers, excoriations, etc. It is composed of 30 parts of silica, 12 of magnesia, 6 of alumina, 2 of protoxide of iron, and 50 of starch from the olgra root. The name is also applied to a paste or salve, or to a poultice (q.v.).

PASPALUM (Neo-Lat., from Gk. πάσπαλος, *paspalos*, sort of millet, from πᾶς, *pas*, all + πάλη, *palē*, meal). A genus of numerous species of grasses, natives of warm climates, with solitary or variously grouped spikes, one-flowered spikelets, and awnless paleæ. *Paspalum scrobiculatum*, the cereal koda, cultivated in India, grows in dry loose soils. (See MILLET.) *Paspalum exile* is called fundi (q.v.) or fundungi in West Africa, where it is similarly cultivated. *Paspalum racemosum* is a very important fodder-

grass in the coast districts of Peru during the dry months of February and March. It has been introduced into France; but it is apt to be injured by frosts, and seldom ripens its seeds in the neighborhood of Paris. Several perennial species are indigenous in the Southern United States, where they are highly appreciated as fodder and pasture grass. They have something of the same habit of Bermuda grass (q.v.). *Paspalum compressum* (or *Paspalum platycaule* of some botanists), commonly known as Louisiana grass, is considered an excellent lawn grass for the Southern States, being superior to Bermuda and less difficult to eradicate.

PASPATIS, pās-pā'tis, ALEXANDROS GEORGIOS (1814-91). A modern Greek historian, born on the island of Scio. He was enslaved in 1822, but was manumitted in Smyrna, came to the United States, and graduated at Amherst in 1831. He studied medicine at Paris and Pisa, and, after many years' practice in Constantinople, became professor in the University of Athens in 1878. He wrote: *Etudes sur les Tchinghianés ou Bohémiens de l'empire ottoman* (1870); *The English Version of the Revised New Testament* (1882); *The Great Palace of Constantinople* (trans. from the Greek by Metcalfe, 1893); and various works in Greek, of which the most important is on the capture of Constantinople by the Turks in 1453 (1890).

PASQUE-FLOWER (OF. *pasque*, Fr. *pâque*, Easter, from Lat. *pascha*, Gk. πάσχα, Easter, from Heb. *pesach*, a passing over, Pass-over, from *pāsach*, to pass over), *Anemone*. A genus of perennial silky herbs of the natural order Ranunculaceæ, by some botanists separated into the genus *Pulsatilla*, the chief distinguishing characteristic being the long feathery awns of the fruit. The common pasque-flower (*Anemone Pulsatilla*) is a native of Europe, with widely bell-shaped bluish-purple flowers, the petals of which are often used to color Easter eggs. *Anemone pratensis* has smaller and more perfectly bell-shaped blackish-purple flowers. These plants emit, when bruised, a pungent smell, due to an essential oil. *Anemone patens* is acrid and is said to blister the skin occasionally. *Anemone patens Nuttalliana*, the American pasque-flower, occurs abundantly from Illinois northward and westward.

PASQUIER, pā'skyā', ETIENNE (1529-1615). A French jurist and author. He early studied law under the ablest jurists of France and Italy,



PASQUE-FLOWER
(*Anemone Pulsatilla*).

and in 1549 was called to the bar. Having already secured a considerable practice, he in 1560 published the first part of his *Recherches de la France*—an antiquarian treatise on national politics, literature, and religion. In 1565 he made his celebrated speech defending the University of Paris from the encroachments of the Jesuits. He was in 1585 appointed by Henry III. advocate-general of the Court of Accounts.

PAS'QUINADE'. See PASQUINO.

PASQUINO, pás-kwé'nò. The name given in Rome to a mutilated antique statue discovered in the Piazza Navona, and erected in a little square which bears the same name, near the Palazzo Braschi. From the end of the fifteenth century it was customary to affix to it epigrams on current events, frequently in the forms of questions and answers passing between Pasquino and another statue known as Marforio. These epigrams were called Pasquinades. The name is said to have been taken from a witty tailor of the early part of the sixteenth century, who was renowned for his pungent criticisms of public men. The Roman populace, when the government checked their freedom of speech, found this an outlet for their opinions; but since Marforio was transferred to the Capitoline Museum, Pasquino has not had much to say.

PASSAGE (OF., Fr. *passage*, from ML. *passaticum*, right of passage, from *passare*, to pass, to step, from Lat. *passus*, pace). In music, a term applied to a rapidly executed ornamental figure which is not essential to the melodic outline. In concertos for solo-instruments it is customary to give the performer an opportunity to display his mastery of mere technical skill. In the finale, just before the end, the composer indicates such a place by placing the word *cadenza* there. Such a *cadenza* has really nothing to do with the composition and consists of an extensive series of rapid ornamentations, without any accompaniment. This is called 'passage-work.'

PASSAGLIA, pá-sá'lyá, CARLO (1812-87). An Italian theologian. He was born near Lucca, became a Jesuit in 1827, and in 1844 was appointed professor of canon law, and later of dogmatic theology, in the Collegium Romanum. During the temporary withdrawal of the Jesuits from Rome in 1848-51, Passaglia, with some of his brethren, went to England, where he taught theology to the young brethren of his Order, and on the reestablishment of the Jesuits in the Roman College he resumed possession of his chair. During the discussions which preceded the definition of the doctrine of the Immaculate Conception (q.v.) he published an elaborate treatise on the doctrine and history of that question (1853). Becoming interested in the movement for Italian unity in 1859, he left the Society of the Jesuits, and entered warmly into the discussions as to the temporal power of the Pope. Having fallen under suspicion in Rome, he withdrew from that city to Turin, where he established a journal entitled *Il Mediatore*, which appeared till 1866. In 1861 he was appointed by the King professor of moral philosophy, and subsequently of theology, in the University of Turin. In 1863 he became a member of the Turin Parliament. He is said to have sought reconciliation with the Church, but to have failed to make the required retraction. He died in Turin, March 12, 1887.

Passaglia's principal works are the treatise on the Immaculate Conception already referred to; a treatise (Latin) on the primacy of Saint Peter (1850); a scholastic treatise entitled *Commentarius Theologicus de Partitione Divinæ Voluntatis* (1851); an apology for the cause of Italian unity, entitled *Pro Causa Italica; ad Episcopos Catholicos* (1861), in which he attacked the temporal power of the Pope and recommended the Church to make peace with the nation; several essays on religious and political subjects, and a reply to Renan's *Vie de Jésus* (1864).

PASSAIC. A river of northern New Jersey (Map: New Jersey, D 2). It rises a few miles southwest of Morristown, flows in a devious course northeastward to Paterson, then bends abruptly to the south, and flows into Newark Bay between Newark and Jersey City. It is about 100 miles long, and navigable 13 miles for small steamers and sloops. At Paterson it has a perpendicular fall of 50 feet, which furnishes immense water power.

PASSAIC. A city in Passaic County, N. J., 11 miles northwest of New York City and 4 miles south by east of Paterson, at the head of navigation on the Passaic River, and on the Erie, the Lackawanna, and the New York, Susquehanna and Western railroads (Map: New Jersey, D 2). It has two public libraries, the Jane Watson Reid Memorial Library, completed in 1903, being the finest edifice in the city. Among other prominent features are the municipal building and the city hall and park. The city is extensively engaged in manufacturing—the industrial establishments include rubber and woolen mills, pantasote leather works, print works, chemical works, silk mills, and handkerchief and enamel factories. There are also large vineyards and a winery. Under a revised charter of 1874, the government is vested in a mayor elected every two years, a council, and in administrative officials, the majority of whom are nominated by the executive with the consent of the council. The school board is independently elected by popular vote. Population, in 1890, 13,028; in 1900, 27,777. Settled about 1679, and organized as a township in 1693, Passaic was incorporated as a village in 1869, and chartered as a city in 1873. Until about 1852 it was known as Aquackonk Landing. In November, 1776, Washington, retreating through New Jersey, crossed the Passaic at this point. Consult Pape and Scott, *History of Passaic* (Passaic, 1899).

PAS'SAMAQUOD'DY (perhaps, pollock-catcher). A small Algonquian tribe, closely related to the Amalecite and less intimately to the Abnaki proper, and formerly residing about Passamaquoddy Bay and Saint Croix River, in Maine and New Brunswick. In customs they resembled the Abnaki, and, like them, acted with the French in the colonial wars. They are now gathered, to the number of about 200, at Pleasant Point and on Lewis Island, on the bay of their name.

PASSAMAQUODDY BAY. An inlet of the Bay of Fundy, forming part of the boundary between Maine and New Brunswick (Map: Maine, K 6). It is 12 miles long by 6 wide, and shut in by a cluster of islands so as to form an excellent harbor. It receives the Saint Croix and other rivers. The city of Eastport, Maine, lies on one

of the islands, and at the head of the bay is the town of Saint Andrews, New Brunswick. The tide here rises 25 feet.

PASSANT, pá'sán' (Fr., passing). An heraldic term used to express the attitude of an animal in a walking position, with his head straight before him. See **HERALDRY**.

PASSAROWITZ, pás-sá'ró-víts (Serv. *Pozarevac*, pó-zhí'rě-váts). A town of Servia, situated about 35 miles southeast of Belgrade (Map: Balkan Peninsula, C 2). It has a considerable trade in agricultural products. It is noteworthy for the treaty concluded here on July 21, 1718, between Turkey, on one side, and Austria and Venice on the other. Turkey ceded the Banat, part of Servia (including Belgrade), and parts of Bosnia and Wallachia to Austria. She retained the Morea, which had been reconquered from the Venetians in 1715. Population, in 1900, 12,957.

PASSAU, Ger. pron. pás'sou. An ancient town of Bavaria, Germany, situated at the confluence of the Danube, the Inn, and the Ilz, on the Austrian frontier and about 90 miles northeast of Munich (Map: Germany, E 4). The town proper is situated on the rocky tongue between the Danube and the Inn, and is remarkably picturesque with its old-fashioned houses rising in terraces above each other. The two suburbs of Innstadt and Ilzstadt are situated on the Inn and the Ilz respectively. Opposite Ilzstadt stands the old fortress of Oberhaus, dating from the beginning of the thirteenth century. The centre of the old town is the Domplatz, with its beautiful cathedral founded in the fifth century and rebuilt in the rococo style in the seventeenth century. Adjoining the cathedral is the post-office, formerly the canons' residence, where the Treaty of Passau (q.v.) was concluded in 1552. Worthy of mention are also the old and the new rococo episcopal residences and the recently restored Rathaus. In the Innstadt is situated the pilgrimage church of Mariahilf. The educational institutions include a gymnasium founded in 1611, a *Realschule*, a school of agriculture, a training school for teachers, and a number of institutes for girls. The city manufactures hard-wood flooring, leather, paper, mirrors, porcelain, matches, wire, etc., and trades in wood, salt, and grain. Population, in 1890, 16,333; in 1900, 17,988, chiefly Roman Catholics.

Passau proper occupies the site of the Castra Batava of the Romans, and Innstadt is identified with the Celtic settlement of Boiudurum, founded about one hundred years B.C. The bishopric of Passau, of which the town is the seat, was founded in 738, secularized in 1803, and re-established in 1817. Consult Moun, *Passau* (Passau, 1878).

PASSAU, TREATY OF. An agreement made in the year 1552 at Passau, by the Elector Maurice of Saxony and Ferdinand, King of the Romans, representing his brother, the Emperor Charles V. It was signed by Maurice on August 2d and agreed to by the Emperor a few weeks later. It established peace between the Catholics and Lutherans pending the settlement of ecclesiastical matters by the next Diet, thus guaranteeing the free exercise of their religion to the adherents of the Confession of Augsburg in the States which had adopted this form of worship. A definitive settlement was effected at the Diet of

Augsburg in 1555. Consult Barge, *Die Verhandlungen zu Linz und Passau und der Vertrag von Passau* (Strassburg, 1893). See **REFORMATION**, **THE PROTESTANT**.

PASSAVANT, pá'sá'vân', JOHANN DAVID 1787-1861). A German art critic and painter, born at Frankfort-on-the-Main. He studied painting with David and Gros at Paris, and afterwards with the Nazaries in Rome. His paintings are unimportant, but he eventually became inspector of the Städel Institute at Frankfort, and did much to promote art, by virtue of his position, and also by his literary works. The principal of these are: *Rafael von Urbino und sein Vater Giovanni Santi* (1839-58); *Die christliche Kunst in Spanien* (1853); and *Le peintre-graveur* (6 vols., 1860-64), an appendix to Bartsch's standard work on the same subject. Consult his autobiography (Frankfort, 1863), and the biography by Cornill (ib., 1865).

PAS'SAVANT, WILLIAM ALFRED (1821-94). An American philanthropist, born at Zelenople, Butler County, Pa. He graduated at Jefferson College in 1840, and at the Lutheran Theological Seminary in 1842; was ordained to the Lutheran ministry in the latter year; was pastor of churches at Baltimore, Md., and Pittsburg, Pa., successively, and subsequently became widely known as the founder of hospitals and orphan asylums at various places in the United States. In 1870 he, with A. Louis Thiel, founded Thiel College, at Greenville, Pa., and in 1819 he founded the Lutheran Theological Seminary in Chicago. He introduced the order of deaconesses into the United States. He was founder and editor of *The Workman*, published at Pittsburg; from 1845 to 1861 edited *The Missionary*, and subsequently was a co-editor of *The Lutheran*, into which *The Missionary* was merged in 1861.

PASS CHRISTIAN. A town in Harrison County, Miss., 58 miles east by north of New Orleans, on Mississippi Sound (Gulf of Mexico), and on the Louisville and Nashville Railroad (Map: Mississippi, G 10). It is one of the most popular watering places on the Gulf, having a healthful climate and excellent facilities for boating, bathing, and fishing. Among its attractions is a wide shell-paved avenue, lined with fine trees. It extends for seven miles along the shore, where there are many pleasure piers. Pass Christian is the centre of an important oyster industry; it also has a large packing establishment. Population, in 1890, 1705; in 1900, 2028.

PASSÉ, pá'sá'. A tribe of the great Arakan stock (q.v.), formerly the most numerous tribe on the Japura River, Northwestern Brazil, but now nearly extinct. Both men and women are noted for their light complexion, fine figures, and handsome features, approaching the Caucasian type. They are clean in habit, intelligent, gentle, and industrious, and have been called the noblest tribe of the Amazon region. They tattoo their faces; the men cut the hair close, while the women wear it flowing loosely. They bury their dead in circular graves and are greatly under the influence of their priests.

PASSENGER PIGEON. The American wild or migratory pigeon. See **PIGEON**. Also Plate of **PIGEONS**.

PASSENGERS. See **CARRIAGE, COMMON**.

PASSEPIED, pás'pyá' (from Fr. *passer*, to pass, from Lat. *passus*, step, from *pandere*, to stretch + *piéd*, foot, from Lat. *pes*, foot). An old French dance in three-eighth or six-eighth time. It resembled the minuet, but was a little more lively. During the time of Louis XIV. it was introduced into the ballet, and was also often inserted in suites. It was divided into a number of parts of eight or sixteen bars each.

PASSERAT, pás'rál', JEAN (1534-1602). A French poet and scholar, born at Troyes. He taught in various Provençal colleges until 1569, when he gained the patronage of Henri de Mesmes, and settled in Paris. In 1572 he succeeded Ramus as professor of eloquence and Latin poetry at the Collège de France, where his learning and wit brought him many pupils. But Passerat was a patriot, and during the Wars of the League he had to suspend his courses. At this time he was one of the authors of the *Satire Ménippée* (1594), which was his chief literary achievement. The grace, point, and erudition of his verse make him one of the most interesting of the post-Pléiades. His works include: *Vers de chasse et d'amour* (1597); *Kalendæ Januariæ et Varia quædam Poemata* (1597), and commentaries on Tibullus, Catullus, and other Roman poets. His collected works were edited by Blanchemain in 1881 (Paris).

PASSERES, pás'sêr-êz (Lat., sparrows), or **PASSERIFORMES**. The largest order of birds, nearly corresponding to the old order *Insessores* or 'perchers.' The order takes its name from a typical genus (*Passer*) represented by the common house-sparrow (q.v.). The Passeres are characterized by the possession of four toes, three in front and one behind, all inserted on the same level. The muscle that bends the hind toe is separate from the muscle which bends the other toes collectively; there is no ambiens, and no accessory femoro-caudal muscle; the sternum has a single notch on each side behind; there are more than six secondaries and the rectrices are almost always twelve; the palate is ægithognathous; there is a single carotid, the left; the oil-gland is nude; there are two cæca; the upper cervical feather-tract is directly continuous with the dorsal tract, and the femoral tracts are weak; the young are hatched naked and helpless. More than half of all known birds are Passeres. They are found everywhere, and their habits, colors, food, songs, eggs, etc., show the greatest diversity. According to the structure of the syrinx, they are grouped as *Clamatores* (*Passeres anisomyodæ*), or as *Oscines* (*Passeres diacromyodæ*). Consult Evans, *Birds* (London, 1900).

PASSI, pás'sê. A town of Panay, Philippines, in the Province of Iloilo, situated 19 miles north of Iloilo (Map: Philippine Islands, G 8). Population, 13,802.

PASSING NOTES. A term in music. In passing from one chord to another, an intervening note, not belonging to either chord, may be used to assist the progression. Such a note is called a passing note or note of transition, as the notes marked * in the upper part of the subjoined example:



They differ from suspensions in not being prepared and in always entering upon the unaccented beat.

PASSINI, pá-sē'nâ, LUDWIG (1832—). An Austrian painter, born in Vienna. He was a son of and was first instructed by the engraver Johann Passini (1798-1874), then studied at the Vienna Academy under Führich and Kupelwieser, and finally devoted himself to painting in water-colors under Karl Werner, with whom he traveled in Italy. In 1855 he made his home in Rome, where he first painted architectural subjects and interiors with figures, but gradually cultivated more exclusively genre scenes from Italian popular life. He settled in Venice in 1873, and thenceforth devoted his brush chiefly to those delineations of Venetian life with which his name is associated as one of the most distinguished aquarellists of his day. Prominent examples of his work are: "Canons in Saint Peter's, Rome" (1870, National Gallery, Berlin); "Reading Aloud from Tasso to Fishermen at Chioggia" (1872); "Pumpkin Venders in Venice" (1876, Vienna Museum); "Curious People on a Bridge" (1885, Breslau Museum); "Venetian Women at a Fountain" (1891). He also painted excellent portraits.

PASSION, or **PASSION MUSIC**. From the earliest times it was customary in the Church to chant the story of the passion of Christ during Holy Week. As a musical art-form the passion first appears in Germany about 1570. At the same time Italy originated the form of the oratorio, and for the next half century no marked distinction appears between the two forms. Then the passion began to assume characteristic traits which distinguish it from the oratorio. These traits are the frequent introduction of chorales, the retention of the character of the 'narrator' (which entirely disappeared from the oratorio), and the use of the chorus for contemplation and reflection upon the events related. See **ORATORIO**; **SACRED MUSIC**.

PASSIONATE PILGRIM, THE. A small collection of sonnets and lyrics by Shakespeare, Marlowe, Barnfield, and Raleigh, published by W. Jaggard in 1599. Shakespeare's name appeared on the title-page, but was evidently unauthorized, as it was dropped in later editions, and several of the poems were erroneously attributed to him.

PASSION CROSS (Lat. *passio*, suffering, from *Pati*, to suffer). A cross supposed to reproduce the form and proportions of that on which Christ suffered, with a long upright and one or two short traverses near the top. It often bears the figure of Christ, and is heavier in proportions than the resurrection cross, which also belongs to the type of the Latin cross. A passion cross, when elevated on three steps or degrees (said by heralds to represent the virtues of faith, hope, and charity), is called a cross Calvary.

PASSION-FLOWER (*Passiflora*). A genus of fifty known species of mostly climbing plants of the natural order *Passifloraceæ*. The species, which are almost exclusively natives of the warm parts of America, have alternate, simple, variously lobed leaves, from the axils of which tendrils are produced. The flowers are usually hermaphrodite, with a generally fine segmented

colored calyx, and similarly segmented or absent corolla. Several rows of filamentous processes spring from within the cup, which is formed by the consolidated calyx and corolla. The genus received its name from fanciful persons among the first Spanish settlers in America who imagined a representation of the Lord's passion, the filamentous processes being taken to represent the crown of thorns, the three styles the nails of the cross, and the five anthers the marks of the wounds. On account of the large and beautiful flowers, many of the species are cultivated in greenhouses; some are also grown in tropical countries for their fruit, particularly *Passiflora edulis*, or granadilla (q.v.). *Passiflora quadrangularis* is a larger edible species known as the large granadilla. One of the best known species is *Passiflora carulia*, a native of Peru and Brazil, extensively grown for its beautiful white, pale blue, or rose-colored flowers. Like most species, it succeeds in the open only in tropical and subtropical climates. Among the popular cultivated species are *Passiflora gracilis* and *Passiflora racemosa*. About ten species are natives of the United States, among which are *Passiflora incarnata*, the May-pop of the Southern States, a showy flowered edible fruited species. The passion-flower is propagated by seeds and by cuttings of the young wood.

PASSIONISTS. The name generally applied to the order formally known as "Barefooted Clerks of the Holy Cross and Passion of Our Lord," founded by Saint Paul of the Cross (q.v.). Their first permanent settlement was made on Monte Argentaro, near Genoa, in 1737; they received the first Papal approbation as a society of mission preachers from Benedict XIV. in 1741, and their rule, modified in some points, was again confirmed by Clement XIV. in 1769, who four years later gave them the Church of Saints John and Paul on the Caelian Hill in Rome, now the headquarters of the Order. The members take, besides the usual monastic vows, a fourth to remember and meditate continually upon the sufferings of Christ. Their work is principally the conversion of sinners, especially by preaching missions. Their habit is black, with a white heart-shaped piece of stuff sewed on the left breast, in which are represented the instruments of the passion—cross, nails, crown of thorns, etc. The general (*praepositus*) is elected by the general chapter for six years; each house has a rector, chosen for three years. The Order has now eight provinces—four in Italy, one in England, one in America, one in France, and one in Spain. In 1901 they numbered eighty-seven professed fathers in the United States (to which they came in 1852), with ten monasteries.

PASSION PLAY. A performance which takes place every tenth year in the village of Oberammergau, in the Bavarian highlands. In 1633, as an act of gratitude for the cessation of a plague which had desolated the surrounding country, the villagers vowed to represent the passion of Christ every ten years, and have ever since observed their vow. The inhabitants of this secluded spot, long noted for their skill in carving wood and ivory, have a rare union of artistic cultivation with perfect simplicity. The personator of Christ considers his part an act of religious devotion; he and the other principal performers are said to be selected for their holy

life, and consecrated to their work with prayer. The players, about six hundred in number, are all villagers, who, though they have no artistic instruction except from the parish priest, act their parts with much dramatic power and a delicate appreciation of character. The Gospel narrative is closely followed; the acts alternate with tableaux from the Old Testament and choral odes. Many thousands of the peasantry are attracted by the spectacle from all parts of the Tyrol and Bavaria, among whom the same earnest and devout demeanor prevails as among the performers. Consult: Stead, *The Passion Play* (London, 1890); Grein, *Das Oberammergauer Passionspiel* (Leipzig, 1880). See MYSTERY.

PASSEVER (translation of Heb. *pesach*, a passing over, from *pāsach*, to pass over). The first of the three chief festivals prescribed by the Pentateuchal codes (Ex. xii.; Lev. xxiii. 4-8; Num. ix. 1-14; xxviii. 16-25; Deut. xvi. 1-8). Its celebration begins on the evening of the fourteenth day of Nisan (corresponding to the older Abib) and lasts for eight days. The Jewish Church associates the festival with the Exodus from Egypt, and this historical character was so impressed upon it as to obscure its original significance. By a careful study, however, of the passages referring to the Passover in the various Pentateuchal codes, modern scholars claim that they have traced the gradual development of the festival and have shown that it was a mixture of various elements, originally having nothing to do one with the other. In the first place, distinction must be made between two festivals combined in the Passover, viz. (1) a feast of unleavened bread known as *massôth*, and (2) a festival in which the chief rite was the sacrifice of a sheep within the family circle and the sprinkling of the lintels and doorposts of the houses with the blood. This sacrifice was called *pesach*. Of these two festivals the former is the old Canaanitish harvest festival, commemorative of the first ripening of the corn, which the Hebrews naturally adopted when they took possession of the Canaanitish soil. Thanksgiving offerings were made on this occasion to Yahweh as the 'Baal,' to whom the land belonged. Since the presentation of such gifts, consisting of the first-fruit sheaf, involved a visit to a Yahweh sanctuary, the occasion became a *khâg*—the ancient Semitic designation for a mirthful festival with dances and processions at a sanctuary and a sacrificial meal as the symbol of communion between the god and his worshipers. It was customary at this festival to eat only unleavened bread, which merely represents the usual food during the harvest season, when the people, busy with field labors, did not take time to wait in baking their bread until the completion of the slow process involved in the leavening of the dough; hence the festival became known as the *khâg ham-massôth*, i.e. the festival of unleavened bread. On the other hand, the sacrifice of the *pesach* stands in no connection with agriculture and is originally a rite of propitiation or lustration observed during a pestilence or on some other special occasion. It consisted in sprinkling with blood the entrance to the house (or tent), which was particularly sacred. It is still customary among the Bedouins to sprinkle their camels and flocks with blood as a protection against the ravages of a pestilence. This blood

PASSION-FLOWERS



1 PURPLE FRUITED PASSION-FLOWER: PASSIFLORA EDULIS	4 YELLOW FRUITED VIRGINIA PASSION-FLOWER: PASSIFLORA INCARNATA
2 SLENDER " " " " GRACILIS	5 SQUARE-STALKED " " " " QUADRANGULARIS
3 COMMON BLUE " " " " CARULEA	6 PRINCESS CHARLOTTE'S " " " " RACEMOSA

rite, from being indulged in on extraordinary occasions, became a regular custom observed in the spring, the bearing time of the flocks, when it became especially important to secure the protection of the deity. Already in the earliest of the Pentateuchal codes these two festivals, one belonging to the agricultural stage, the other a survival of the nomadic stage, are brought into connection with the Exodus from Egypt, and combined with each other. The combination once made, there resulted a series of ceremonial observances which gradually assumed the elaborate character of the Jewish Passover festival. The sprinkling of the blood became the symbol of the protection granted the Hebrews by Yahweh at the time that pestilence struck the Egyptian households. The offerings of the first-fruits of the field to Yahweh led to the view that firstlings of the flock and the first-born of the household likewise belonged to the deity. The sacrificial lamb and the unleavened bread were also brought into connection with the Exodus, the former pictured as a ceremony indulged in on the eve of the departure of the people, the latter a symbol of the 'haste' with which the deliverance was brought about, so that the people did not have time to bake bread from leavened dough. In later Judaism the historical association was still further emphasized, and there grew up an elaborate service for the eve of the Passover, known as the *séder*, the chief features of which were the recalling of the Exodus by reciting the narrative in the household, the preparation of dishes symbolizing the affliction and hardships of the people in Egypt, together with thanksgivings and songs of praise, accompanied by benedictions over wine for the miraculous deliverance. For eight days unleavened cakes are eaten and no food prepared of any leaven material is to be eaten. In fact, all traces of leaven are to be removed out of the house, and in orthodox Jewish households separate sets of dishes are used during the eight days of the Passover. In the Christian Church the paschal lamb became pre-eminently the type of the sacrifice of Christ.

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PASSOW, pás'só, FRANZ (1786-1833). A German philologist. He was born at Ludwigs-lust, studied at Leipzig, and was called in 1807 to the chair of Greek in the Weimar Gymnasium, and in 1815 to that of ancient literature in the University of Breslau. His principal work is his *Handwörterbuch der griechischen Sprache* (1819-24). He also published *Grundzüge der griechischen und römischen Literatur- und Kunstgeschichte* (2d ed., 1829), and other volumes.

PASSPORT (Fr. *passoport*, from *passer*, to pass + *port*, Lat. *portus*, port, harbor). A written instrument issued by the authority of a government for the identification and protection of its citizens when traveling abroad. It is first a certificate of the citizenship of the bearer,

and, second, a formal permit authorizing him to leave the State of which he is a subject. The origin of the practice of granting passports grew out of the right of nations, which was formerly more frequently exercised than now, to withhold from foreigners the right of transit through their territory. The formal permission granted to a foreigner by a government to pass through its territory was a passport. To avoid the inconvenience of this requirement, the practice was adopted by which a subject of one government leaving his country for travel in another obtained from his government a certificate of citizenship which was accepted by the other government as a passport. This is presented to the foreign government as an identification of the bearer, who, instead of receiving a passport from the foreign government, is given permission to pass through by the act of an officer in putting a *visé* upon the certificate itself. At present Russia, Turkey, Portugal, and Greece are the only European countries where travelers cannot travel freely without passports, though some of the German States require certification for the purpose of police protection, where parties desire to reside for a considerable period in one place. In the United States passports are issued only by the Department of State and only to citizens upon application supported by proof of citizenship. No distinction is made between native-born and naturalized citizens in the granting of passports. The fee is \$1, and a passport for the head of a family includes the wife and minor children. In foreign countries they may be obtained by citizens of the United States only by the chief diplomatic representative or by the consul-general, or, in the absence of both of these officers, by a consul. A fee of \$5 is allowed to be charged for each passport granted to a citizen of the United States abroad by a diplomatic representative. An application to a diplomatic officer for a passport by a native citizen must be accompanied by a written declaration under oath stating the name, age, and place of birth of the applicant, supported if possible by the affidavit of a creditable person to whom the applicant is personally known. If the applicant claims to be a naturalized citizen, he must produce a copy of the decree of the court by which he was naturalized. In both cases an oath of allegiance is required for transmission to the Department of State. Every such passport to be valid must be renewed either at the Department of State or at a legation of the United States abroad at the expiration of one year from its date. Passports are not granted to aliens who have declared their intention to become citizens of the United States, although they may obtain authenticated certificates of their declaration of intention, which entitle them to a qualified protection while traveling abroad. Nor are they granted to naturalized citizens who may be inferred from long residence abroad and other circumstances to have abandoned their nationality. The chief value of a passport is that it provides the holder with authentic proof of his national character and frees him from inconveniences which he might otherwise experience while traveling in foreign lands. If lawfully issued it is *prima facie* evidence of citizenship, and as such must be respected not only by the administrative officers, but by the courts of the government where the holder may be sojourning; but it furnishes no

exemption from the jurisdiction of the country in which he may be. It is nothing more than a request to foreign governments to admit the bearer to the enjoyment of the rights and privileges to which he as citizen of the country issuing the passport may be entitled by treaty or convention.

In some European States no subject is allowed to depart therefrom without first securing a passport from his government authorizing him to leave the country. Where this rule prevails the passport is required to be countersigned by the minister or consul of the country which the bearer visits. In time of war passports or safe conducts are frequently granted by military commanders to allow persons to pass through the lines or to insure the safety of officers while in the performance of some duty which takes them beyond the lines. They may also be granted for the passage of goods as well as for individuals. Diplomatic representatives upon departing from a State in which they have been residing usually demand and receive passports to enable them to withdraw in safety.

PASSY, pâ'sé'. A western suburb of Paris, included in the city since 1860.

PASTA, pâ'stâ (née NEGRI), GIUDITTA (JUDITH) (1798-1865). An Italian singer, and one of the most distinguished opera sopranos of modern times. She was born near Milan, and received her musical education partly at Como, under the chapelmaster of the cathedral there, and partly in the conservatory at Milan. After 1811 she appeared at various theatres of the second rank in Northern Italy. Her first great triumph was achieved at Verona in 1821. The year following she was engaged at the Paris Italian Opera, where her singing excited great admiration. From 1825 to 1830 was the period of her greatest triumphs, which were won principally in London and Paris. Vienna, where she accepted an engagement in 1832, witnessed the last. Some time afterwards she withdrew from the stage and purchased a villa on the banks of Lake Como, where, and at Milan, she resided. She had a magnificent voice, which easily passed from clear, shrill soprano notes to the gravest contralto tones, besides which she had great dramatic energy, and a stateliness of manner that suited lofty and imposing characters. Her principal rôles were in *Medea*, *Desdemona*, *Semiramide*, *La Sonnambula*, and *Norma* (these operas were written for her by Bellini), and *Giulia* in *Romeo e Giulia*. Donizetti and Pacini also wrote operas for her.

PASTEL (Fr. *pastel*, from Lat. *pastillus*, little roll, lozenge, diminutive of *panis*, loaf, bread). Colored crayon. (See CRAYON.) Also, by abbreviation, the process of drawing in color by means of such crayon. The substance is generally sold in small cylinders. The paper used is not very smooth. The drawing is carried on exactly as with black and white drawing, with this distinction, that a color effect may be, and generally is, sought, depth of shade and gradations of light and dark being replaced by gradations in colors. One of the special difficulties with the pastel process is the perishable nature of the result. A sharp jar or blow will dislodge some of the particles of color, and a touch of a soft brush or cloth will make a great scar in the colored surface. It is possible to remedy this

in part by the use of a fixative; but a pastel drawing remains the most easily injured of all works of art. To guard against this, it is almost universally the custom to cover such a drawing with glass; and, moreover, the drawing must not touch the glass. Properly protected, a pastel may remain beautiful for a century and a half, as is seen in the very admirable drawings in the Louvre by French masters of the eighteenth century. The special beauty of a pastel drawing is in its soft, velvety surface, giving a bloom and depth to the color harmonies hardly attainable elsewhere; but this beauty is at once marred when it is seen through the glass covering. It will be best, then, to risk the chance of injury to pastels of no special value, keeping them in closed portfolios; and, for those of great importance, to have the glass arranged to open readily.

On the whole, pastel seems more fitted for the sketching of an artist who cares for color than for any other purpose. It gives a great facility to the artist who wishes to work rapidly, and who does not wish to wait while liquid washes or semi-liquid touches are drying.

There are crayon drawings in two or three colors which date from the sixteenth century, but pastel in the usual sense hardly appears before the second quarter of the eighteenth century. Rosalba Carriera of Venice (1675-1757), the most original of all woman artists, seems to have brought pastel drawing to its full charm during her stay in France, about 1720. The chief of all pastel-draughtsmen is generally admitted to be Maurice Quentin de la Tour (in the eighteenth century), whose works are chiefly in the Louvre and in the Museum of Saint Quentin (Aisne). Jean Baptiste Greuze, in the eighteenth century, and Eugène Delacroix, in the nineteenth did admirable work in this way, and the Swede Lundberg, who died about 1780, is also famous, though his work is not much known out of Sweden.

The art underwent a sort of revival during the last quarter of the nineteenth century. In Brussels, Emile Wauters, a portraitist of real merit, and in France H. G. E. Degas, the impressionist, have used pastel with surprising originality. Other noted pastel artists of the present day are Pierre Carrier-Belleuse, René Gilbert, Emile René Ménard. In the United States this medium has been used with success by William M. Chase, J. Appleton Brown, and especially by J. Wells Champney. Consult: Robert, *Le Pastel* (Paris, 1890); Jännicke, *Kurze Anleitung zur Tempera- und Pastelltechnik* (Stuttgart, 1893); Retscher, *Anleitung zur Pastellmalerei* (4th ed., Dresden, 1900).

PASTEUR, pâ'stêr', LOUIS (1822-95). A celebrated French scientist, born at Dôle. He early devoted himself to the study of chemistry and took his doctor's degree in 1847. In 1848 he became professor of physical science at Dijon, and in the following year accepted the professorship of chemistry at Strassburg. In 1854 he founded the faculty of sciences at Lille, of which he became dean. Here he remained until 1857, when he went to Paris as scientific director of the Ecole Normale Supérieure and was elected a member of the Institute. In 1863 he became professor of geology, physics, and chemistry at the School of Fine Arts, and from 1867 to 1875 was

professor of chemistry at the Sorbonne. Later he carried on his researches at the institute bearing his name. The results of Pasteur's investigations have formed contributions of the highest importance to nearly every branch of physical and natural science. By his classical researches on optically active substances and their separation into isomeric modifications of identical chemical but different physical properties, Pasteur became the founder of modern stereo-chemistry (q.v.). In the province of fermentation and the germ theory his work was even more valuable. He showed that lactic, butyric, acetic, and other fermentations are caused by micro-organisms, and established on a firm scientific basis the principle that spontaneous generation cannot take place, at least under ordinary conditions. The different processes of putrefaction and fermentation set up by the air are invariably produced by germs the presence of which in the atmosphere Pasteur demonstrated by passing a current of air through gun-cotton, and dissolving the latter in a mixture of alcohol and ether; an insoluble residue was thus obtained, in which the germs of organisms could be readily seen with the aid of a microscope and could be shown to be capable of developing into mature organisms.

Pasteur's studies on the diseased conditions of wine and beer have rendered possible and easy the prevention of these conditions. No less important were his investigations on the silkworm's disease *pébrine* and its cure. His discovery of bacteria as the cause of anthrax (splenic fever) in cattle was epoch-making in the science of diseases. Similar results were obtained with regard to fowl-cholera; and his experiments show success in preventing the various diseases caused by septic bacteria, by inoculating animals with a milder form of the disease by means of a weaker brood of bacteria, artificially cultured. Pasteur found that by keeping a cultured crop of specific micro-organisms at a certain temperature with a full supply of oxygen, he could reduce organisms to an incapacity for producing spores, therefore to sterility. But before this point is reached the cultured organism loses its virulence, although still germinating; vaccination with it then produces a mild disease, which effectually protects from the fatal scourge of splenic fever, of fowl's cholera, and other diseases.

In the same manner he dealt with splenic apoplexy, which he showed to be caused by the presence of specific bacteria in the blood. By artificially cultivating these bacteria he succeeded in developing a weaker crop of germs; and by inoculating healthy animals with the virus he produced a milder form of the disease, which is believed to afford protection from the more violent and dangerous malady. Pasteur's well-known treatment of hydrophobia (q.v.) is based on a similar principle.

His published works include: *Nouvel exemple de fermentation déterminée par des animalcules infusoires pouvant vivre sans oxygène libre* (1863); *Etudes sur le vin, ses maladies, causes, qui les provoquent, etc.* (1866); *Etudes sur le vinaigre, ses maladies, moyens de les prévenir, etc.* (1868); *Etudes sur la maladie des vers à soie* (1870); *Nouvelles études sur la maladie des vers à soie, etc.* (1871); *Etudes sur la bière,*

ses maladies, etc. (1876); *Les microbes* (jointly with Tyndall (1878)); *Sur les maladies virulentes et en particulier sur la maladie appelée vulgairement choléra des poules* (Paris, 1880); and several important articles in the *Annales de Chimie*. Consult: Bournand, *Un bienfaiteur de l'humanité: Pasteur, sa vie, son œuvre* (Paris, 1896), and a *Life* in English by Mr. and Mrs. Percy Frankland (New York, 1898).

PASTEURIZER. An apparatus for preserving wines, milk, and other solutions from deterioration by means of heat. See MILK.

PASTICCIO, pâ-stêt'chô (It., medley). In music, a term applied to works that are patched up from various earlier works of a composer. In the eighteenth century operatic composers did not always trouble themselves to compose new music to a new text. They took arias or choruses from their other earlier operas and adapted them to a new text. Gluck's *Piramo e Tisbe* is such a pasticcio in which the composer used the best arias of operas previously written by him. Handel made liberal use of this inartistic device, even in some of his best works. Thus the famous chorus from the *Messiah*, "For unto us a child is born," is not original, but the music is taken note for note from a madrigal composed by Handel himself in 1712 to a text representing a jealous lover.

PASTO, päs'tô. The capital of the province of the same name in the Department of Cauca, Colombia, near the border of Ecuador, and 120 miles northeast of Quito (Map: Colombia, B 3). It is situated at an altitude of 8650 feet in the midst of a large plain at the foot of the volcano of the same name. The town is well constructed, with broad, well-paved streets, and many fine private residences. It is an episcopal seat with a seminary and collegiate institute. It has manufactures of woolen blankets, hats, and certain kinds of decorated pottery. It maintains a regular trade with Ecuador. Its population is about 10,000. Pasto was founded by order of Pizarro in 1539. It was twice burned during the wars of independence and ruined by an earthquake in 1827, in which 10,000 people perished.

PASTON LETTERS. The correspondence of the Paston family in Norfolk, including over 1100 letters, together with a few State papers which came into the family's possession. The letters cover the years 1422-1509 and are of the utmost value as affording us our only glimpse into the public and private life of the time in all its phases. They were first published by Sir John Fenn in five volumes (London, 1787-1823), the last volume appearing by another hand after the principal editor's death. The disappearance of the manuscripts after their publication naturally led to doubts as to their genuineness. Gairdner defended their authenticity on the grounds of internal evidence, and the soundness of his argument was completely proved by the subsequent reappearance of several volumes of the lost manuscripts. He also prepared an admirable edition of the letters in three volumes (London, 1872-75; reprinted in 1896), with an introduction containing a full history of the Paston family in connection with the history of the time. This edition was speedily exhausted and a new one by the same editor, containing 105 new letters, appeared in four volumes (London, 1900-01).

PASTOR (Lat., shepherd; so called because frequently seen near flocks of sheep). The popular, as well as the generic name of certain birds of the starling family (Sturnidæ). They differ from starlings in the compressed and slightly curved bill. In habits, as in structure and food, the groups are very similar. (See OXPECKER.) They are confined to the Old World, and especially to the Orient, though one species, the rose-colored pastor, or rose-starling (*Pastor roseus*), glossy black, with pink back and abdomen, is occasionally seen (sometimes in vast flocks) about the Mediterranean. It is not only a very handsome bird, but is very useful, especially where locusts occur, as the pastors eat the young locusts greedily, and are for this reason sometimes called 'locust-birds' (q.v.). In India the species is numerous and familiar, and is included with the mynas. See Plate of LARKS AND STARLINGS.

PASTOR, päs'tör, LUDWIG (1854—). A German historian, born at Aix-la-Chapelle. He studied at the universities of Bonn, Berlin, and Vienna, became a lecturer at Innsbruck in 1880, and was appointed to a professorship of history there in 1886. In the preparation of his historical works he made extensive research in the archives of Germany, France, and Italy, particularly those of the Vatican, first made accessible by Leo XIII. His chief publication is his *Geschichte der Päpste seit dem Ausgang des Mittelalters* (1886-95; 4th ed., 1899-1901; English trans., London, 1891-98), an extensive and thorough history of the Papacy from the close of the Middle Ages. Other volumes by him are *Die Kirchlichen Reunionsbestrebungen während der Regierung Karls V.* (1879), and *Die Korrespondenz des Kardinals Contarini während seiner deutschen Legation* (1880).

PASTORAL EPISTLES. A sub-group in the collection of New Testament letters which in their several addresses claim to have been written by the Apostle Paul. They comprise the following three writings: I. Timothy, II. Timothy, and Titus. They are called *Pastoral* because of the rather unusual character of their contents, as compared with the Apostle's other letters, being addressed to helpers of the Apostle, whom he had left in pastoral care of certain fields, and whom he wished in these communications to instruct regarding the duties involved in their charges. See the articles on the individual Epistles.

PASTORAL POETRY (Lat. *pastoralis*, relating to a shepherd, from *pastor*, shepherd; connected with *pasci*, to feed, *pabulum*, food, OChurch Slav. *pasati*, to feed, Skt. *pā*, to protect). A kind of poetry in which the incidents, thoughts, and emotions of cultivated society are presented under the disguise of rustic life. The characters are shepherds and shepherdesses, in a setting of valley and hillside, and the usual theme is love. This artificial literary *genre* flourished in antiquity and for centuries throughout Western Europe. The oldest extant forms are the idyl and the eclogue, but the pastoral motive may enter the romance and the drama.

ANTIQUITY. The pastoral undoubtedly takes its root far back in Greek literature. According to Elianus (*Varia Historia*, x. 18) its inventor was Stesichorus of Himera in Sicily (who died about B.C. 555); and his subject was the blindness of Daphnis, afterwards the typical love-lorn cowherd. According to the ancient grammarians,

it originated in the rustic cult of Artemis at Syracuse (*Scholia* upon Theocritus). These traditions certainly point to very old folksongs now lost. The extant pastoral dates from Theocritus, who flourished about B.C. 270 at the courts of Syracuse and Alexandria. To him are attributed thirty-one idyls (little pictures of life), of which ten are strictly bucolic. Here first occur Thyrsis, Tityrus, Corydon, Damoetas, Daphnis, Lycidas, Menalcas, and Amaryllis, names since made familiar to Western Europe. Theocritus seemingly reproduces the language of the peasants, their melodies, superstitions, and custom of answering one another in verse. His idyls are short descriptive lyrics combined with little dramatic pieces, sometimes comic, like the mimes which had been popular in Sicily since Sophron (about 440 B.C.). The poet introduces himself under the name of Simichidas, and devotes an idyl to his patron Ptolemy Philadelphus of Alexandria, and another to Hiero II. of Syracuse. Theocritus was followed by two poets: Bion of Smyrna, known for his beautiful *Lament for Adonis*, and Moschus, author of the still more beautiful *Dirge for Bion*. Several centuries later an unknown Greek writer told the story of *Daphnis and Chloe* in prose. The theme of the romance is artless innocence; its tone is sensuous and decadent. The pastoral poem had already been adapted to Italy by Vergil (d. 19 B.C.). However much Theocritus may have idealized his country scenes, he yet had nature before his eyes. The purely artificial pastoral began with Vergil, who took his notes not so much from nature as from Theocritus. Vergil composed ten graceful bucolics, which he called *eclogæ* (i.e. selections). Like Theocritus, he wove into them incidents from his own life. From Vergil the pastoral motive spread to Horace, Catullus, and other Roman poets, and eventually throughout Western Europe.

ITALY. The pastoral of the Renaissance did not spring from Vergil alone. To it contributed the *pastourelles*, love songs with a rustic setting, which were cultivated in various countries of Southern Europe in the thirteenth century. They especially flourished in Provence, as early as the twelfth century, whence they were largely diffused. They were in no way connected with Vergil, but they seem to have had their source in folk-song. In the fourteenth century the two streams of influence—the native and the classic—united to form the modern pastoral. The Vergilian revival first took the form of allegories, in which the learned addressed Latin epistles to one another under pastoral names. Eclogues of this kind passed between Dante and Giovanni del Virgilio, professor of Latin at Bologna (about 1320). Dante figures as Tityrus and his friend as Mopsus. Petrarch (1304-74) also composed a pastoral in twelve eclogues, in which he worked out an elaborate allegory. Dante and Petrarch thus mark the reappearance of Vergil as a literary force. Boccaccio (1313-75) blends the ancient and the indigenous pastoral. He wrote Latin eclogues much in the manner of his great compatriots. His *Ameto* (1342) is the first pastoral romance in the vernacular. He took as his model the song-fable in which prose is employed for the narrative and verse for the expression of the feelings. Under the names Calcone and Fiammetta Boccaccio veiled his passion for Maria, natural daughter of King Robert of

Naples. The *Ameto*, with its disguised personal history and cross-loves, is the prototype of the later Italian pastoral romances, of which a famous specimen is the *Arcadia* (1504) by Jacopo Sannazaro. Another aspect of the pastoral, which indeed is found in Petrarch, was rendered by Mantuan (d. 1516). His rustics were made a medium for fierce satire on women, the Court, and the Church. Attention has already been called to the dramatic element in the pastoral as early as Theocritus. When the popularity of the mediæval mystery play began to wane, the pastoral drama, easily expanded from the eclogue, was one of the forms that took its place. Even in Boccaccio's *Ninfale Fiesolano* the pastoral begins to assume a dramatic turn. But the first distinctive pastoral drama is the *Orfeo* of Poliziano, a sort of opera given at Mantua in 1471. It is founded on the story of Orpheus and Eurydice. During the next century many similar pastorals were produced at the Italian courts. By far the best of them is the *Aminta* of Tasso, performed at Ferrara in 1573. Equally well known in its own time was the *Pastor Fido* of Guarini (1590).

SPAIN. In the Spanish Peninsula the native pastoral songs counted for much more than elsewhere. As early as 1300 the *pastourelle* was cultivated at the Court of Dom Diniz, King of Portugal. And in Spain proper the Christmas mystery play, performed by real shepherds, was in fact a pastoral. The way was thus prepared for Juan de la Encina (d. 1534), who, besides translating Vergil's eclogues, composed pastoral pieces for recital before audiences at the house of the Duke of Alba. To this time belong also the pastoral lyrics by Garcilaso (d. 1536), one of Spain's greatest poets. Under Italian influences, the pastoral romance made its appearance with the *Menina e Moça* (Girl and Maiden) of the Portuguese Ribeiro (d. 1550). It was followed by the more famous *Diana* (1558) of Montemayor, a Portuguese by birth who chose to write in Spanish. For Spain the pastoral sentiment received its most refined expression in Cervantes, in his *Galatea* (1584) and the closing chapters of *Don Quixote* (1616).

FRANCE AND GERMANY. In Southern France the pastoral love song goes back to the twelfth century. At the outset this kind of poetry belonged to the country folk, who sang it especially in May, but as early as Marcabru the pastoral is already an artistic form and becomes stereotyped. A knight, happening to come where a shepherdess is, makes love to her, but he is usually dismissed. This is the theme of all. No pastorals of genuinely popular design have survived. The pastoral soon appeared in Northern France. From the beginning of the thirteenth century the French *pastorele* strongly influenced that of Provence. The shepherd Robin or Robert was adopted in the South, and Marion, too. The old theme blooms charmingly in the *Jeu de Robin et de Marion* (c. 1283) by Adam de la Halle. Though the song fable of *Aucassin et Nicolette* (c. 1225) contains delightful rustic scenes, it is hardly a true pastoral. During the sixteenth century the pastoral disguise was sometimes employed by the poets. Clément Marot (d. 1544) addressed an eclogue to the King, in which he described the course of his life under the symbol of the four seasons. The pastoral ideal, enforced by translations of

the Italian *Arcadia*, the Spanish *Diana*, and the Greek *Daphnis and Chloë*, culminated in the *Astrée* (1610-25) of Honoré d'Urfé, an immense prose romance. Here the bucolic life reached its extreme idealization. The nymphs appear in gilded buskins, arms adorned with bracelets, and heads covered with garlands of pearls. From the *Astrée* the pastoral made its way into Germany, where it flourished for more than a century. Of the German pastorals may be cited the *Hercynia* of Opitz (1622), the *Daphnis* (1754) and the *Idyllen* (1756) of Gessner, the *Luise* (1795) of Voss, and Goethe's *Hermann und Dorothea* (1797), in which the idyl returned to the truthfulness and simplicity of Theocritus.

ENGLAND. Before the sixteenth century there was nothing beyond the realistic treatment of the shepherd scenes in the religious drama, and *Robyn and Makyne* of Robert Henryson (d. 1506?), written in the Scotch dialect. The pastoral on the Continental model made its first English appearance in the six dull eclogues of Alexander Barclay (d. 1552). They closely resemble the work of Mantuan. In 1563 appeared eight equally dull eclogues by Barnabe Googe. To *Tottel's Miscellany* (1557) Surrey contributed two beautiful pastoral songs in the Italian manner. The important date for the English pastoral is 1579, when Edmund Spenser published the *Shepherd's Calendar*. In twelve eclogues under this title, Spenser handles the leading motives—allegory, satire, and love. During the next quarter of a century English literature became saturated with pastoral sentiment. In all the great writers lived the image of a 'golden world' somewhere in Arcadia or the Forest of Arden. The pastoral poem was cultivated in many lyrics, of which may be cited Marlowe's *Passionate Shepherd*; and in many collections, as *Britannia's Pastorals* of William Browne and the *Eclogues* of George Withers. Of romances inspired originally by Italy and Spain, the most typical is Sir Philip Sidney's *Arcadia* (1590), which had many imitators. There was, moreover, another large group of romancers, at the head of whom stood Robert Greene and Thomas Lodge, the authors respectively of *Menaphon* (1589) and *Rosalind* (1590). Undying charm was given to the pastoral ideal by Fletcher, Ben Jonson, and Shakespeare, in *The Faithful Shepherdess*, *The Sad Shepherd*, and *As You Like It*. A generation later Milton placed the masque in an exquisite pastoral setting and composed his great dirge in the manner of Moschus (*Comus* and *Lycidas*). After Milton the English pastoral fell into sad ways. The pastorals of Pope and Ambrose Philips—each published in 1709—are utterly conventional. Their imagery, when not borrowed, is either false or so general as to convey nothing. In ridicule of Philips, John Gay professed to depict rustic life with the gilt off. His *Shepherd's Week* (1714) probably comes somewhere near country manners. William Shenstone wrote several pretty ballads, in which appear Strephon and Chloë. We come to something better in Allan Ramsay's *Gentle Shepherd* (1728), a genuine picture of Scotch rural life. Later in the eighteenth century, the pastoral was fused with other forms of descriptive poetry and hardly existed as an independent species. The pastoral elements may, however, be uncovered. For example, the summons from the city to the country, so fre-

quent in Cowper, is a motive of Spenser. And the lyrics of Burns, many of them, are pastoral songs. The Vergilian type of pastoral has become thoroughly discredited. But several of the greatest English poets in the nineteenth century drew upon the Sicilian idylists. There they found truth, grace, and charm. The two finest dirges since Milton—Shelley's *Adonais* and Arnold's *Thyrsis*—go back to Bion and Moschus. Pastoral themes were beautifully rendered by Landor in some of his *Hellenics* (1847), for example "The Hamadryad." Theocritus is easily discovered in Tennyson's *Dora* and *The Miller's Daughter*.

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PASTORAL STAFF. See CROSIER.

PASTORAL SYMPHONY, THE, or RECOLLECTIONS OF COUNTRY LIFE. The title of Beethoven's sixth symphony, F major, opus 68, written in the country in 1807, and produced December 22, 1808, at Vienna in the Au der Wien Theatre. It belongs to Beethoven's so-called second period, and is representative of the free, joyous music which characterizes his compositions of the years 1800-15. See BEETHOVEN.

PASTORELS (OF. *pastorel*, Fr. *pastoral*, from Lat. *pastoralis*, relating to a shepherd). A name given to certain disorderly bands which appeared in France during the thirteenth and fourteenth centuries. They were recruited from the lower orders of society, including many shepherds, whence the name. In the year 1251 a certain Jacob, who claimed to be Lord of Hungary, and is commonly known as Jacob of Hungary, appeared as their leader in Flanders. He was an unprincipled adventurer and fanatic, but an able man. The King, Louis IX. (Saint Louis), was then in the East, engaged in the disastrous Seventh Crusade, and the preceding year had been a prisoner in the hands of the Mohammedans. Jacob preached that God had rejected princes and the mighty and would free the Holy Land by means of the common people. He claimed to have special revelations and assumed ecclesiastical functions. He formed his followers in well-organized companies, and, ostensibly on the way to Palestine, they began to overrun the country. The true character of the movement soon became evident. The rulers were attacked, property was destroyed, priests and monks were murdered, and the Jews in particular suffered cruel persecution. The disorders were ultimately put down with a firm hand. Jacob was killed while haranguing a crowd in Paris, or, according to another account, in a conflict at

Bourges. Seventy years later, under Philip V., similar disorders broke out under the same pretext. These bands of Pastorels ultimately threatened to attack Avignon, when the Pope, John XXII., excommunicated them, and the Seneschal of Carcassone dispersed them with an army.

PASTOR FIDO. See QUARINI.

PASTORIUS, FRANCIS DANIEL (1651-1719). An American colonist, born at Sommerhausen, in Franconia, Germany. Having joined the Society of Friends while in England, where he met William Penn, Pastorius, in 1683, led a party of German and Dutch Mennonites to the new colony of Pennsylvania, where they founded Germantown. He was a man of noble character and deep learning, and exerted great influence among his countrymen. Five years after his arrival in America he signed a protest addressed to the Friends' yearly meeting in Burlington, N. J., which characterized slavery as unchristian. This protest is said to have been the first formal plea for emancipation made in America, and is the subject of Whittier's "Pennsylvania Pilgrim." Whittier also translated the Latin ode to posterity which Pastorius prefixed to the Germantown book of records. Among his other writings is an interesting *Geographical Description of Pennsylvania*, first published under the title, *Umständige geographische Beschreibung der allerletzt erfundenen Provinz Pennsylvania* (1700).

PASTURAGE (OF. *pasturage*, Fr. *pâturage*, from OF. *pasturer*, Fr. *pâturer*, from ML. *pasturare*, to pasture, from Lat. *pastura*, feeding, pasture, from *pasci*, to feed; connected with *pastor*, shepherd, *pabulum*, food, OChurch Slav. *pasati*, to feed, Skt. *pā*, to protect). In law, the right of one who is not the owner of land to put his cattle and sheep on such land to feed there. In England the strips of waste land between inclosed fields and the public highways, are presumed to belong to the owner of the inclosed land, subject to the right of passage in the public, and he can pasture his own cattle there, and prevent others from doing so. Pasturage is one of the rights in 'common' in many communities in Great Britain. The right is seldom separated from the ownership of the land itself in the United States. See COMMON, TENANCY IN; EASEMENT.

PASTURE, PASTURAGE. The word *pasture* signifies in its widest sense land for the grazing of domestic animals; in its limited sense, the inclosed lot or meadow found on nearly every farm in which the stock feeds on the growing herbage. The word *pasturage* also has two different meanings, being used in the one sense for the growing grass and other green plants eaten by stock, and in the other as a synonym for pasture. Pasture is here used in its limited sense, and *pasturage* as meaning the growing grass and herbage on which stock feeds. The area of the ranges, those great natural pastures of the Rocky Mountain and Great Plains regions, is decreasing as the land is being brought under cultivation by settlers. The pampas of South America, and to some extent the steppes of Asia, are vast natural feeding-grounds corresponding to our ranges. Sometimes the different kinds of farm animals are confined in one inclosure, but most farmers have a separate pasture for swine. Horses and cattle are generally pastured to-

gether, although they sometimes annoy and injure each other. Sheep graze much closer than horses and cattle, and so place the latter at a disadvantage when pastured with them, while, on the other hand, they are useful in keeping down certain weeds which horses and cattle do not eat. A dairy herd is always most profitably pastured by itself. In the United States, and in all countries where new lands are brought into cultivation, the native prairie is often used for pastures, while in older countries or long-settled regions the cultivated soil is laid down to grass for this purpose. Native grasses are hardy and adapted to the prevailing conditions of soil and climate, so that when they are used the element of uncertainty is entirely eliminated. Pasturing more stock than can be well fed in a pasture of this kind has the effect of killing out the grasses and encouraging the growth of weeds, especially during times of drought. Occasional light applications of well-rotted barnyard manure, followed by a thorough harrowing, are very beneficial when the sod has become unproductive and hard. The care of native pastures further requires that the weeds be always kept down and that hardy tame or wild grasses be sown on places where the sod is becoming bare.

The practice of laying down land to pasture is common in all farming regions, and often forms a part of the crop rotation. Pastures on cultivated land intended for only a few years are called temporary pastures, and those for a long series of years permanent pastures. In starting pastures on cultivated land the first and most important requisite is a good condition of the soil. The kinds of soil best adapted for pastures are loams and clays, while loose, sandy, and gravelly soils are entirely unsuitable in this connection. Before the land is seeded down the soil is brought to the best possible condition of cultivation and fertility, and if the natural drainage is inadequate artificial drains are laid. A high state of fertility is conducive to a luxuriant growth of grass and a rapid formation of a good sod. A heavy dressing of barnyard manure is well adapted to grass lands, because it not only furnishes all the necessary elements of plant food, but also has a beneficial effect on the mechanical condition of the soil. It is preferable to lay land down to pasture after a hoed crop like corn, which leaves the soil in a good condition of tilth and comparatively free from weeds. The methods of preparing the soil and sowing the grass seed are the same in pasture-making as in laying down land to grass for a meadow (q.v.).

The choice of grasses depends largely upon the conditions of climate and soil. On ordinary soils in regions where the rainfall is generally sufficient, Kentucky blue grass (*Poa pratensis*), Canada blue grass (*Poa compressa*), tall fescue (*Festuca elatior*), red top (*Agrostis vulgaris*), perennial rye grass (*Lolium perenne*), orchard grass (*Dactylis glomerata*), and red and white clover form a good mixture for pastures. Red top, alsike clover, creeping bent grass (*Agrostis stolonifera*), and perennial rye grass are grown in wet pastures, and red fescue (*Festuca rubra*), red top, Kentucky blue grass, and white clover in pastures on light sandy soils. In the Southern States, Bermuda grass (*Cynodon Dactylon*), carpet grass (*Paspalum platycaule*), large water grass (*Paspalum dilatatum*), and Texas blue

grass (*Poa arachnifera*) are valuable pasture grasses. Timothy (*Phleum pratense*), an excellent hay grass, is often sown for pasture, but it is rather subject to injury by the trampling of stock and close grazing, and it does not form a good turf. Unlike the course pursued for meadows, in selecting pasture grasses those species are sought which furnish a succession of green forage throughout the season. For temporary pastures annual and biennial crops and short-lived grasses are suitable, but for permanent pastures perennial and good turf-making species are required.

Many farmers grow forage crops near their pastures to feed to the stock during times of drought, to prevent injury being done by too close cropping. The droppings of the stock are not sufficient to keep up the fertility of the soil, and hence, as mentioned above, top dressings of barnyard manure and commercial fertilizers are applied to supply the deficiency. The droppings of cattle ought to be broken up and scattered over the ground. Harrowing a pasture in the spring admits heat and light into the soil and favors the growth of grasses and leguminous plants. Weeds should never be allowed to grow in pastures, and the coarsest and rankest grass should be mowed once or twice each year. Re-seeding old pastures is usually not so profitable as breaking and working up the sod and growing a few crops before the land is again seeded down. An abundance of pure water in pastures is a prime necessity. A few trees on the highest points where the stock can find cool shade are of great benefit. A paddock is a small pasture generally located near the barns. Compare MEADOW.

PAT'AGONIA. A name formerly applied to the whole southern portion of the South American continent, extending from the Strait of Magellan indefinitely northward to about the 38th parallel of south latitude. In its present use, though the name has no political significance, it is generally restricted to the region lying east of the Andes and south of the Rio Negro (Map: Argentina, D 13). The name is supposed to be derived from the Spanish word *patagón*, a 'large foot,' in allusion to the large footprints found by the first explorers; but it may also come from the Quichua word *patacuna*, meaning 'terraces.' The region was visited by various Spanish and English explorers after it was first seen by Magellan in 1520. It remained unclaimed by any country until 1881, when it was incorporated into Argentina, while the strip west of the Andes was given up to Chile. The latter portion now constitutes the Chilean Territory of Magallanes (q.v.), and Patagonia proper consists of the Argentine Territories of Rio Negro, Chubut, and Santa Cruz (qqv.).

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PATAGONIAN CAVY. See CAVY.

PĀTĀLA, pā'tā'la. In Hindu mythology, the name of a series of lower worlds, each 10,000 *yōjanas*, or miles, in depth. According to the *Puranas* (q.v.), they are usually seven in number: Atala, Vitala, Sutala, Rusatala, Talatala, Mahatala, and Patala. Other authorities make eight: Patala, Tala, Atala, Vitala, Tala, Vidhi-Patala, Sarkara-Buhmi, and Vijaja. These regions are entirely distinct from the *Narakas* (q.v.), or hells, and are inhabited by various classes of semi-divine beings. The soil is white, black, purple, yellow, sandy, stony, and golden, respectively, and they are embellished with magnificent palaces, decorated with brilliant jewels, and filled with delicious viands and wines. There are in these regions beautiful groves, and streams and lakes, where the lotus blows, and the skies are resonant with the songs of birds.

PATALIPUTRA, pā'tā-lē-pō'trā. A famous city of ancient India, and the capital of the Kingdom of Magadha. It was situated at the junction of the Son (Sanskrit *Sōna*, classical *Erannoboas*) River with the Ganges. It seems, therefore, to have stood near the site of the modern city of Patna. It was the chief city of the Nanda and Maurya dynasties, and is famous as the residence of Megasthenes (q.v.) during his stay in India. It was also called Pushpapura and Kusumapura, both terms meaning 'Flower City.'

PAT'AMAR (East Indian name). A species of sailing vessel or boat used along the coast of India, especially in the vicinity of Bombay. It is of the grab (q.v.) type, is fast, and has a large carrying capacity. It was formerly much used for carrying despatches, but steam vessels have now superseded it in this work.

PATAN, pā-tān', or **PATTAN**. A town in the State of Baroda, India, 55 miles northwest of Ahmedabad (Map: India, E 3). It contains over a hundred Jain temples, and is celebrated for its collections of Jain manuscripts. It occupies the site of Anhilvada, the ancient capital of the Gujarati kingdom, renowned for its beautifully sculptured buildings, which was captured by Mahmud of Ghazni in 1024. Population, in 1901, 31,402.

PATAN. A town in Gujarat, India. See SOMNATH.

PATAÑJALI, pā-tān'jā-lē. (Probably second century B.C.) The founder of the Yoga (q.v.) system of Hindu philosophy. There seems to be little reason to doubt that he actually composed the *Yōga-sūtras* (edited and translated by Rajendralala Mitra, Calcutta, 1883), which formulate the principles of the Yoga philosophy. He is generally regarded, probably correctly, as the author of the *Mahā-bhāṣya* (edited by Kielhorn, 3 vols., Bombay, 1878-85), a commentary on the *Vārttikas*, or Explanations, of Katayana (q.v.), which form in their turn a commentary on the grammar of Panini (q.v.). Consult: Garbe, *Sāṃkhya und Yoga* (Strassburg, 1896); Müller, *Six Systems of Indian Philosophy* (New York, 1899).

PATAP'SCO. A river of Maryland, entering Chesapeake Bay by a large and wide estuary at the head of which stands Baltimore, and which is navigable for the largest ships (Map: Maryland, M 4). The upper course of the river is very swift and furnishes considerable water power.

PATARINES, or **PATARENES**, pāt'a-rēnz. A name applied in Milan in the eleventh century to the reforming party, who held their meetings in the *Pataria* or ragmen's quarter. Under the leadership of Anselm of Lucca and the deacon Arialdo, they took energetic steps to suppress clerical concubinage and simony. They were supported by the popes, but the emperors and many of the nobility opposed them forcibly, and as a popular movement the *Pataria* died out early in the twelfth century. The name of Patarini was, however, appropriated by the Cathari (q.v.) or Manichaean heretics of Northern Italy and Southern France.

PATAS, pā-tās' (African name), **MONKEY**. One of the *guenons* (*Cercopithecus patas*), a native of Senegambia, distinguished from all others by its reddish color, and grayish cheeks and under parts. It is usually to be seen in menageries. See GUENON.

PATCH, SAMUEL (1807-29). An American noted for various feats of leaping. He was born in Rhode Island, went to sea in early life, and afterwards settled at Paterson, N. J., where he was a cotton-spinner. Because of his threats to jump from a bridge over the Passaic River, he was finally placed under arrest. A few months afterwards the successful performance of the feat gave him such widespread notoriety that he traveled about, leaping from the yard-arms or topmasts of ships. He lost his life in making a jump of 125 feet into the Genesee River below the falls at Rochester, N. Y.

PATCHOGUE, pā-chōg'. A village in Suffolk County, N. Y., 55 miles east of New York City, on the shore of Great South Bay, and on the Long Island Railroad (Map: New York, H 5). It is popular as a place of residence and as a summer resort, and has several hotels, fine church edifices, a high school, and a public library. The village has large oyster and fish interests, ice and cold storage plant, lumber yards, and manufactories of lace curtains, paper, and surveyor's steel tapes and supplies. It was incorporated in 1893. The government is administered by a village president, who holds office for a year, and a board of trustees, elected on a general ticket. Population, in 1900, 2926.

PATCHOULI (Fr., from the East Indian name). The powerfully odoriferous dried branches of *Pogostemon patchouli* or *Pogostemon Heyneanus*, of the natural order *Labiatae*, which first appeared in commerce in 1844. The plant is a native of the Malay coast, Ceylon, Java, the neighborhood of Bombay, and probably also of China and Japan. The odor of patchouli was known in Europe before the material itself was introduced, because of its use in keeping moths out of Cashmere shawls, hence genuine Cashmere shawls were known by their scent until the French found the secret, and imported the herb. In India, where it is known as puchapat, it is used as an ingredient in fancy tobaccos, as a perfume for the hair, and for keeping insects from linen and woolen articles. Patchouli yields by distillation a peculiar heavy brown oil, disagreeably odoriferous, which requires extreme dilution for perfumery purposes.

PÂTÉ DE FOIE GRAS, pā'tā' de fwā grā (Fr., paste of thick liver). Sometimes called 'Strassburg pie,' a dish greatly esteemed by epi-

cures, and, as the name indicates, made of the livers of abnormally fattened geese or ducks. Strassburg and Toulouse are the chief places of manufacture. The *pâtés* are exported to every part of the world, and the trade amounts to several hundred thousand dollars annually. The fowls are fed to repletion with salted maize, and by this means the liver is increased to the unnatural weight of two or even three pounds.

PATEL, *pâ'tel'*, PIERRE (c.1605-76). A French landscape painter, born probably in Picardy. He is said to have been a pupil of Vouet, and also to have studied in Italy. He was one of the many painters employed on the Hotel Lambert, and on the decorations in the Louvre. His paintings are in the manner of Claude Lorraine, and he chose like subjects—the ruins of old buildings and masses of finely drawn architecture, in which he shows considerable variety in the arrangement of the surrounding landscape. He also had Claude's genius for aerial perspective and fine, glowing skies. Their works are sometimes confounded. Patel had a son who imitated his father. The Louvre contains several pictures by the older Patel; these include "Exposure of Moses," "Moses Burying the Egyptian," and some landscapes. There are other works by him in the provincial museums of Besançon, Montpellier, Nantes, and Marseilles.

PATELLA (Lat., small pan or dish, kneepan, patella), or KNEE-CAP. A sesamoid bone, developed in the common tendon of the *rectus vastus externus*, and *vastus internus* muscles—the great extensor muscles of the leg. It is of rounded, somewhat heart-shaped form, the broad end being directed upward and the apex downward. The anterior or external surface is convex, perforated by small apertures for the entrance of vessels, and marked by rough longitudinal striæ, while the posterior or internal surface is smooth and divided into two facets by a vertical ridge, which corresponds and fits into the groove on the lower articulating surface of the femur or thigh-bone, while the two facets (of which the outer is the broader and deeper) correspond to the articular surface of the two condyles.

This bone is liable both to dislocation and fracture. Dislocation is rare. It may occur either inward or outward; but it is most frequent in the outward direction. The displacement may be caused either by external violence, or by too sudden contraction of the extensor muscles in whose conjoined tendon it lies, and is most liable to occur in knock-kneed, flabby persons. It may be readily detected by the limitation of active motion, and by the bones being felt in its new position: the dislocation is usually capable of being reduced without great difficulty.

Fracture of the patella may (like dislocation) be caused either by muscular action or by external violence. Fracture by muscular action is the more common, and occurs thus: A person in danger of falling forward attempts to recover himself by throwing the body backward, and the violent action of the extensors (chiefly the *rectus*) snaps the patella across, the upper fragment being drawn up the thigh, while the lower portion is retained *in situ* by that portion of the common tendon which is continued from the patella to the tubercle of the tibia, and which

is called the ligamentum patellæ. The conservative treatment consists in relaxing the opposing muscles by raising the trunk and slightly elevating the limb, which should be kept in a straight position, while straps and other devices are applied directly to the fragments to secure their close approximation. In consequence of the great difficulty of bringing the broken surfaces into exact apposition, it is very difficult to obtain bony reunion of the parts, and the case generally results either in mere ligamentous union or in no true union at all. The practical results in these cases as regards the use of the limb are fairly satisfactory, however.

The operative treatment consists in cutting down on the fragments and fastening them together with catgut, wire, or some other form of suture. It is attended with remarkably perfect results, but is not devoid of danger. A measure intermediate between operative and non-operative treatment consists in the application of hooks or other devices which seize the fragments through the skin and hold them in apposition until union has taken place.

PATELLA. See LIMPET.

PATEN (Lat. *patena*, *patina*, flat shallow dish, from *patere*, to lie open; connected with Gk. *πετασύναι*, *petannynai*, to spread out). The plate on which the bread in the eucharistic service is consecrated, sometimes used also for the distribution to the faithful. In the earliest centuries it was of wood, glass, or the more ordinary metals, and underwent the same changes as the chalice (q.v.), which it accompanied. As early as the fourth century, however, patens were often made of silver or gold, weighing thirty pounds and more. These early examples were of large size and called *patenæ ministeriales* or *communicales*. The smaller patens (*patenæ parvæ*) for the use of the celebrant at the altar were of far later origin. Special patens were used for the chrism in baptism and confirmation (*patenæ chrisimalis*). Patens were usually circular, though later examples are sometimes polygonal or square. A very few examples remain of the Byzantine and Romanesque periods, of silver with decoration in low relief, niello, or enamel.

PATENT, and **PATENT LAW** (from Lat. *patens*, lying open, patent, pres. part. of *patere*, to lie open; originally in the phrase *litteræ patentēs*, letter patent, open letter). A patent, in the most general sense, is a letter patent (q.v.), but the term is mostly used in the specific sense of a letter patent granted by the Government to secure to an inventor the exclusive right to make, manufacture, and sell for a certain period the thing invented or discovered by him. The term patent law is used to designate the law affecting the granting of such letters patent and their use, protection, etc. By the common law an inventor has no protection in the exclusive use of his invention, and therefore all patent law is founded upon statutes. The policy of encouraging useful discoveries and inventions in the arts and industries by securing to discoverers and inventors the exclusive benefits of their discoveries is an old one among governments. It was a common practice among the Tudor sovereigns of England to grant to inventors such exclusive privileges. At first the inventor was required to use his invention within the kingdom,

and in some instances to pay a tax to the Crown or share with it the profits derived therefrom. Until 1852 the British patent law was restricted to England, patents in Scotland being issued under the common law. In 1852 the basis of the present British system of patent legislation was laid by a comprehensive statute which was applied to the whole kingdom. The British policy of encouraging by exclusive privilege the invention of new and useful articles was extended to the English colonies in America, and we find occasional colonial statutes empowering certain persons to exercise the exclusive right to manufacture articles of use which they had invented.

The Constitution (Art. I, § 8) of the United States recognized and sanctioned the policy by conferring authority upon Congress to secure to inventors the exclusive use of their inventions for limited periods of time. In pursuance of this authority, Congress in 1790 passed an act to provide for the granting of patents to the inventor of "any useful art, manufacture, engine, machine, or device, or any improvement therein not before known or used." Applications for patents under this law were required to be made to a board consisting of the Secretary of State, the Secretary of War, and the Attorney-General. The patent was issued by this board upon the concurrent action of two members, was authenticated by affixing the great seal of the United States, and was valid for such term not exceeding fourteen years as the board might in its discretion agree upon. The law of 1790 contained provisions for the punishment of infringements and provided that no distinction should be observed between foreigners and American citizens in the granting of letters patent. A small fee amounting to less than five dollars was charged for the patent. In 1793 a new statute was passed, repealing the Act of 1790 and making several changes in the system. The new act restricted the grant of patents to citizens of the United States; required applicants to surrender to the United States any patents which they might have received from any State prior to the adoption of the Constitution; provided that applications should be made to the Secretary of State, that conflicts between applications should be decided by a board of three arbitrators, and that patents obtained by fraud or misrepresentation could be declared void by a United States district court upon due proof. Supplemental acts of 1794 and 1800 were passed, the latter of which extended patent privileges to aliens who at the time of application had resided in the United States for a period of two years. All applicants were now required to make oath that to the best of their knowledge and belief the invention for which they were seeking a patent had not been known or used in any foreign country. About this time the judicial question arose as to whether the power of Congress was exclusive in the matter of patents (*Gibson vs. Ogden*, 9 Wheat. 1.); but the precise point as to the right of a State to grant patents was not decided. Since then, however, the opinion has become settled that the power of Congress in the premises is exclusive.

The year 1836 marks the beginning of an era in the patent system of the United States. In that year all previous statutes were repealed and a comprehensive act was passed which brought the system somewhat into its present condition,

retaining many old features, but introducing new and important changes. In the first place, it created a patent office to be attached to the Department of State, and at the head of which was to be a commissioner of patents. The most important provision of the Act of 1836 was the introduction of the policy of preliminary examinations for the purpose of determining the patentability of an invention before issuing the patent. The Act of 1836 also provided for a board of appeal to hear appeals from the decisions of the examiner and commissioner against the patentability of an invention. The patent privilege was now extended to any alien who had resided one year in the United States and who had made a declaration of intention to become a citizen. The fee was fixed at \$30 in the case of citizens and resident aliens, \$500 for the subjects of Great Britain, and \$300 for the subjects of other nations. Provision was also made for filing caveats on incompleting inventions and the policy of reissuing patents was confirmed and extended. Exclusive jurisdiction of cases involving patent rights was conferred upon the United States Circuit Courts. Provision was also made for extending the duration of patents for a period of seven years after the expiration of the original fourteen, the power of extension being placed in the hands of a board consisting of the Commissioner of Patents, the Secretary of State, and the Solicitor of the Treasury. Various amendments of the patent laws were made during the succeeding years. In 1842 provision was made for patenting designs for a period of seven years. By an Act of 1861 the term of patents for inventions was extended from fourteen to seventeen years; all former acts discriminating between aliens and citizens were repealed; a uniform scale of fees was adopted; and a board of examiners intermediate between the regular examiners and the Commissioner was established to hear appeals from the former. The whole system of patent legislation was revised and codified in 1870, and brought into its present condition.

As the laws now stand (Rev. Stat. § 4886) any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, not known or used by others in this country and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned, may upon payment of the fee required by law obtain a patent therefor.

Patents are obtained by making application to the Commissioner of Patents in accordance with forms prescribed by law. The form prescribed is that of a petition together with an oath that the applicant believes himself to be the first inventor. The application is accompanied by a specification describing the invention in a full, clear, and concise manner. Drawings accompany the specification in cases which admit of it, and the Commissioner may require the applicant to furnish the office with a model of the article; but this of late years has not usually been required except where necessary to a correct understanding of the article. The application upon being received is referred to the proper examiner for inquiry as to whether the article possesses not-

elty and utility and whether it has already been anticipated in the United States or abroad. If no objection is found by the examiner the patent is issued. If objection is raised by the examiner the applicant may amend his application so as to eliminate the features that are old. If still refused he may appeal to the board of examiners, and from their decision he may appeal to the Commissioner of Patents. Finally, an appeal lies to the Supreme Court of the District of Columbia. The fee upon filing an application is \$15; on issuing the patent, \$20; on application for extension of a patent, \$50; on granting an extension, \$50. A prior patent by the inventor in a foreign country does not debar him from receiving a patent in the United States, provided the application be made within seven months of the application for the foreign patent.

Where a person has made an invention, but has not completed the details to his satisfaction, or feels that he can improve on it after further experiment, he may protect himself against a patent being granted meanwhile for the same thing, by filing a 'caveat' in the Patent Office. A caveat is a notice which contains a description of the thing claimed as an invention, and concludes with a request that the inventor's rights be protected until he has completed his invention and has an opportunity to apply for a patent. A caveat is kept secret by the Patent Office, thereby avoiding giving information which might be fraudulently utilized by clever persons, and entitles the caveator to notice of the filing of an interfering application for a period of one year. If such notice is sent him, the caveator, to retain his rights, must file his application, specifications, and, if necessary, models or samples, within three months thereafter. Where he does this his invention is considered to date back to the date of filing the caveat.

The interpretations by the courts of the various words and phrases in the sections above quoted form the great body of the substantive law of patents, in connection with the statute itself. The alternative use of the words 'invention' and 'discovery' early attracted attention, and the question arose as to whether different meanings were to be ascribed to them. It was undisputed that the mere discovery of a force of nature could not be patentable, as natural forces and elements belong to all mankind, and it was finally determined that the word 'discovery' as used was synonymous with 'invention,' and involved the exercise of inventive or creative genius or faculties. For example, the person who discovered electricity as a force could not have obtained a patent allowing him the exclusive use of that force of nature, but Morse, who applied electricity to the communication of messages, was allowed a patent on his system of telegraphy, as that was a device calling for inventive genius in its creation, and was not merely the finding of an already existing thing.

Under the word 'art' many of the 'processes' now held patentable are classified. A process is a combination of the elements or laws of nature designed to accomplish a useful result. Much controversy arises over this class of patents. The word 'machine' includes all contrivances whereby mechanical parts or pieces are arranged to move together for the production of some useful result, and it is under this head that most patents are granted in the United States. The word

'manufacture' is construed to mean anything new, made by the hand of man, and which is not included in the other terms employed in the above sections, and covers fabrics, furniture, clothing, etc. The term 'composition of matter' may be defined as the uniting of two or more elements or substances by chemical union or by mechanical mixing, and includes such products as paints, medicines, etc. Frequently it is very difficult to determine under which of the above heads an invention should properly be classified, but it is held not to be absolutely essential for an inventor to do so, provided it is certain that his invention comes under one or more of them. The section allowing patents for designs is liberally construed to include ornamental as well as useful designs.

Besides consisting of one of the above subject-matters, a thing for which a patent is asked must have the three general characteristics prescribed by the statute, viz.: it must be an invention; it must have novelty, that is, be new; and it must be useful. The determination of whether a thing presented really constitutes an invention is frequently a very difficult matter. In general, it may be said that it is not invention to devise something that is not a practical working device, but needs more thought or experiment to enable it to produce the result; or to construct or produce something which any mechanic or reasonably skilled person in the particular line would produce, upon request, in the exercise of his ordinary skill; or to put in better materials or workmanship into a known article; or to change the size of a thing; or to omit a useless or 'dead' part of a machine or device; or to substitute an equivalent which merely performs the same office as the part taken away, without improving the operation of the whole; or to make a new or 'double' use of a known article, without improving on it, as by utilizing the principles of an ice-cream freezer for the purpose of preserving fish. A person who produces a combination of elements, or of mechanical devices, need not be able to explain the scientific reasons for their combination or adjustment in the particular manner or form in which he presents them, in order to be considered the inventor, provided he can describe the materials and the combination or construction so that the same result can be accomplished again. See INVENTION.

A distinct and original improvement on an old invention is patentable, but a patent on the improvement does not disturb the rights of the inventor of the first device to its exclusive use as it was. It is not necessary that an inventor be personally able to construct the device which he has conceived, if he can dictate his ideas to a skilled mechanic, so that the latter can readily construct the device without the exercise of his own inventive genius. However, the mere conception of a result, without being able to suggest a practical means of attaining it, is not invention.

The word 'new' in the statute is not confined to its ordinary meaning, but includes anything which has not before been made public or been given to the world. For example, if A presents a model of a machine together with an application for a patent on it, at the Patent Office, he is first entitled to a patent, although another inventor may later bring there a machine identically the same as the first, and be able to

prove that he had conceived and constructed it long before A, provided the inventor who first conceived the machine had not used it or made it public in any way. However, if the thing which is sought to be patented has been previously used in a single instance by other parties, even though that use was not known to the public at large, it is sufficient to defeat a claim for a patent on the device presented, for want of novelty, although the one presenting it and claiming to be the inventor had never heard of the previous use of his alleged invention. But a patent may be granted for a new method of producing a result theretofore accomplished in another manner, as, for instance, if a new machine should be devised for making pins.

The statute also requires that an invention, to be patentable, must be useful. This is perhaps the most liberally construed of the three general essentials, and as a result, almost anything which is not injurious to public health or morals can be patented if it contains the other essential characteristics, and contributes to the comfort, convenience, or pleasure of mankind. Thus, a toy, intended for the amusement of children, may be patented.

A patent will be issued only to the inventor, except that if he dies before making application, his personal representatives are permitted to do so, and that he may sell his rights in his invention before obtaining a patent, and in making his application ask that the patent issue to his assignee, which will be done. Joint inventors must have their inventions patented to both jointly. Foreign inventors may obtain patents in the United States, with the condition that if their inventions are not known in the United States before they make application, and a citizen of the United States has made the same invention without knowledge that it had previously been produced abroad, the latter can obtain a patent in preference to the former, even though his application be filed subsequently. Where an employee makes a new thing under the guidance and direction of his employer, the latter is entitled to the patent, as he is the actual inventor; but if an employee, independently of the suggestions of his employer, conceives and produces something which is patentable, he is entitled to the patent, as his inventive faculties were alone employed; but the employer may by the terms of his contract with the employee be entitled to an assignment of the patent. Before or after filing a caveat or application, an inventor may abandon his invention to the public by express acts or words, or by such conduct that an intention to do so may be presumed. Delay in making or completing an application and lack of public exhibition or use of the invention are considered evidence of abandonment. However, any acts or words are subject to explanation, and if the inventor was too poor to defray the expenses of an application, or was unable through temporary insanity, illness, or any other reasonable cause, to make application, the above presumption will be rebutted.

Where a patentee has reason to believe that his patent is defective by reason of an insufficient description in the specifications, or that his claims were not broad enough to include all the principles of his invention, or if there was an error affecting it in the Patent Office, he may surrender the old patent and at the same time

file an application to have a new one issued to him, upon proper specifications. This is known as 'surrender and reissue.' A good patent cannot be thus surrendered for the purpose of having a new one containing the features of a subsequent improvement, issued to the inventor. The reissue must be for the same invention.

Where a claim in a patent covers more than the patentee is lawfully entitled to, the patent is wholly void. However, where this has occurred through inadvertence or mistake, the patentee may file an instrument known as a 'disclaimer,' which should contain a clear statement of what he justly claims as his own invention, and what he disclaims. Unless this is done, such a patentee cannot maintain an action to protect whatever rights he is actually entitled to in the invention. A disclaimer is not the proper method of correcting defective specifications, as it only amounts to an abandonment of a thing previously claimed.

Where two or more patents contain claims which are identical, they are known as interfering patents. In such a case, any one of the patentees may bring an action in equity to have the respective rights of the interfering patentees determined, and only one of the patents can be sustained as valid.

Patents are considered as property, and may be sold and transferred from one person to another, by assignments in writing. Provision is made for recording such assignments in the Patent Office, and unless this is done within three months after its date, an assignment will be void as against innocent purchasers or mortgagees for value. Prospective purchasers should therefore search in the Patent Office for possible assignments. Patents may be held by joint owners, partners, or corporations. An owner of a patent may convey an interest in it, or grant a license to another to use it upon payment of royalties or a fixed rent, or may grant the right to make and sell it for an agreed period.

All patented articles should be marked with the word 'patented,' and with the exact date on which the patent was granted. Unless this is done no damages can be recovered in an action for an infringement, if the infringer had no previous notice of the existence of the patent. Where an unpatented article is marked 'patented,' the person so marking it is liable to a penalty of not less than \$100 and costs, to be recovered in a *qui tam* (q.v.) action, one-half of which goes to the informer, and the other half to the Government.

An infringement of a patent consists in wrongfully making, using, or otherwise dealing with a patented invention. A person to whom the patentee sells a patented machine may make necessary repairs from time to time, but they must not amount to a reconstruction of the machine, and he cannot build a new machine without being guilty of an infringement. Many cases of infringement arise in regard to patented compositions of matter, by an infringer substituting an equivalent for one element. A patentee has two remedies for an infringement. He may sue at law for damages, or may apply to a court of equity for an injunction restraining the infringer from continuing his acts, and incidentally be awarded damages for the injury suffered. If the patented article is properly stamped, it is

no defense that the infringer had not seen or heard of it.

The United States Government will not issue a patent except with the consent of the patentee, as the relation between them is in a sense contractual, as the patentee pays certain fees and complies with certain regulations in return for his protection. The grant of a patent is not the grant of a monopoly in the strict sense of that word, which is that certain rights or privileges theretofore enjoyed by the whole public are granted exclusively to one or more individuals, and the general public restrained in the exercise of those rights. A patent is merely protection for a limited time in the enjoyment of something created or produced by an inventor, and which had not theretofore been enjoyed by the general public. Consult the treatises on the *Laws of Patents*, by Walker (3 ed., New York, 1895); Phillips (5th ed., Boston, 1867); Curtis (4th ed., Boston, 1873); Carpmael, *Patent Laws of the World* (2d ed., London, 1889), and the official Government reports of the United States, Great Britain, etc.; Merwin, *Patentability of Inventions* (Boston, 1883); Munn & Co., *United States Patent Law* (New York, 1870). See COPY-RIGHT; LETTERS PATENT; MONOPOLY; TRADE-MARK.

PATENT OFFICE. A Government department or bureau established by act of Congress in 1836, with a commissioner at its head charged with performing all duties relative to the granting of patents. In 1849 the Patent Office was transferred to the newly created Interior Department, where it has since remained. From the beginning provision was made for the collection and preservation of models, as a result of which an immense collection of specimens and designs have been gathered. In 1836 the building in which the models were kept was burned and many of them were destroyed, but Congress made an appropriation of \$100,000 to procure duplicates of the most valuable ones. Again in 1877 a part of the building was burned together with many models, but the most of these were replaced by the manufacture of new ones.

The business of the Patent Office during the early years of its existence was small, the number of patents granted varying from 400 to 600 annually during the period from 1837 to 1847. In 1840 the applications for patents amounted to 735, while the number of patents actually issued was 458. In 1899 the number of applications was 35,352, while the number of patents granted was 23,550. The receipts of the Patent Office usually exceed the expenditures, although there have been exceptional years. In 1840 the receipts and expenditures were respectively \$38,056 and \$39,020; in 1899 they were \$1,325,457 and \$1,211,783. The Commissioner of Patents is required to make an annual report of the business of the office, giving with other information a list of patents issued during the year, with the names of the patentees. Specifications and drawings of all inventions are likewise published in a monthly volume. Until 1862 the Patent Office also published an annual volume on agriculture. An official gazette containing lists of patents, issued together with brief descriptions and drawings, decisions of the office on important questions arising in the course of the administration, and important judicial decisions affecting

patents, is now one of the regular weekly publications of the office. The Commissioner of Patents is aided by an assistant commissioner, three examiners in chief, and a large number of examiners, each of whom has charge of a distinct class of inventions. Besides these there are several hundred assistant examiners, clerks, messengers, etc.

PATER, pā'tā', JEAN BAPTISTE JOSEPH (1695-1736). A French genre painter, born in Valenciennes. He was a pupil of Watteau, and painted subjects similar to those of his master. The 'fêtes galantes' were depicted by him with something of the grace and ease that distinguished Watteau himself. But although he was a good colorist, he was not a good draughtsman. His works include: "Fête Galante" (in the Dresden Gallery); "Women Bathing" (in the National Gallery, Edinburgh); "Fête Champêtre" (1728), in the Louvre; "The Bath" (in Versailles); and "The Comical March" (in the Metropolitan Museum, New York City).

PATER, pā'tēr, WALTER HORATIO (1839-94). An English essayist, born at Shadwell, in the East of London, August 4, 1839. He was educated at King's School, Canterbury, and at Queen's College, Oxford, graduating B.A. in 1862. In 1864 he was elected fellow of Brasenose College. Except for his visits to the Continent and a short residence in London, he passed his life at Oxford. He had come to the university with the intention of entering the Church of England; but by 1865—the date of his first visit to Italy—he had lost all belief in Christian doctrines. He found his mission in interpreting to his age the spirit of the Renaissance in art and literature. For this end he employed the historical novel, the story, and mainly the essay. In all his work—much of which originally appeared in the reviews—he wrought with the greatest care, aiming at absolute precision in the expression of his thoughts and emotions. The result was an extremely delicate and refined style, delightful in its rhythm, but lacking in vigor and simplicity. After a quiet career as tutor and author, Pater died at Oxford, July 30, 1894. His publications in book form comprise: *Studies in the History of the Renaissance* (1873), containing the brilliant essay on Winckelmann; *Marius the Epicurean* (1885), a masterly exposition of the best phases of Epicureanism, put into the form of an historical romance; *Imaginary Portraits* (1887), studies in philosophic fiction; *Appreciations* (1889), containing his most subtle literary criticism and a notable essay on style; *Plato and Platonism* (1893); and *The Child in the House* (1894), an imaginary portrait. After his death appeared *Greek Studies* (1895), and a volume of essays collected from contributions to the *Guardian* (1897). His *Works* in eight volumes appeared in 1900.

PATER'ULUS, GAIUS VELLEIUS. A Roman historian, descended from an ancient and wealthy Campanian family. He is thought to have been born about B.C. 19. He entered the army at an early age, and from A.D. 4 to 12 served under Tiberius as *præfectus equitum* or *legatus* in Germany, Pannonia, and Dalmatia. He was a great favorite with Tiberius, and when the latter became Emperor, A.D. 14, Paterculus was appointed *prætor*. He was alive in A.D. 30, as his history comes down to that year; but it is conjectured

that in the following year he was perhaps put to death as one of the friends of Sejanus, of whom he speaks highly in his work. Paterculus's claim to remembrance is his *Historia Romanæ*, a compendium of universal, but more particularly of Roman, history, in two books. The work, as we have it, is not complete, the beginning and a portion following the eighth chapter being wanting. It seems to have commenced with the fall of Troy, and describes only the most prominent historical incidents, but these, fortunately, with considerable fullness of detail. The *editio princeps* of the *Historia Romanæ* appeared at Basel in 1520. Later editions are by Orelli (Leipzig, 1835); Kritz (ib., 1840); Haase (ib., 1863); and Halm (ib., 1876). There is a partial English translation by Baker (London, 1814), and a complete one in the Bohn Library (ib., 1859).

PATERERO (corrupted from *pederero*, from Sp. *pedrero*, swivel-gun, from ML. *petraria*, stone-throwing engine, from Lat. *petra*, from Gk. *πέτρα*, rock). A small gun, firing a shot weighing 12 pounds or less, formerly much used as a swivel. It was mounted on the ship's rail or in the bow of a boat. (See article on GUNS, NAVAL.) The name is also applied to a small mortar for firing salutes on holidays and at festivals, especially in Roman Catholic countries.

PATER JOCHEM, pā'tēr yō'rēm. A Swiss patriot. See HASPINGER, JOACHIM.

PATERNO, pā-tēr'nō. A town in the Province of Catania, Sicily, situated on the slope of Mount Etna, 11 miles northwest of Catania by rail (Map: Italy, J 10). There are some interesting remains here of the Roman period. On a height overlooking the city stands an ancient Norman tower now used as a prison. There are mineral springs, and a trade in wine, oil, and flax. Paterna is built on the site of the old Greek city of Hybla Major. Population (commune), in 1881, 17,353; in 1901, 23,453.

PATERNOSTER (Lat., Our Father). A name for the Lord's Prayer (q.v.) commonly used among Roman Catholics, from the opening words of the Latin version employed in all their services. In the rosary (q.v.) it is combined with the Hail Mary; the larger beads of the rosary are thus called paternosters, and the name was at one time applied to any beads about the same size, even when used for trimming a dress.

PATERNOSTER ROW. A noted London street, long the focus of the publishing and book trade of the city. Its name is derived from the makers of rosaries and prayer-books, who formerly made it their headquarters.

PATERSON. An important manufacturing city, the county-seat of Passaic County, N. J., 16 miles northwest of New York City; on the Passaic River, the Morris Canal, and the Erie, the Lackawanna, and the New York, Susquehanna and Western railroads (Map: New Jersey, D 2). The city, with an area of about 8½ square miles, extends over a broad plain around a curve of the river. The Passaic has a perpendicular fall of 50 feet at this point, and a descent of 20 feet more to the plain, affording great water power. The streets are broad and well drained. Sixty-four miles are paved, the great proportion with macadam. The street

railroad system, including 50 miles of track, extends beyond the city, connecting with important towns and cities of the vicinity. Paterson has a public library of about 37,000 volumes; two city parks—East Side and West Side parks; an imposing soldiers' monument; Paterson General Hospital and Saint Joseph's and isolation hospitals; Old Ladies' Home and Children's Nursery, and other charitable institutions. Among prominent structures are also the new city hall, court-house, post-office, and several banking buildings. The manufactures, which make this the third city of the State in importance, include silk and silk goods, locomotives, steel trusses and bridge work, engines and boilers, iron and steel, brass castings, general machinery, cotton goods, linen thread, jute, paper, malt liquors, etc. The silk mills are the most extensive in the United States, employing an army of operatives, and representing a considerable amount of capital.

The government is vested in a mayor, elected every two years; a council; and in subordinate administrative officials, appointed or elected as follows: board of education and library trustees, by the executive; park commissioners and health board, by the executive, subject to the consent of the council; and heads of city departments such as are employed in the city hall, by the council. Paterson spends annually, in maintenance and operation, about \$1,175,000, the main items of expense being \$295,000 for schools, \$145,000 for interest on debt, \$120,000 for the fire department, \$115,000 for the police department, \$75,000 for municipal lighting, \$60,000 for charitable institutions, and \$55,000 for street cleaning and sprinkling. The city's bonded debt is (1901) over \$3,200,000, and the valuation of property (real and personal) is assessed at nearly \$50,000,000.

Paterson was founded in 1792 by "The Society for Establishing Useful Manufactures," in which Alexander Hamilton was much interested. It was thought that the town would soon become the manufacturing metropolis of America. It was incorporated as a town in 1791, William Paterson then being Governor of the State, and was chartered as a city in 1851. The steady growth of the city is indicated in the following statistics: Population, in 1840, 7596; 1850, 11,334; 1860, 10,586; 1870, 33,579; 1880, 51,031; 1890, 78,347; 1900, 105,171. The population in 1900 included 38,800 persons of foreign birth and 1200 of negro descent.

PATERSON, JOHN (1744-1808). An American soldier, born at New Britain, Conn. He graduated at Yale in 1762; practiced law for a time in New Britain; removed to Lenox, Mass., in 1774, and was elected a member of the Massachusetts Provincial Congress. Immediately after the battle of Lexington he led a regiment of minute-men to Cambridge and helped to erect the first redoubt near Boston. He afterwards served with great gallantry in the Canada and New Jersey campaigns in the operations against Burgoyne, and became a brigadier-general (1777) and a major-general (1783). He held a command in the Massachusetts militia during Shays's Rebellion in 1786, and afterwards (1794) removed to Lisle (now Whitney's Point), N. Y., and became county judge of Broome County. He served four terms in the State Legislature, was a

member of the State Constitutional Convention in 1801, and was a member of Congress in 1803-05. From 1805 until his death (at Lisle), he devoted himself to farming. Consult Eggleston, *Life of Major-General John Paterson* (2d ed., New York, 1898).

PATERSON, ROBERT (1715-1801). A Scottish stonemason, born near Hawick, who is immortalized by Sir Walter Scott, as 'Old Mortality.' After his marriage he leased a quarry of his own, but being a Cameronian with the courage of his convictions, his house was burned and himself made prisoner by the Jacobites on their retreat from England with Prince Charles in 1745. Paterson began his wanderings by taking monuments into the Galloway district for the graves of the Covenanters, and from 1758 he forsook his wife and family in his enthusiasm for his self-appointed task. For more than forty years he and his old white pony were well-known figures in the vicinity of every churchyard of Southern Scotland where there were Cameronian monuments. 'Old Mortality' restored their lettering and otherwise kept them in order. He depended for his living chiefly upon Cameronian hospitality, which never failed him, had ever a melancholy mania for discoursing upon the persecutions of the hill-men, and died in poverty.

PATERSON, WILLIAM (1658-1719). A British financier, born in Dumfriesshire, Scotland. When a young man he removed to England, and then went to the Bahama Islands. Returning to London, he engaged in trade, and soon acquired a considerable fortune. Paterson is chiefly famous for having been the originator of the Bank of England and for having projected the Darien scheme. His first overtures to the Government for the establishment of the bank were made in 1691, but it was not until 1694 that Parliament adopted his plan and passed the act creating for ten years the corporation called the "Governor and Company of the Bank of England." Paterson was one of the original stockholders of the bank, but in less than a year he resigned, and soon afterwards took up the more visionary Darien scheme (q.v.). Removing to Edinburgh, he succeeded in persuading the Scottish Parliament to pass the Act of 1695, which created the "Company of Scotland trading to Africa and India," under the management of which the settlement at the Isthmus of Darien was made. Paterson, who had, because of a quarrel with the directors, accompanied the expedition merely as a private individual, lost his wife by death and suffered greatly from hardships and sickness. Upon his return to England he was an active and influential advocate of the union between Scotland and England, and had a considerable share in framing the articles of the treaty relating to trade and finance. In consideration of his public services, the united Parliament of 1708 recommended that he be given an indemnity for his losses in the Darien undertaking, but this was not done until 1715, when he received £18,241. Paterson published anonymously more than twenty works on finance, colonial enterprises, legislative union, and other subjects. His *Works* have been collected by Bannister in three volumes (London, 1859). Consult also, Bannister, *Life of W. Paterson* (Edinburgh, 1858).

PATERSON, WILLIAM (1745-1806). An American statesman and jurist, said to have

been born at sea. He came to America when very young, graduated at the College of New Jersey (Princeton) in 1763, studied law, and was admitted to the bar in 1769. In 1776 he was a member of the Legislative Council of New Jersey, and of the State Constitutional Convention. The same year he was elected Attorney-General and served ten years. He was a delegate to the Continental Congress in 1780-81, and in 1787 to the National Constitutional Convention. Here, as a representative of the smaller States, who feared to enter a union in which population or wealth should govern representation, he proposed (June 13th) the famous 'New Jersey plan.' This provided for a single legislative house, in which each State should have one vote; an Executive Council removable by Congress, and a supreme judiciary to be elected by Congress. The National Government should have power to regulate commerce, levy import duties, and, if necessary, make requisitions for money upon the States. He was one of the first Senators from New Jersey in 1789, but resigned in 1790. From 1791 to 1793 he was Governor of the State, and the town of Paterson was named in his honor. In 1793 Washington appointed him an associate justice of the Supreme Court, on which he served until his death. A collection of his letters has been published under the title *Glimpses of Colonial Society and the Life at Princeton College, 1766-1773*, by one of the class of 1763, edited by Mills (Philadelphia, 1903).

PATERSON, WILLIAM ROMAINE (1871—). An English novelist, better known by his pseudonym, Benjamin Swift. He was born in Glasgow, and studied a year at Lausanne. His books are: *Nancy Noon* (1896); *The Tormentor* (1897); *The Destroyer* (1898); *Siren City* (1899); *Nude Souls* (1900); and *The Game of Love* (1901). Of these the earlier were overfanciful or consistently disagreeable in matter, and in manner imitations of Meredith, but with *Siren City* he struck an original note.

PATHANS, pā-thānz'. One of the names of the Afghan peoples of the border-land of Hindustan and Afghanistan. The Indian Pathans have been of considerable historical importance, and the less cultured tribes have at times fought desperately against the British. Consult: Bellw, *The Races of Afghanistan* (London, 1880) and *Inquiry into the Ethnography of Afghanistan* (London, 1891); Oliver, *Across the Border, Pathan and Biloch* (London, 1890).

PATHELIN, pat'lān', or MAÎTRE PATHELIN. A noted French farce, composed probably at Rouen in 1465. Pathelin is a tricky lawyer, whose dishonest shifts form the staple of the action. It was worked over in modern style by Brueys and Palaprat (1706) as *L'avocat Patelin* and had great success. From their dialogue comes the familiar phrase *Revenez à vos moutons*, used there to recall Patelin to the sheep whose disappearance is under discussion. Consult Schaumburg, *Die Farce Pathelin und ihre Nachahmungen* (Oppeln, 1887).

PATHFINDER. A name given to Gen. John Charles Frémont, on account of his success in exploring the passes of the Rocky Mountains.

PATHFINDER, THE. A novel by James Fenimore Cooper (1840). It is the third in the *Leatherstocking Series*, and continues the career

of Natty Bumppo under the name of the Pathfinder. The scene is about Fort Oswego and Lake Ontario during the French and Indian War of 1756, and displays the sagacity of the hero in the perils of the wilderness.

PATHOLOGICAL ANATOMY (from Gk. *πάθος*, *pathos*, disease + *λογία*, *-logia*, account, from *λέγειν*, *legein*, to say). The branch of anatomy which treats of organs, tissues, and cells as changed from the normal by disease. It is usually studied in connection with the causative disease; and therefore in this work the pathological changes occurring during a disease are described in the article which treats of that disease.

PATHOLOGY (from Gk. *πάθος*, *pathos*, disease + *λογία*, *-logia*, account, from *λέγειν*, *legein*, to say). The study of disease as a province of scientific knowledge; pathological physiology. Disease is well defined as 'the expression of the sum of abnormal cell activities' (Schmaus). Such activity disturbs the regular cell life in one of three directions: nutrition, function, or multiplication. It is evident, then, that pathology is equally with physiology a department of biology.

Many theories of disease and its causation are found in the history of medicine. Athenæus, of Attalia (A.D. 69), was the founder of the pneumatic pathology. He held that there is a certain spiritual principle, the *pneuma*, which reaches the heart by way of the respiration and is thence driven through the whole body. When working regularly, and mixed with warmth and moisture, it occasions health. When mixed with warmth and dryness it occasions acute diseases. When mixed with cold and moisture it produces the phlegmatic diseases. When mixed with cold and dryness it causes melancholy. He also claimed that in febrile diseases the humors of the body became corrupted or putrefied. This putridity, he asserted, was a process within the fluids by which they exhaled much water.

Galen (130-c.201) elaborated and advanced the humoral pathology of Hippocrates (c.460-357 B.C.). He selected four fluids, or humors, of the body as the primary seats of disease: blood, phlegm, yellow bile, and black bile. Health he conceived to be the due combination, or 'crasis,' of these; while illness he considered was the result of a disturbance of this condition. During favorable progress of disease, these humors underwent a change, or 'coction,' which was taken as a sign of returning health and as a preparation for the 'crisis,' when an expulsion of morbid matter occurred. The humoral pathology was long in vogue. Sylvius (1478-1535) and Boerhaave (1668-1738) championed a new pathology. They asserted that the iatro-chemical 'acridities' of the fluids played a most important rôle. They classified acid, saline, oleaginous, glutinous, alkaline, and mixed 'acridities,' which were supposed to originate in the food and to be especially active in chronic diseases. Glisson (1597-1677) advanced the theory of 'irritability,' attributing it to both solids and liquids. Life itself was considered to be 'irritability.' Hoffmann (1660-1742) originated the 'solidist pathology.' He claimed that disease was "a marked disturbance in the movements of the solids and the fluids." In these disturbances the solids are the active and the fluids are the passive agents.

Excessive movement produces 'spasm' and defective movement produces 'atony.' Disease, he admitted, "might be due to alteration in the humors, and especially to a gradual thickening of the vessels, which tends at once to hinder their free circulation and to prevent the excretion of waste products." His four main sources of disease were, therefore, spasm, atony, altered humors, and deficient excretion. Barthoz (born 1734) launched the mystic and vague vitalistic pathology. He assumed the existence of a 'vital principle,' neither soul nor body. Disease he asserted to be the effort of the vital principle to resist harmful agencies, or to be due to "a morbid idea manifesting itself by alterations in sensibility, abnormal movements, or an aberration in those acts which regulate the chemical constitution of the humors."

It was reserved for Virchow in 1858 to enunciate clearly and elaborate convincingly the cellular pathology, now accepted the world over, and forming the basis of a universal view of the organs and the diseases which affect them.

The complex human organism may be reduced to very simple elements—the cells and the intercellular substance to which they give origin. All parts of all organs and tissues are composed of cells or products of cells. Blood and lymph are tissues, differing from muscular or fibrous tissues in that they have fluid intercellular substance. Cells are the conductors of vital functions, normal or abnormal. Their condition changes with age, disease, and fatigue on the one hand, and reparation and nutrition on the other.

Pathological conditions affect an organ in one of two ways: as an increase or as a decrease in vital activity. Hence such conditions may be divided into two classes: the retrogressive and the progressive disorders. It is obvious that each of these processes involves functional as well as anatomical differences and abnormalities. Between the two processes seems to stand the condition of arrest of development, due to mechanical causes or to interrupted vascular supply. If development begins, but is arrested, the condition is termed *aplasia*. If the arrest is partial, the condition is termed *hypoplasia*. If an organ is wholly undeveloped, the condition is termed *agenesia*.

The pathologist's attention is fixed largely upon the nature of anatomical changes found, and the explanation of their occurrence. These changes are termed 'lesions,' and upon more or less accurate idea of their nature and extent depend the success of measures taken for the relief of disease. Having established a conception of the lesions present, the investigator turns to their cause. The inquiry as to causation is embraced in the branch of pathology termed etiology. This department includes not only the study of vegetable organisms (bacteria) and animal organisms (such as plasmodia), and mineral toxins, and their agency in producing lesions, but also the study of reaction following the activity of the agent. This reaction depends, in some measure, upon the developmental disorder present, or the inherited dispositions of the tissues as to resistance or susceptibility. Inherited conditions are largely speculative and inferential, and this factor of etiology is of less importance in the analysis of disease. The essential feature of the whole matter is the adequate comprehension of the abnormal expression of cellular life.

There are, then, three subdivisions of pathology: etiology, or the study of causes of disease; morbid anatomy, or the study of structural changes in disease; and morbid physiology, or the study of disturbances of function, including morbid chemical action.

Pathology naturally separates into two great divisions: (1) general pathology, or the study of morbid conditions which are common to several different diseases; (2) special pathology, or the study of individual diseases. To illustrate, fever is a morbid condition which enters into a number of diseases, and therefore belongs to the realm of general pathology; while the study of the lesions of typhoid fever, an individual disease, belongs to special pathology. The study of the gross and microscopic anatomy of diseased tissues is termed pathological histology. The study of the lesions in diseases referred to the surgeon for treatment and of the lesions in post-operative conditions constitutes surgical pathology.

GENERAL PATHOLOGY. Of prime importance to the pathologist is the study of *disorders of circulation*, whether (1) *hyperæmia*, arising from excess of supply or diminished escape of supply of blood; or (2) *anæmia*, a decrease of supply of arterial blood; or (3) *hemorrhage* (see BLEEDING); or (4) *edema* (q.v.); or (5) *thrombosis* (q.v.), under which is to be considered *embolism* (q.v.), with consequent necrosis or relief by anastomosis.

Necrosis (q.v.) is a local death of tissue, due to circulatory disorder, thermic action, or inflammation. A regressive disorder of the life of cells in which there is diminished nutritive and functional derangement is *degeneration*. Ten forms occur. The degeneration may be parenchymatous (or albuminous), fatty, mucous, colloid, amyloid, hyaline, glycogenic, or hydropic, or may appear in the form of petrification or pigmentation. Some of these forms of degeneration are described in the article BRIGHT'S DISEASE. In some forms of degeneration products of imperfect metamorphosis accumulate within the cells. In others, necrotic cells and tissue elements or foreign material collect between the cells. In still others, there is a gradual degeneration of the cell elements and a deposition in their place of a new substance. Atrophy (q.v.), on the contrary, is essential loss of substance without deposit of pathological or foreign material. Each component part of the tissues shrinks in volume. Yet atrophy may be accompanied by deposits of various kinds, and in such cases coexists with degeneration, as in arterio-sclerosis (q.v.). Defective innervation, exhausting diseases, disuse, long-continued moderate pressure, or certain drugs may be the cause of atrophy, in different tissues, and these causes must be weighed by the physicians in determining pathological conditions in the course of treatment of a diseased person.

Among the progressive processes, or those in which the vital activity of the organism is actually increased, the most important are the reproductive. Inherent in every cell is the tendency for reproduction. Stimulus of various kinds awakens this innate tendency, which results in production of new tissue of various forms. Closely allied to the reproductive energy is the stimulus and the power to repair, to replace lost parts. Should the process of rebuilding go on to an

excess of mere replacement, or should regular physiological growth be excessive, and the result be an increase in size as well as an increase in number of the elements, the condition is termed *hypertrophy* (q.v.). Under the influence of bacteria or chemical agents or unascertained causes, and accompanied by pronounced vascular disturbance, a certain progressive process results in *inflammation* (q.v.). Still another progressive process results in the formation of neoplasm, or new growths, constituted of tissues of a different kind from those adjacent and developing at their expense. Most of these formations are considered under TUMOR.

With this preliminary knowledge of the processes at work, it is usual, in taking up the study of *special pathology*, to consider first the diseases of the blood, next those of the lymphatic tissues, then those of the various systems with their organs—respiratory, gastro-intestinal, urinary, and reproductive—and then the diseases of bones and of joints, of voluntary muscles, of the brain and its membranes, of the spinal cord and its membranes, and of the peripheral system of nerves.

To bacteria are ascribed the production of lesions, and they certainly influence chemical and physiological processes, locally and systemically. To their agency are ascribed pneumonia, diphtheria, cholera, leprosy, bubonic plague (qq.v.), etc. Animal parasites also play an important rôle in the production of pathologic conditions. Among them are the *Amœba coli*, the *Hæmatozoon malaria*, etc. It is believed, though not yet demonstrated, that to some protozoa are due scarlet fever, measles, and smallpox. There are also parasitic worms which produce diseases such as tænia, lumbricoides, filaria (qq.v.), etc. The special pathology of the different diseases is considered under the proper title for each disease.

Consult: Green and Murray, *Pathology and Morbid Anatomy* (Philadelphia, 1900); Stengel, *Textbook of Pathology* (ib., 1901); Schmaus and Ewing, *Pathology and Pathological Anatomy* (ib., 1902).

PATHROS. The Hebrew corruption of the Egyptian name for Upper Egypt, *Pa'to'rës*, literally 'the South-land.' It occurs in five passages of the Old Testament: Isaiah xi. 11; Jeremiah xlv 1-15; Ezekiel xxix. 14; xxx. 14. The name was probably pronounced *Pathoris* by the Hebrews, as is indicated by the Greek rendering Παθούρης and Φαδούρης. In Assyrian it appears as *Paturisi*. The Pathrusim, mentioned in Genesis x. 14 and I. Chronicles i. 12, are the people of Pathros or Upper Egypt. Consult Erman, in *Zeitschrift für die alttestamentliche Wissenschaft*, vol. x. (Giessen, 1890).

PATIALA, pāt'ā-lā. An eastern native State of the Punjab, India. Area, 5951 square miles. Population, in 1891, 1,583,521; in 1901, 1,586,030. Capital, Patiala.

PATIALA. The capital of a native Punjab State of the same name, India, 25 miles southwest of Ambala (Map: India, C 2). Population, in 1891, 55,856; in 1901, 53,545. There are about 5000 Sikhs; the rest are almost equally divided between Hindus and Mohammedans.

PATIENCE. A comic opera by Sir Arthur Sullivan with libretto by W. S. Gilbert (1881). It is a satire on the æsthetic craze in England in

the seventies, typified in the ridiculous character of Bunthorne. It was one of the most successful of the Savoy operas.

PATINIR, pá'té'nér', or **PATENIER**, -nyá', JOACHIM (c.1490-1524). A Flemish painter, born at Dinant. He was probably the pupil of Gheeradt David at Bruges. Afterwards he lived in Antwerp, where Albrecht Dürer painted his portrait on the occasion of his second marriage in 1521. He was the first of the Flemish painters to make figures subordinate to the landscape in his pictures. He had little knowledge of perspective, and the small figures he introduced are fantastically grouped. He painted with extreme detail. His best pictures are: "Baptism of Christ," Vienna Museum; "Virgin of the Seven Sorrows," Brussels Museum; "Temptation of Saint Anthony," and "Repose in Egypt," Madrid Museum.

PATKUL, pát'kul, JOHANN REINHOLD VON (1660-1707). A Livonian nobleman, prominent as an opponent of the Swedish power during the last part of the seventeenth century and the beginning of the eighteenth. He was born at Stockholm, where his father was then a prisoner of State, and after receiving a military education entered the Swedish Army and rose to the rank of captain. His bold advocacy of the rights of the Livonian nobility, which the Swedish Crown had suppressed, gained him the hatred of Charles XI., who in 1694 condemned him to mutilation and the loss of his estates. Patkul escaped, and, in 1698, took service with Augustus the Strong, Elector of Saxony and King of Poland, as a member of the Privy Council. He was instrumental in bringing about the alliance of Russia, Poland, Saxony, and Denmark against Charles XII. in 1700, but soon after left the Saxon Court and entered the service of Peter the Great. In 1704 he was Russian Ambassador at Warsaw, where his outspoken criticism of the conduct of Augustus led to his being imprisoned. In the Treaty of Altranstädt concluded between Saxony and Sweden in 1706, Augustus promised to surrender Patkul to Charles XII., but privately gave orders to the commandant of the prison to connive at his escape. Before this could be effected, however, a Swedish detachment entered Warsaw and Patkul was delivered into their hands. At Kazimierz, near Posen, on October 10, 1707, Patkul was broken on the wheel and quartered as a traitor to his country. Consult Buchholz, *Beiträge zur Lebensgeschichte J. R. Patkuls* (Leipzig, 1893).

PATMORE, COVENTRY KEARSEY DIGHTON (1823-96). An English poet, born at Woodford, Essex. His earliest publication was a volume of *Poems* (1844), praised by Bulwer and utterly condemned by *Blackwood* in an unsparing review. He also contributed to various periodicals, in particular to the *North British* and the *Edinburgh*, critical articles, which, although marked by valuable detached observations, are unsatisfactory because of his failure to understand work other than his own. It was he who asked Ruskin to send to the *Times* the latter's famous letter in defense of the Pre-Raphaelites, and he wrote for the *Germ* an essay on *Macbeth*, and verse, including *The Seasons*. However, he was not much concerned with the Pre-Raphaelite movement, and latterly at least held no complimentary opinion of Rossetti. He was at one time

a disciple of Tennyson, and in 1850 recovered the manuscript of *In Memoriam* from a cupboard in which it had been left. From 1846 to 1866 he was assistant in the printed-book department of the British Museum. His published verse includes: *The Angel in the House* (in part, 1854; complete, 1863; last ed. 1896); *The Unknown Eros and Other Odes*, i.-xxxi. (1877); and *Poems* (in a definitive edition, with a treatise on English metrical law, 1886; reprinted, 1890, 1894, 1897). Of these, the more pretentious are in narrative form, quite lacking in any unity of interest and at times bathetic, but with fine isolated passages, particularly convincing descriptions of natural scenery, set in the mass of context. His triviality and baldness have been perhaps too monotonously dwelt upon by the critics, and the high esteem of eminent contemporaries is not wholly to be disregarded; but his work seems much less remarkable than his rugged and striking personality. Of his prose may be mentioned *Principles in Art* (1889; new revised and rearranged ed. 1898), essays reprinted from the *Saint James's Gazette*, and *Religio Poeta* (1893; revised and rearranged, 1898). He wrote, also, a memoir of the poet Procter, better known as 'Barry Cornwall' (1877). Consult Champneys, *Memoirs and Correspondence of Coventry Patmore* (London, 1900).

PATMOS (Lat., from Gk. πάτμος). An island of picturesque and irregular shape, about 10 miles in extent from north to south, lying off the coast of Asia Minor (Map: Turkey in Asia, B 4). The most prominent physical feature of the island is its masses of volcanic hills, which rise 800 feet at their highest point. The island has borne no conspicuous part in history and owes its reputation to the reference made to it in the Bible (Rev. i. 9), where it is stated that Patmos was the place to which Saint John was exiled and that there he received the visions contained in the Book of Revelation. The island is now under Turkish rule and its condition has steadily deteriorated. The most important feature of modern Patmos is the Monastery of Saint John, founded in the eleventh century. Here was once gathered a very valuable library, many of the most important books in which have been sold.

PATNA. A native State of India, feudatory to the Central Provinces (q.v.). Area, 2399 square miles. Population, in 1891, 332,197; in 1901, 277,566. After having been several years under British administration, the State was restored to a descendant of its ancient Rajput rulers.

PATNA. A division of Behar, Bengal (q.v.), British India, comprising the districts of Patna, Gaya, Shahabad, Saran, Champaran, Muzaffarpur, and Darbhanga. Area, 23,686 square miles. Population, in 1891, 15,811,600; in 1901, 15,464,400. It is watered by the Ganges and its tributary, the Son. The climate is very hot in summer and mild in winter. The soil is fertile and well cultivated. Rice, wheat, and barley are grown, and the opium poppy is extensively raised. Capital, Patna (q.v.).

PATNA. The capital of a district and division of Bengal, British India, on the right bank of the Ganges, 130 miles east of Benares (Map: India, E 3). It covers a large area, stretching with its suburbs for 9 miles along the river

bank; its streets are crooked and dirty, and there are few interesting buildings. The Golab, a large, circular structure with walls more than 12 feet thick, originally built as a granary, is remarkable for its acoustic properties. The city has extensive bazaars, contains the largest opium factories in India, and is an important centre for the indigo trade. In the European quarter on the west are a Roman Catholic cathedral, Protestant churches, Government offices, schools, the Nabob's palace, and the great tank.

Patna, under the former name of *Padmavati*, or Lotus City, is supposed to have been the capital of Behar as early as B.C. 419. Here, at an early period, the East India Company established factories, and traded in opium, rice, etc. In 1763 disputes about transit-duties arose between the company's servants and the native Government. A war ensued, resulting in the British taking possession of the district. Patna was the headquarters of the Wahabi or Mussulman conspiracy in 1864. It lies on the principal railroad of the Ganges Valley, and also has considerable shipping on the river. Population, in 1891, 165,192; in 1901, 134,785, most of whom were Hindus, with about 40,000 Mohammedans and 500 Christians.

PATON, Sir JOSEPH NOEL (1821-1901). A Scottish historical painter. He was born at Dunfermline, Scotland, December 13, 1821. His first work in art was the designing of patterns for damask fabrics. He entered the Academy Schools, London, in 1843, and in 1845, as well as two years later, his designs received prizes in the Westminster Hall Competition. He became a member of the Royal Scottish Academy in 1850, and in 1857 he settled in Edinburgh. In 1866 he received the appointment of Queen's Limner for Scotland, and was knighted in 1867. He made the cartoons for the glass of the great windows of Dunfermline, restored in 1884 by Andrew Carnegie. He died at Edinburgh, December 10, 1901. His subjects are drawn from fairy tales, history, poetry, and religious lore, and his painting, though imaginative and sympathetic, is faulty in drawing and sometimes harsh in color. His chief works include "The Spirit of Religion" (1845); "Reconciliation of Oberon and Titania" (1847), National Gallery, Edinburgh; "Home from the Crimea" (1856); "Luther at Erfurt" (1861); "Death Barge of King Arthur" (1865); "Love in Tenebris" (1879).

PATOS, pã'tosh, LAGOA DOS. A lake in Brazil. See LAGOA DOS PATOS.

PATRAS, pã'trás, or **PATRÆ**. A fortified seaport of Greece and the capital of the Nomarchy of Achaia, situated in a fertile plain on the Gulf of Patras (Map: Greece, C 3). The town is dominated by a citadel-crowned ridge, the site of the ancient acropolis. It is well built, with wide and straight streets, and has a fine church and post-office, a high school, and ruins from ancient Greek and Roman times. The harbor is only a roadstead, protected by a breakwater, but the town is, nevertheless, an important trade centre, and the seat of a United States consul. The chief exports are currants, wine, oils, valonia, and skins. Population, in 1889, 33,529; in 1896, 37,958. Patras was one of the foremost among the 'twelve cities' of Achaia, and during the Middle Ages was the chief

commercial city of the Peloponnesus. It was destroyed by the Turks in 1821, but was soon rebuilt.

PATRIA POTESTAS (Lat., paternal power). The power of the father over his children in early Roman law was similar to that which existed among other Aryan peoples at the same stage of social development. (See PARENT AND CHILD.) What was peculiar in later Roman law was the extent to which this early power was maintained even at an advanced stage of civilization, and the duration of the power, in the case of sons, until the father's death. Daughters (at least in the earlier law) passed out of the paternal power upon marriage, but sons remained subject even after their marriage. The son had no *potestas* over his children until his father's death. *Patria potestas* was thus the authority not merely of the father over children, but of the ancestor over all descendants in the male line (son's children, son's son's children, etc.).

In early Roman law the father had an unlimited right to expose all infant daughters except the first-born. Sons and first-born daughters might also be exposed if they were deformed and the deformity were attested by five of the nearest neighbors. The father had also, as domestic magistrate, the right to punish his children, even with death, after a trial at which the kinsmen were present. These paternal rights existed throughout the Republican period, unchecked except by the arbitrary power of the censors and of the popular assembly to punish abuses of paternal power. In the Imperial period, however, exposure of children was forbidden and the right of punishment was reduced within disciplinary limits.

The father had also the right to sell the child. Sale into slavery was unusual; in the later Empire it was permitted only in the case of new-born children and only when the father was in extreme poverty, and even then the father retained the right of ransom. To pledge the person of a child for the father's debt (which was originally accomplished by sale with the right of ransom) was not uncommon, nor was this practice forbidden until the Imperial period. It was also not unusual for a father to sell his son's services for a number of years. A so-called royal law (i.e. a rule of the old religious law; see CIVIL LAW) forbade the sale of a married son; and another royal law declared that a son sold three times should be free from the father—a rule of which the jurists took advantage in devising a form of emancipation (q.v.). Sales of children for the purposes of emancipation or of adoption into a new family, and sales of daughters as a method of giving them in marriage, were of course purely formal.

Sons and daughters under *patria potestas* had no property of their own; whatever they acquired was acquired for the head of the house. In the Imperial period, however, the son and also the daughter obtained property rights: (1) Whatever the son acquired in the military or civil service of the Empire (*peculium castrense*, *quasi castrense*) was his own; (2) whatever a son or daughter acquired from the mother or from maternal relations (*bona materna*, *materni generis*), and, finally, whatever a son or a daughter acquired from any one except the father (*bona adventicia*), passed indeed into the control and usufruct of the father, but the equitable interest was in the child. Accordingly the father was for-

bidden to sell land thus acquired, and his estate was accountable to the children for all goods and money thus acquired.

With the development of the legal recognition of the child's right to life came the recognition of his right to support. With the development of independent property rights of the child came the duty to support an indigent parent.

Even at early Roman law there was one field in which sons were independent, viz., that of public law. The son under paternal authority had political rights and was eligible to office; and, if clothed with official power, he could control the actions of the father.

Paternal authority existed over children born to the father in lawful marriage. In the later Empire children born of a concubine (*filii naturales*) could be legitimized by the subsequent marriage of their parents or by rescript of the Emperor. Children thus legitimized and children brought into the family by adoption (*arrogatio* or *adoptio plena*; see ADOPTION) were subject to *patria potestas*.

Patria potestas was extinguished not only by the death of the father, but by his loss of liberty or of citizenship (*capitis deminutio maxima, media*). His capture and enslavement by foreign enemies, however, only suspended his paternal authority, and if he escaped or was ransomed it revived. The practical meaning of the rule was that condemnation to any penalty which carried with it loss of freedom or of citizenship destroyed *patria potestas*. Forfeiture of paternal authority was also imposed, by Imperial legislation, on the father who exposed his child or prostituted his daughter. The marriage of a daughter extinguished her father's authority as long as marriage (q.v.) carried the woman into the power (*manus*) of her husband; but when the free marriage was developed, the married woman remained under her father's authority. Even in such a marriage, however, her children were under the paternal authority of her husband or of her husband's father. Paternal authority was extinguished, in the older Roman law, when a son became a flamen of Jupiter or a daughter became a vestal virgin. In the law of Justinian the same result attached to the elevation of the son to the episcopate or his appointment to any important secular office. Finally, paternal authority was extinguished when the son or daughter was voluntarily emancipated or transferred to an adopted father. The emancipation of children originally deprived them of all right of inheriting property in their original family except by testament; but this result was obviated, as regarded the father's estate, by the prætorian edict, and, as regarded the estates of brothers, sisters, and paternal relatives, by Imperial legislation. Consult the authorities referred to under CIVIL LAW.

PATRIARCH (Lat. *patriarcha*, *patriarches*, from Gk. *πατριάρχης*, patriarch, chief of a tribe, from *πατρία*, patria, lineage, from *πατήρ*, *patēr*, father + *ἀρχαίνω*, *archein*, to rule). The name given to ten personages appearing in the antediluvian period of biblical history, who are, however, supposed by many modern scholars to represent traditional epochs or dynasties, similar in character to and standing in some connection with Berosus's list of antediluvian dynasties in Babylonia. See METHUSELAH.

In the history of the Christian Church, the title is applied to the bishops of certain great metropolitan sees of a wider jurisdiction than other metropolitans. The three earliest instances seem to be directly connected with a tradition of the establishment of those sees by Saint Peter. These are the three which the First Council of Nicæa asserts to be recognized by ancient custom—Rome, Antioch, and Alexandria. After the translation of the seat of empire to Byzantium, thenceforward called Constantinople, that see, which had originally been subject to the Metropolitan of Heraclea, obtained first metropolitan and then patriarchal rank, and eventually established a precedence over Antioch and Alexandria, being ranked second only to Rome. To these four patriarchates was added in 451 that of Jerusalem, which was formed out of the ancient Patriarchate of Antioch. The limits of these five patriarchates can only be loosely assigned. These patriarchs had authority to consecrate the metropolitans under their jurisdiction, and to preside over councils and high judicial tribunals within the same limits. After the Greek schism, and particularly after the establishment of the Latin Kingdom of Jerusalem, Latin prelates were appointed with the rank and title of patriarch in each of the four great Eastern sees. Since then there have been a number of patriarchs in the East, among the Greek Orthodox (one for Russia created in 1589 and removed by Peter the Great), among the Nestorian and Eutychian communities, and among those who have returned to union with Rome.

Besides the five greater patriarchates, there have been others in the West known by the name of minor patriarchates. The controversy of the Three Chapters (see CHAPTERS, THE THREE) gave the Bishop of Aquileia an opportunity to assume this title, whereupon the orthodox Bishop of Grado asserted an equal right to it. It remained in the former line even after the first bearer made his submission, until Benedict XIV. abolished it; that of Grado was transferred to Venice in 1451. In France the Bishop of Bourges at times claimed the title, and Napoleon had the idea of creating a French patriarch. Pope Paul III. granted the dignity of Patriarch of the Indies to the grand chaplain of the King of Spain, and the King of Portugal asked a similar dignity for his grand chaplain, with his see in Lisbon. As a matter of fact, by the concordat of 1886 which regulated the relations between Church and State in the Portuguese East Indies, the honorary title was conceded to the Archbishop of Goa.

PATRIARCHAL CROSS. A cross which, like the patriarchal crosier, has its upright part crossed by two horizontal bars, the upper shorter than the lower. A cross patriarchal fimbriated or was a badge of the Knights Templars.

PATRIARCHATE. (1) The rule or jurisdiction of a father. (2) Any social group, as a family, a clan, or a tribe, living under the rule of a father or eldest male member of the group. The term stands for an important stage in the development of human society, and for an important theory commonly called the patriarchal theory. In nomadic communities, and often in simple agricultural populations, there are found compound families, in which two or three generations of relatives, including many brethren

with their wives and children, live together under the rule of the eldest male, and in the common ownership of a household property. The society of the ancient Hebrews in the very early days is described in the Old Testament as patriarchal. The nomadic tribes of the Arabian desert and of the steppes of Central Asia are patriarchal now. The family and clan organization of the ancient Greeks and of the ancient Romans was patriarchal, and a large proportion of the Slavic population of Russia and of Southeastern Austria is patriarchal still. In its simplest form the patriarchal theory is stated by Aristotle in the opening pages of the *The Politics*. Society is represented as springing from a single family, consisting of a man and his wife and children. The children and children's children continue to live with the first father, acknowledging him as chief or patriarch as long as he lives. On his death his descendants divide into as many families as he has sons with offspring. Each such son becomes the patriarch of a new compound family. In the course of time many such related families, living in one district and speaking one tongue, become a tribe. Tribes enlarging divide, but if they do not separate too far they presently confederate and become a nation. This simple theory underwent great modification through the researches of Sir Henry Sumner Maine, who in *Ancient Law* (London, 1861) showed that the patriarchal family of the Romans was a partly natural, partly artificial group held together by the supreme power (*potestas*) of the eldest male. Membership in the group might be acquired through adoption as well as by actual descent from the first father, and it could not be acquired through blood relationship on the side of the mother. Neither males nor females not subject to the father's power were accounted of the group, and property descended only through kinship in the male line. The group was thus essentially not a compound family, but, rather, a clan or gens. (See *GENS*.) Maine attempted to prove in this work, and later in *Early Law and Custom* (London, 1883), that this highly artificial patriarchal system had been general among Aryan peoples. A destructive criticism of Maine's theories by John F. McLennan, *The Patriarchal Theory*, edited and completed by Donald McLennan, was put forth (London) in 1885. In this work it was shown that the patriarchal family has everywhere been preceded by the clan and family system based on kinship through females, and that the true *patria potestas* has been of exceptional occurrence, even after the patriarchal system has been established. Substantially the same conclusions are maintained by W. Robertson Smith, *Kinship and Marriage in Early Arabia* (London, 1885). An exceedingly interesting and instructive account of the economic aspect of patriarchal institutions, especially in Slavic communities, is found in Laveleye's *De la propriété et de ses formes primitives* (Paris, 1874; translated, *Primitive Property*, London, 1878). See *MATRIARCHATE*; *MARRIAGE*.

PATRIARCHS, TESTAMENT OF THE. See *APOCRYPHA*, section on *Old Testament*.

PATRIARCHS, TESTAMENTS OF THE TWELVE. See *APOCRYPHA*, section on *Old Testament*.

PATRICIAN (Fr. *patricien*, from Lat. *patricius*, of the rank or dignity of the fathers, from *pater*, Gk. *πατήρ*, *pater*, Skt. *pitar*, father;

connected with Goth. *ƿadar*, OHG. *fatar*, Ger. *Vater*, AS. *ƿader*, Eng. *father*). A name given to the members of the original Roman *gentes*, of whom the *populus Romanus* consisted, and to their descendants by blood and adoption. The amalgamation of the three tribes of Ramnes, Tities, and Luceres gave rise to a distinction between *patres majorum gentium* and *patres minorum gentium*—the latter term being applied to families recently elevated to an equality with the old patrician class. On the establishment of the plebeians as a distinct order, sharing certain rights with the patricians, the patriciate became an aristocracy of birth, in the exclusive possession of a number of important privileges. A long struggle between the two orders ended in the attainment by the plebeians of a political equality, and the establishment of a new aristocracy of *nobiles* based on wealth and office. From B.C. 300 the old political distinction between patricians and plebeians had no real existence, except that patricians were ineligible to the tribunate of the plebs. The Empire made an end even of this relic of earlier days. Under Constantine the dignity of *patricius* became a personal title, not hereditary, but conferring very high honor and certain privileges. It was created at Constantinople, and not confined to Romans or subjects of the Empire, but sometimes bestowed on foreign princes. These patricians, unlike the old Roman order, were distinguished in dress and equipage from the ordinary citizens. The popes in after times conferred the same title on eminent persons and princes, including many of the German emperors. In several of the Germanic kingdoms the title of patrician was bestowed on distinguished subjects, and in some parts of Italy the hereditary nobility are still styled patricians. See *ROME*; *PLEBEIANS*.

PATRICK, SAINT (373?-463?). The apostle of Ireland. Of the existence of this holy man there is no question, but every other fact about him has been hotly disputed. This is the more strange as he left an autobiography, but as his object in it was rather to exalt the work than the worker, he was not careful to give facts in their chronological order or to detail his life; so that for the purposes of a sketch of his life the document has little value. According to the facts which can be gathered from this work Patrick was born at Banavem Tabernie, in Scotland, probably identical with the modern Dumbarton, on the Leven near its confluence with the Clyde, a few miles northwest of Glasgow. His father was Calpornius, deacon in the Church, also a decurion and a man of means and standing. His baptismal name was Suat. When he was sixteen years old he was captured by pirates and carried to Ireland, where he was sold to Miliuc, chieftain of North Dalaradia, in the County of Antrim, North Ireland. He lived as a slave for six years, employed in tending cattle. His sad condition drove him to find consolation in God, and he learned to wait upon the divine will. In obedience to a divine intimation, he fled from his master and journeyed south 200 miles. He found a ship about to sail for France, and after a little parley was taken on board as a servant, and in three days landed at the mouth of the Loire. Then for twenty-eight days he traversed a wild country with the ship's company until they came to Marseilles. Here he parted

from his companions and went to Tours, where the famous Martin (q.v.) was Bishop. If, as some accounts state, his mother was the sister of this Martin, his going to Tours was the more natural. He lived with Martin for four years. At last he returned to Scotland. But the desire to devote himself to preaching the Gospel to the Irish was strengthened by visions and voices, and he went to Auxerre in France to be consecrated by Bishop Amator. It was on this occasion that he assumed the name of Patrick, by which he is now exclusively known. In 405 he began his missionary work in Ireland, and the rest of his long life was spent in incessant labors with commensurate success. He came to Ireland with a thorough knowledge of the language and of the people and seems to have encountered little opposition. He found no Christians and left no heathen. It is probable that he died at Armagh in 463. His bell is in the Museum of Arts and Sciences in Dublin; his crosier was preserved till the Reformation, but then unfortunately it was burned.

Besides the Patrick of history there is the Patrick of legend, and the less attractive Patrick of controversy. Among the many legends which have gathered about him the most familiar is that he banished the snakes from Ireland. Others represent him as escaping from his foes by miraculous agencies. For example, it is related that on one occasion when a company was lying in wait to slay Patrick and his companions, he chanted his hymn, called a 'Breastplate,' and the opponents mistook the Christians for wild deer with a fawn behind them. These legends have enhanced Patrick's reputation and doubtless some of them have some foundation in fact. The Patrick of controversy is now by birth a Frenchman, now an Irishman; now of the third century, now mythical; now a Presbyterian, now a devoted follower of the Roman Church; now deriving his orders from Scotland and now from Rome; now remarkably successful, now really accomplishing very little.

Patrick was emphatically a man of deeds and not of words, and so his literary remains are few, though of great interest. First is his autobiography, which he calls his *Confession*. This was written in Latin, in which tongue he had become very rusty. Next comes his Epistle to Coroticus, a Welsh prince, who had taken captive some of the Irish Christians. Patrick wrote to secure, if possible, their release. Finally, his hymn in Irish, called a 'Breastplate,' which is a confession of faith, showing plainly the very simple character of Patrick's faith. Other remains bearing his name have not such good claim to be called genuine. All his remains, genuine and disputed, are in Migne, *Patr. Lat.*, liii.; also in better shape with the *Tripartite Life*, one of the sources of his biography, in the "Rolls Series," No. 89, two parts, edited by Whitley Stokes (London, 1887). For English translations of his genuine works and notes, consult: Wright, *The Writings of Patrick, the Apostle of Ireland* (London, 1889); and Olden, *Epistles and Hymns of Saint Patrick* (Dublin, 1876; 3d ed. 1895). For his life, consult: Miss Cusack, *Life of Saint Patrick, Apostle of Ireland* (London, 1871, with a translation of the *Tripartite Life* from the original Irish by Hennessey); also Todd, *Saint Patrick, Apostle of Ireland* (Dublin, 1864);

Morris, *Ireland and Saint Patrick* (London, 1888); Newell, *Saint Patrick, His Life and Teaching* (ib., 1890); Shearman, *Loca Patriciana* (ib., 1879).

PATRICK, SAINT, ORDER OF. See SAINT PATRICK, ORDER OF.

PATRICK, SIMON (1626-1707). A Church of England divine. He was born at Gainsborough, Lincolnshire, and graduated from Queen's College, Cambridge, in 1648. He took orders, and in 1655 was received as chaplain into the family of Sir Walter Saint John, of Battersea. In 1662 he was appointed rector of Saint Paul's, Covent Garden, London, and endeared himself to his people by faithful instructions, and especially by remaining with them during the plague of 1665. In 1671 he was made chaplain in ordinary to the King. In 1672 he was made prebendary of Westminster, and in 1679 Dean of Peterborough. During the reign of James II. he defended Protestantism. In 1689 he was made Bishop of Chichester, and in 1691 transferred to the see of Ely. In his early life he wrote against the Non-Conformists, in a pamphlet entitled *A Friendly Debate Between a Conformist and a Non-Conformist* (1669), but after he became bishop he changed his opinion, regarded them with favor, and used his influence to allay strife. He stood next to Tillotson in learning and influence. Among his numerous works were: *Mensa Mystica, or A Discourse Concerning the Sacrament of the Lord's Supper* (1660); *The Heart's Ease, or a Remedy Against Trouble* (1660); *The Parable of the Pilgrim* (1664); *The Christian Sacrifice* (1671); *The Dignity of the Christian Priesthood* (1704). His paraphrases upon the books of the Old Testament from Genesis to Solomon's Song were published in ten volumes between 1695 and 1710. They are included with the commentaries of Lowth, Arnold, Whitby, and Lowman, in *A Critical Commentary and Paraphrase on the Old and New Testament and the Apocrypha* (London, 1809). A complete edition of his works was published in 1858 by the Rev. Alexander Taylor, in nine volumes. His *Autobiography* was published at Oxford in 1839.

PATRIOFELIS (Neo-Lat., from Lat. *paterius*, relating to a father, hereditary, ancient + *felis*, cat). A fossil creodont mammal found in the Middle Eocene (Bridger) beds of Wyoming, and of interest because it is considered by some authors to be the ancestor of the modern seals. Other writers, basing their conclusions on more recent examination of the material, consider *Patriofelis* to have been a terrestrial creodont with habits similar to those of the cats and presenting a lateral line of evolution that seems to have no descendants among modern carnivores. The animal, as indicated by the finely mounted skeleton in the American Museum of Natural History, was of heavy build, about six feet in length with low, crouching attitude, flexed limbs, and long tail. The skull is rather large, with small brain case, and a prominent posterior crest. The powerful jaws are armed with sharp cutting teeth. The feet are digitigrade with spreading clawed toes. *Oxyena*, from the Wasatch lower Eocene beds, is a more slender, less specialized ally of *Patriofelis*. Consult: Wortman, "Osteology of *Patriofelis*, a Middle-Eocene Creodont," in *Bulletin of the*

American Museum of Natural History, vol. vi. (New York, 1894); and Osborn, "Oxyæna and Patriofelis Re-Studied as Terrestrial Creodonts," in *Bulletin of the American Museum of Natural History*, vol. xiii. (New York, 1900).

PATRIOTIC SOCIETIES (ML. *patrioticus*, from Gk. πατριωτικός, *patriōtikos*, relating to descent or to a fellow-countryman, from πατρίωτης, *patriōtēs*, fellow-countryman, from πατρία, *patria*, race, country, from πατήρ, *patēr*, father). Societies having as their objects the preservation of the records of important events in history, and especially of the wars in which the United States has participated; the encouragement of love of country; the saving and restoration of historical sites and objects; the celebration of anniversaries of historic events; and the fostering of fraternal feeling and intercourse among veterans.

Of the colonial period, the first of the hereditary patriotic bodies is the Society of the Mayflower Descendants. (See MAYFLOWER DESCENDANTS, SOCIETY OF.) The Society of Colonial Wars admits to membership adult male descendants of Colonial ancestors of distinction. (See COLONIAL WARS, SOCIETY OF.) Similar to the foregoing is the Order of the Founders and Patriots of America. Besides colonial ancestry, it requires that its members shall be descended from ancestors who were loyal to the colonies during the War of the Revolution. (See FOUNDERS AND PATRIOTS OF AMERICA, ORDER OF.) Of like character is the Settlers and Defenders of America (q.v.), which admits both men and women. The first patriotic hereditary society of women to be organized was the Society of Colonial Dames of America. It admits on invitation women who are directly descended from some ancestor of worthy life who resided in an American colony before 1776. (See COLONIAL DAMES OF AMERICA, SOCIETY OF.) Broader in its scope is the National Society of Colonial Dames of America. It admits on invitation women who are descended from an ancestor of worthy life who resided in an American colony prior to 1750. (See COLONIAL DAMES OF AMERICA, NATIONAL SOCIETY OF.) The Society of Daughters and Patriots of America admits to membership by invitation women who are descended in the direct paternal line of either father or mother from an ancestor who settled in the colonies before 1687, and of an ancestor in the same line who was loyal to the colonies during the War of the Revolution. In New York City there is the Holland Society (q.v.), which admits to membership male descendants in the direct male line of a man of Dutch blood resident in America before 1675.

Commemorating the period of the great struggle between the colonies and Great Britain are a number of hereditary societies, of which the oldest and best known is the Society of the Cincinnati (q.v.), which admits to membership descendants of officers who served in the Continental Army for at least three years. Following the centennial celebration of the battle of Lexington, there was organized in San Francisco, Cal., on October 22, 1875, the Sons of Revolutionary Sires, which, on April 30, 1889, became the Society of the Sons of the American Revolution. (See SONS OF THE AMERICAN REVOLUTION, SOCIETY OF THE.) The Society of the Sons of the Revolution has priority over the previous-

ly mentioned society in the Eastern States, and has almost identical requirements, for it admits to membership lineal descendants of participants in the War of the Revolution. (See SONS OF THE REVOLUTION, SOCIETY OF.) The Naval Order of the United States (q.v.) admits to membership any officer, or descendant of one, who served in the naval forces of the United States during the War of the Revolution or any of the subsequent wars. Enlisted men who have received the naval medal of honor are also eligible to membership. One of the most distinguished among the patriotic societies is the Military Order of Foreign Wars, which admits to membership commissioned officers who participated in the foreign wars of the United States, and their direct lineal descendants in the male line. See FOREIGN WARS, MILITARY ORDER OF.

Originally the Sons of the American Revolution admitted to membership women, but this being found unsatisfactory, special organizations were instituted for women, the first of which was the Society of the Daughters of the American Revolution, which admits any woman of acceptable character descended from an ancestor who rendered material aid to the cause of independence. (See DAUGHTERS OF THE AMERICAN REVOLUTION, SOCIETY OF.) Of similar nature is the Daughters of the Revolution (q.v.). Other societies are the Daughters of the Cincinnati, organized in New York City in 1894, and the Dames of the Revolution, organized in New York City in 1896. The Society of the Children of the American Revolution, with a membership of over 5000, was organized in Washington in 1895.

Of the period subsequent to the War of the Revolution and prior to the Civil War, there are comparatively few associations that are both patriotic and hereditary, although worthy of mention of that character is the Saint Nicholas Society of New York, organized in New York City on February 28, 1835. This society admits natives or residents of New York State who are descended from residents of the State prior to 1785. The American Order of Louisiana was organized in Denver, Colo., on December 20, 1901, and admits to membership descendants of those who rendered distinguished services in the settlement and civilization of the Louisiana Purchase States, from 1803 to 1903. The War of 1812 is commemorated by the Veteran Corps of Artillery (q.v.), which since 1892 has been known as the Military Society of the War of 1812. The General Society of the War of 1812 admits to membership any male person who is lineally descended from a participant in the War of 1812. (See WAR OF 1812, GENERAL SOCIETY OF.) Corresponding to the last-mentioned is the Society of the United States Daughters, 1812. (See UNITED STATES DAUGHTERS, 1812, SOCIETY OF.) The memory of the War of Mexico is preserved by the Aztec Club of 1847 (q.v.). The Association of Mexican Veterans admits to membership descendants of any participant who served in that war.

The Civil War proved rich in the formation of commemorative societies. One of the most important of these is the Military Order of the Loyal Legion, which admits to membership officers who participated in the war, and as a second class the eldest sons of living original members. (See LOYAL LEGION OF THE UNITED

STATES, MILITARY ORDER OF.) The Grand Army of the Republic (q.v.), popularly known as the G. A. R., admits to membership any soldier or sailor who was honorably discharged after service. As the Grand Army grew in strength, there was organized as an auxiliary the Woman's Relief Corps (q.v.), which admits to membership mothers, wives, daughters, and sisters of Union soldiers. Also auxiliary to the Grand Army is the Sons of Veterans, U. S. A. (q.v.). The Union Veteran Legion (q.v.) draws the line a little closer than the G. A. R., for it admits to membership only those who volunteered prior to July 1, 1863, for a term of three years. That is to say, it will not admit any drafted person or substitute. It has as an auxiliary the Ladies of the Union Veteran Legion, which was organized in Newark, Ohio, on February 20, 1890. The Union Veteran Union (q.v.) admits to membership veterans who served between April 12, 1861, and April 30, 1865, and who participated in one or more engagements or battles, and received an honorary discharge. Of broader scope than the foregoing is the Regular Army and Navy Union of the United States of America (q.v.), in which any honorably discharged soldier, sailor, or marine, without regard to time or length of his service, is eligible for membership. Of worthy recognition in this connection is the Medal of Honor Legion (q.v.), which is composed of officers and enlisted men who have received the medal of honor (q.v.) for distinguished conduct in action. The United States Veteran Navy (q.v.) admits to membership any officer or enlisted man in the naval service during the period of the Civil War or during the Spanish-American War. There is also the National Association of Naval Veterans, to which any officer or enlisted man who served in the navy or marine corps during the period of the Civil War is eligible. (See NAVAL VETERANS, NATIONAL ASSOCIATION OF.) Mention should also be made of the Society of the Army of the Cumberland, Society of the Army of the Potomac, and Society of the Army of Tennessee, as well as the Eleventh Army Corps Association, whose character is evident from their names. They now admit to membership descendants of original members, thus becoming hereditary societies.

The history of the Confederate States of America is preserved by three organizations, the oldest of which is the United Confederate Veterans, which admits to membership any soldier or sailor who served in the Confederate service during the Civil War. (See CONFEDERATE VETERANS, UNITED.) The United Sons of Confederate Veterans admits to membership any male descendant over sixteen years old of a soldier or sailor who served in the Confederate Army or Navy. (See CONFEDERATE VETERANS, UNITED SONS OF.) The United Daughters of the Confederacy admits to membership the widows, wives, mothers, sisters, and lineal descendants of those who served in the army or navy of the Confederate States. See CONFEDERACY, UNITED DAUGHTERS OF THE.

The long period between the Civil War and the war with Spain saw the organization of two patriotic societies, the Order of the Indian Wars of the United States, founded at Chicago in 1896, and the Society of Veterans of Indian Wars of the United States, established at Philadelphia

in the same year. The War with Spain (1898) was prolific in the formation of war societies. Corresponding to the Loyal Legion is the Naval and Military Order of the Spanish-American War, which admits to membership officers who were on the active list in the United States army, navy, marine corps, or revenue marine, during the War with Spain, or the subsequent insurrection in the Philippines. (See SPANISH-AMERICAN WAR, NAVAL AND MILITARY ORDER OF.) The most important organization of this period, however, is the Spanish War Veterans (q.v.), which admits to membership soldiers and sailors of the volunteer army and marine corps who served honorably during the war. Of similar nature is the Society of Spanish-American War Veterans, which was organized in Trenton, N. J., on December 14, 1899. Arrangements were concluded in 1903 for the consolidation of this organization with the Spanish War Veterans. The Society of the Army of Santiago de Cuba admits to membership all officers and soldiers of the United States Army who served with the expeditionary force to Santiago de Cuba. (See SANTIAGO DE CUBA, SOCIETY OF THE ARMY OF.) The occupation of Porto Rico gave rise to the Military and Naval Society of the Porto Rican Expedition. (See PORTO RICAN EXPEDITION, MILITARY AND NAVAL SOCIETY OF.) The members of the first regiment of United States Volunteer Cavalry that served in Cuba, before disbanding, organized the Rough Riders' Association. The Spanish-American War in the West Indies was also productive of the Society of the Caribbean, which was founded by American war correspondents who participated in the naval and military campaigns in Cuba and Porto Rico. Service in the Philippines led to the organization of the National Society of the Army of the Philippines. Membership is extended to soldiers and sailors who served during the war in the Philippine Islands. The Military Order of the Carabao was formed in the Philippines by officers who served in those islands during the fighting period, and any officer is eligible to membership who was there prior to July 4, 1902. Participants in the Chinese expedition for the relief of Peking, on their return to Manila, organized the Military Order of the Dragon.

Mention must be made of such organizations as the Mount Vernon Ladies' Association, which has for its special purpose the preservation of the home of Washington. Of similar nature is the Ladies' Hermitage Association, which cares for the home of Andrew Jackson, near Nashville, Tennessee, and the Betsy Ross Memorial Association, which has saved the house in Philadelphia where the first American flag was made. The Landmarks Club in Los Angeles is doing a splendid work in the restoration and preservation of the old missions which were left to us by the Spanish occupants of Alta California and the beautiful missions near San Antonio are cared for by an organization of women in Texas. In Colorado the cliff dwellings of the Mancos Cañon have been leased by the Colorado Cliff Dwellers' Association, and efforts have been made by that body to secure the permanent preservation of these ancient ruins by Congress. The Thomas Jefferson Memorial Association, which has for its object the building of a suitable memorial to the author of the Declaration

of Independence, is one of the latest of these organizations. Two national bodies have been formed for such work. Of these the American Scenic and Historic Preservation Society is the older. (See SCENIC AND HISTORIC PRESERVATION SOCIETY, AMERICAN.) The National Trust for Places of Historic Interest or Natural Beauty was formed in Washington City, in 1902. Its members were influential in the movement in 1903 that prevented the demolition of the ancient walls of Manila.

PATRIOTS' DAY. The anniversary in the State of Massachusetts of the double battle of Concord and Lexington on April 19, 1775. It was first observed April 19, 1894.

PATRIPASSIANISM (from Lat. *patrius*, relating to a father, from *pater*, father + *passio*, suffering, from *pati*, to suffer, to endure). One variety of Monarchianism, a belief held by many Christians in the West about 200, according to which Christ and God were so completely identified that the Father himself was said to have suffered and died on the cross. It seems to have originated in the East, but was brought to Rome by Praxeas, late in the second century, and a little later by Noëtus of Smyrna. Its most famous advocate was Sabellius (q.v.), whose name is often used to designate this form of belief (Sabellianism). Tertullian and Hippolytus vigorously attacked the Patripassianists, or Modalists, as they are also called. Largely under the influence of Origen's teaching, the Church rejected modalism, and defined the Catholic doctrine of the Trinity so that it expressed personal distinctions in the Godhead. See ATHANASIUS, and NICÆA, COUNCIL OF. Consult: Harnack, *History of Dogma*, vol. ii. (London, 1896); Fisher, *History of Christian Doctrine* (New York, 1896).

PATRISTIC THEOLOGY. The name applied to the teachings of the early Christian writers who are collectively known as Fathers (q.v.) of the Church. They are commonly divided as follows: (1) The Apostolic Fathers. These include Clement of Rome, Polycarp, Ignatius, Barnabas, Hermas, and Papias. (2) The Ante-Nicene Fathers of the second and third centuries, whose work is mainly of an apologetic nature, against Jews on the one hand and Gentiles on the other. Of these the principal names are Justin Martyr, Irenæus, Clement of Alexandria, and Origen in Greek, and Tertullian and Cyprian in Latin. (3) The Nicene Fathers of the fourth century, who set forth the fully developed doctrines of the Trinity and the Incarnation, and defended them against heretics on both sides of the received teachings. They include Eusebius, the historian, Athanasius, Gregory of Nazianzus, Gregory of Nyssa, Cyril of Jerusalem, John Chrysostom, and Epiphanius in Greek, Hilary of Poitiers, and Ambrose in Latin. (4) Classed as Post-Nicene are, in the East, Cyril of Alexandria, Theodoret and John of Damascus; in the West, Jerome, Augustine, Leo the Great, and Gregory the Great. For extended treatment, see the articles under each of these names. From the literary point of view, there is often much to criticize in their works; but the lack of classical elegance and refinement of diction is compensated by the single-hearted fervor and devotion to their cause with which they write.

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PATROCLUS (Lat., from Gk. Πάτροκλος, *Patroklos*). In Greek legend, a son of Menætiüs, and friend of Achilles (q.v.). According to the common story, while yet a boy in Opuntian Locris, he accidentally killed a playmate, and in consequence was brought by his father to Peleus, father of Achilles, Phthia. With Achilles he went to the Trojan War. Though he was mentioned in the stories of the earlier years of the Trojan War, it is through the *Iliad* that his name has become familiar to us. At the crisis of the battle, when the victorious Trojans had begun to burn the Greek ships, Patroclus persuaded the angry Achilles to allow him to lead the Myrmidons to the rescue. At their head he drove the routed Trojans to their walls, but fell before Apollo and Hector. Over his body raged one of the fiercest struggles of the poem, and it was only when the cry of Achilles struck panic among the Trojans that the Greeks were able to bear it to the ships, where it was mourned in touching verses by Achilles. In later times Patroclus was worshiped as a hero on the Hellespont, where he was believed to be buried with Achilles, and at Opus in Locris.

PATROL (from Fr. *patrouiller*, to patrol, dabble in the water, paw, OF. *patrouiller*, *patouiller*, *patoiller*, to paddle through water, from *patte*, *pate*, paw). In the United States Army, patrols are classified under the following heads: Officers; reconnoitring, visiting, covering, or flanking and connecting patrols. Patrols organized for special or extraordinary purposes, are: Exploring, harassing, expeditionary, and pursuing patrols. The general duties of patrols are to gain all information possible regarding the enemy, and prevent a similar operation on his side. Other duties are also assigned them, dictated by the specific circumstances of the case. Whenever possible, patrol duty is performed by the cavalry, particularly if the enemy is known to be at a distance. At night, or in close, broken, or wooded country the duty is of necessity performed by infantry—although a few horsemen would if possible be attached for the speedy conveying of information. In the 1901 manoeuvres of Germany, France, and Austria, cyclists were found extremely useful as messengers from both cavalry and infantry patrols, wherever the nature of the country admitted of their use; and they are now regularly attached for that purpose. Ordinary patrolling may be performed by any number of men, from three to a company of infantry or a troop of cavalry; a *strong patrol* consists of from 9 to 100 men, and a *small patrol* from 3 to 8 men. *Officers' patrols* consist of from 2 to 10 men, or occasionally of two officers only. They are used in connection with the cavalry screen (q.v.). *Visiting patrols* are a part of outposts (q.v.). *Connecting patrols* are of cavalry, and maintain connection between given points or bodies of troops. *Covering or flanking patrols* reconnoitre along the lateral communications, keeping in touch, if possible, with the main body. *Exploring patrols* carry out many of the duties of a topographical reconnaissance (see *Military Surveys*, in the article ENGINEERING, MILITARY) besides their more specific instructions. *Harassing patrols* are assigned the duty of disturbing and annoying the enemy, by depriving him of sleep and rest. *Expeditionary patrols* are sent out to destroy the enemy's

property, roads, railroads, telegraphs, etc., or to capture his patrols or pickets. *Pursuing patrols* hang on the flanks or rear of a retreating enemy—keeping their own troops supplied with information regarding them. On the thoroughness of patrol service largely depends the value to the main body of effective outpost service, or of advance, rear, or flank guards. (See RECONNAISSANCE.) Excellent authorities in regard to this important service are: Shaw, *Elements of Modern Tactics* (11th ed., London, 1900); Wagner, *The Service of Security and Information* (Kansas City, 1896); and Smylie, *Points in Minor Tactics* (New York, 1898).

PATRON (OF., Fr. *patron*, from Lat. *patronus*, protector, from *pater*, father). Among the Romans, originally the appellation of a citizen who had dependents, called clients, attached to him. Before the time of the Laws of the Twelve Tables, the most frequent use of the term *patronus* was in opposition to *libertus*, these two words being used to signify persons who stood to one another in the relation of master and manumitted slave. The Roman was not deprived of all right in his slave when he freed him; a tie remained somewhat like that of parent and child, and the law recognized important obligations on the part of the *libertus* toward his patron, the neglect of which involved severe punishment. In some cases the patron could claim a right to the whole or part of the property of his freedman. The original idea of a patron apart from the manumitter of slaves continued to exist. A Roman citizen, desirous of a protector, might attach himself to a patron, whose client he thenceforward became; and distinguished Romans were sometimes patrons of dependent States or cities, particularly where they had been the means of bringing them into subjection. Thus the Marcelli were patrons of the Sicilians, because Claudius Marcellus had conquered Syracuse and Sicily. The patron was the guardian of his client's interests, public and private; as his legal adviser, he vindicated his rights before the courts of law. The client was bound, on various occasions, to assist the patron with money, as by paying the costs of his suits, contributing to the marriage portions of his daughters, and defraying in part the expenses incurred in the discharge of public functions. Patron and client were under an obligation never to accuse one another; violation of this law was tantamount to treason, and any one might slay the offender with impunity. As the patron was in the habit of appearing in support of his clients in courts of justice, the word *patronus* acquired, in course of time, the signification of advocate or legal adviser and defender, the client being the party defended; hence the modern relation between counsel and client. Patron, in after times, became a common designation of every protector or powerful promoter of the interests of another; and the saints, who were believed to watch over the interests of particular persons, places, trades, etc., acquired in the Middle Ages the designation of their patron saints. The saint in whose name a church is founded is considered its patron saint.

PATRONAGE (Lat. *patronaticum*, homage due a patron, from Lat. *patronus*, protector), ECCLESIASTICAL. The right of presenting a properly qualified person to a vacant ecclesiastical position. Such a right is under many cir-

cumstances a species of property that may be enforced in the proper courts of law. The patron originally was the person who founded or endowed the benefice, yet the title came to be applied also to one who succeeded to the right as property. Proprietors of lands were early encouraged to build and endow churches on their own possessions. In such cases the priest in charge did not look to the bishop for his support, but was allowed to receive the whole or a part of the profits of the lands with which the founder had endowed the church. Eventually it came to be stipulated with the bishop that the founder and his heirs should have a share in the administration of the property and have the right to nominate a person in holy orders to be the incumbent whenever a vacancy occurred. The person enjoying the privileges of a founder was called *patronus* and *advocatus*. He had a prominent seat and a burial place in the church; his name and arms were engraved on the church, and on the church walls, and he was specially named in the public prayers. He sometimes also had a right to a portion of the church funds, called *patronagium*.

In France the right of patronage was often extended by the sovereigns to churches not originally private foundations. Church property was bestowed in fee on laymen, who appropriated the greater part of the revenues, and took the appointment of the clergy into their own hands. It was at last ruled by the third and fourth Lateran councils (1179 and 1215) that the presentation of the patron should not of itself suffice to confer any ecclesiastical benefice when the presentee was a layman.

Toward the close of the twelfth century letters of request began to be issued by the popes to patrons that benefices should be bestowed upon particular persons. What had at first been requested as a favor was soon demanded as a right. In the thirteenth century the patronage of all livings whose incumbents had died at the court of Rome (*vacantia in curia*) was also claimed by the Pope. By the fourteenth century these claims encountered effective opposition. England took the lead in a resistance which was in the end successful. In Scotland, at the time of the Reformation, the rights of patrons were reserved and the presbyteries were bound by several statutes to admit any qualified person presented by the patron. For three centuries the question of lay patronage was a cause of contention, legislation, and litigation, but by an act of Parliament passed in 1874 patronage in Scotland was abolished, and the right of choosing their minister transferred to the congregation. Upon the Continent of Europe, in the Protestant churches of Germany, Denmark, Sweden, and Norway, ecclesiastical patronage exists to some extent. The only form of ecclesiastical patronage to be found in the United States is that in the hands of the bishops of the Roman Catholic Church. With these rights the decrees of the plenary councils of Baltimore have dealt upon the general principles laid down by the canons of the third and fourth Lateran councils.

PATRONS OF HUSBANDRY. See GRANGE.

PATRONYMIC (Lat. *patronymicus*, from Gk. *πατρωνικός*, *patrōnomikos*, relating to one's

father's name, from *πατήρ*, *patēr*, father + *ὄνομα*, *onoma*, name). Properly a name taken from one's father, but generally applied to such names as express descent from a parent or ancestor. In Sanskrit, Greek, and Latin patronymics are very numerous. They may be derived from the name of a father, mother, grandfather, or remoter ancestor, as Atrides, son of Atreus; Æacides, grandson of Æacus. The names of the founders of nations have also been used to form a sort of patronymic, as when the Romans were called Romulidæ. A number of the surnames in use in modern times are patronymics, as Johnson, the son of John. Originally these names fluctuated from generation to generation, as was the case in Shetland, where Magnus Johnson's son called himself John Magnusson or Manson. In the course of time it was generally found more convenient to take a surname from one well-known ancestor, which should descend unchanged to the children of the bearer of it.

PATROONS' (Dutch *patroon*, protector, patron, from Lat. *patronus*, protector). The name applied to a special class of settlers in the New Netherlands. In 1629, in order to facilitate emigration to America, the Dutch West India Company granted certain 'freedoms and exemptions' to such of their number as, within a period of four years after having given due notice, should plant a colony of fifty persons over fifteen years of age in New Netherlands. Such men were to be called patroons (or patrons) and each was to have as his 'absolute property' a tract of land extending 16 miles along any navigable river (or eight miles if on each shore) and "so far into the country as the situation of the occupiers will permit." The proprietors were, besides, invested with many feudal privileges, being empowered to hold both civil and criminal courts, to appoint local officers and magistrates, and to punish offenders against the law, except in certain specified cases, where there existed a right of appeal to the Director-General at Fort Amsterdam. In practice, however, this right was virtually abrogated. The settlers were to be exempt from taxes for ten years, but were to be absolutely bound to their patroon for a specified period, and were to pay certain rentals, either in money or in kind. Schools and churches were to be established, but at the same time slavery was introduced, commerce was restricted, and manufacturing was prohibited on pain of banishment. Several patroonships were soon established, the largest (and the first) being Rensselaerswyck, which remained in the Rensselaer family until about the middle of the nineteenth century. In 1640 a new charter of 'freedoms and exemptions' was granted, by which patroonship privileges were extended to "all good inhabitants of the Netherlands," the period of settlement limited to three years, the prohibition of manufacturing rescinded, and the size of the grants limited to four miles along a coast and eight miles into the interior. At the same time many inducements were offered to smaller landholders, called masters or 'colonists.' The system gave New York one of its characteristic features throughout the colonial period, creating as it did a landed aristocracy, fostering class divisions and semi-feudal relations between landholder and tenant, and discouraging the immigration of settlers, who naturally preferred to obtain land in

fee simple in other colonies rather than become tenants of proprietors in New York. Under the English régime the system remained virtually unchanged, but in 1775 some of its chief features were abolished, and the patroons or 'lords of the manor' became mere proprietors of estates. Many characteristics of the old feudal tenure, however, remained, and the relations between tenant and landlord became more and more strained, until a modification was effected by the Anti-Rent agitation of 1839-47. See ANTI-RENTISM.

PATTAN, pá-tān'. A town of India. See PATAN.

PATTÉ, pá'tá' (OF. *patte*, broad-footed, from *patte*, paw). A term in heraldry (q.v.) applied to a cross with its arms expanding toward the ends and flat at their outer edges.

PATTEN, SIMON NELSON (1852—). An American economist, born at Sandwich, Ill. He was educated at Jennings's Seminary (Ill.), Northwestern University (Ill.), and at the University of Halle, Germany, and received the degree of Ph.D. in 1878. During the next ten years he taught in the public schools of Iowa and Illinois. In 1888 he was elected professor of political economy at the University of Pennsylvania. His principal works are: *Premises of Political Economy* (1885); *The Consumption of Wealth* (1889); *The Economic Basis of Protection* (1890); *The Theory of Dynamic Economics* (1893); *The Theory of Social Forces* (1896); *Development of English Thought* (1899); *The Theory of Prosperity* (1901); *Heredity and Social Progress* (1903). Professor Patten ranks as one of the most brilliant and original of American economic writers. His chief contributions to economics are his analyses of dynamic forces in economic life, of monopoly elements in value, and of the bearing of the laws of consumption upon distribution. A large part of his work is rather sociological than economic.

PATTERSON, CARLILE POLLOCK (1816-81). An American civil engineer, superintendent of the United States Coast Survey, born at Shildsboro, Mass. He was appointed midshipman in 1830, served in the Mediterranean squadron, and, after graduation at Georgetown College as a civil engineer in 1838, was attached to the Coast Survey (1838-41). In 1845 he led a hydrographic expedition to the Gulf of Mexico; from 1850 to 1861 commanded the Pacific mail-steamer *Oregon*; in 1861 was appointed hydrographic inspector in the United States Coast Survey, and in 1874 superintendent. This department was greatly developed by him.

PATTERSON, DANIEL TOD (1786-1839). An American naval officer, born on Long Island, N. Y. He entered the navy in 1800, and was on board the frigate *Philadelphia* in the expedition commanded by Capt. William Bainbridge when the frigate ran upon the rocks off the coast of Tripoli, and the entire crew were held prisoners until peace was declared. In 1813 he was promoted to be commander. In September, 1814, he commanded the expedition which broke up the establishment of the pirate Lafitte in Barataria Bay. He was made captain in 1815; commanded the frigate *Constitution* from 1826 to 1828; and in the latter year was appointed navy commissioner. In 1832-36 he commanded the Mediterranean squadron, and on his return was ap-

pointed commander at the navy yard at Washington, where he remained until his death.

PATTERSON (BONAPARTE), ELIZABETH (1785-1879). An American woman, famous as the wife of Jerome Bonaparte. She was born in Baltimore, Md., and was the daughter of William Patterson, one of the wealthiest men in the United States. When Jerome Bonaparte visited Baltimore in 1803 he was fascinated by Miss Patterson and the two were married by Bishop Carroll, December 24, 1803. In April, 1804, Napoleon, through M. Pichon, Consul-General of France, in New York, declared the marriage illegal, and ordered Jerome to return to France and to leave the 'young person' behind. The other members of his family, however, accepted the situation and promised to receive her. In 1805 Jerome and his wife sailed for Europe. The latter, not being allowed to land either at Lisbon or Amsterdam, went to England, and her son, Jerome Napoleon, was born at Camberwell, July 7, 1805. Meanwhile Napoleon had requested unsuccessfully the annulment of the marriage from Pope Pius VII., but the Council of State granted the divorce. In November Madame Bonaparte returned to the United States, and lived with her father. After the battle of Waterloo she went to Europe, where she was well received in the most exclusive circles, and was much admired for her beauty and wit. In 1815, by special act of the Legislature of Maryland, she secured a divorce. From 1816 to 1819 she was in Baltimore, and subsequently spent much of her time in Europe. Her last years were spent in Baltimore in the management of her estate, which she increased to more than a million and a half. Consult Didier, *Life and Letters of Madame Bonaparte* (New York, 1879).

PATTERSON, ROBERT (1743-1824). An American educator, and director of the mint. He was born near Hillsborough, County Down, Ireland, emigrated to the United States in 1768, and lived for a time in Philadelphia. In 1774 he became principal of an academy in Wilmington, Del. In the disputes between the colonies and the British Ministry he allied himself with the Whig or Patriot Party, and in the early part of the Revolutionary War served as assistant surgeon and brigadier-major in the Continental Army. From 1779 to 1814 he was professor of mathematics in the University of Pennsylvania, being also from 1810 to 1813 vice-provost. In 1805 President Jefferson appointed him director of the mint, which position he held until a short time before his death. Always actively interested in the American Philosophical Society, he was its president from 1819 until his death. He published *The Newtonian System* (1808) and edited various works.

PATTERSON, ROBERT (1753-1827). An American pioneer, born in Pennsylvania. He emigrated to Kentucky in 1775. In October, 1776, on a trip to Fort Pitt to secure ammunition, his party was attacked by Indians and every member was killed or wounded. He took part in Col. George R. Clark's successful expedition against Kaskaskia and Vincennes in 1778, and in Capt. John Bowman's attack on Chillicothe in 1779. In April, 1779, he built a blockhouse on the present site of Lexington, Ky. In 1780 he was a captain in Colonel Clark's expedition against the Shawnees, and in 1782 was second in command under Boone at the Lower Blue Lick.

He was a colonel in Clark's second expedition into the Miami County this year, and served with Gen. Benjamin Logan's expedition against the Shawnees in 1786, in which he was severely wounded. He, with two companions, bought from John Cleves Symmes a tract of 740 acres of land opposite the mouth of the Licking River, and founded, in 1788, the town of Losantiville, now Cincinnati. He sold his interest in 1794, and in 1804 settled in Dayton, Ohio, where he lived until his death.

PATTERSON, ROBERT (1792-1881). An American soldier, born at Cappagh, County Tyrone, Ireland. About 1798 he emigrated to the United States, and finally settled in Philadelphia. During the War of 1812 he was assistant deputy quartermaster-general, with rank of captain, from 1813 to 1814, and in 1814 was appointed captain of the Thirty-second Infantry. He was commissioned major-general of volunteers in 1846, and in the Mexican War commanded a division at Cerro Gordo, directed the pursuit of the retreating Mexicans by the cavalry and leading infantry brigades, and occupied Jalapa. Under President Lincoln's three-months call for troops (April 15, 1861) he was appointed by Governor Curtin, of Pennsylvania, major-general of volunteers, organized the three-months forces in Philadelphia, and later commanded the Department of Pennsylvania. When McDowell began his march against Beauregard, Patterson was instructed to detain Johnston and prevent him from supplying Beauregard with reinforcements. This, however, he failed to accomplish. He withdrew to Charleston, about 18 miles from Winchester, and Johnston's entire force arrived in time to take part in and determine the result of the first battle of Bull Run. A long controversy ensued as to the responsibility for this event, and Patterson was vigorously criticised in some quarters. He published a vindication entitled *A Narrative of the Campaign in the Valley of the Shenandoah in 1861* (1865). Patterson was mustered out on July 27th. He invested largely in the sugar and cotton industries, and was among the leading American mill-owners.

PATTERSON, WILLIAM MCKENDREE (1838-88). A missionary of the Methodist Episcopal Church, South. He was born near Saint Louis, Mo., graduated at Saint Charles College, 1860, and entered the Saint Louis Conference in 1861. He was chaplain in the Confederate Army, 1862; agent for the American Bible Society, 1865; agent for Vanderbilt University, 1872; missionary to Mexico, 1872-88. Part of the time he edited *Mexican Evangelista*. In 1888 he became agent for the American Bible Society in Venezuela, but died of yellow fever in Caracas a few days after his arrival in the country.

PATTESON, JOHN COLDERIDGE (1827-71). An English divine, Bishop of Melanesia. He was born in London, was educated at Ottery Saint Mary, at Eton, and at Balliol College, Oxford. He obtained a fellowship at Merton, went to Dresden to study German, and was ordained in 1853 to the curacy of Alington, near Ottery Saint Mary. In 1855 he left England with Bishop Selwyn of New Zealand to enter upon a missionary career. His first work was instructing boys of the Melanesian Islands, and when the mission was regularly established there

he was, in 1861, consecrated bishop, and fixed his residence at Mota. He spoke as many as twenty-three of the native dialects, and made translations of parts of the Bible into the Mota tongue, which he regarded as the most typical. He worked for twenty years in the islands and made great improvements in the material and spiritual condition of the natives. His position was rendered difficult by the action of British traders who sometimes used the Bishop's name to further the kidnapping of natives to be either enslaved or held as laborers upon the plantations of Fiji and Queensland. In revenge for such an outrage against the Islanders of Nakapu, the Bishop himself was slain by the natives. Consult his *Life* by Charlotte M. Yonge (London, 1878); also Awdry, *The Story of a Fellow Soldier* (London, 1875).

PATTI, *pát'tà*. A town in the Province of Messina, Sicily, situated on the north coast, 35 miles west by south of Messina by rail (Map: Italy, J 9). Its cathedral contains the tomb of Adelasia, mother of King Roger II. of Sicily. The town has silk mills, sandstone quarries, and a shipping trade in olive oil, flour, and fish. Population (commune), in 1881, 9374; in 1901, 11,082.

PATTI, **ADELINA** (1843—). A celebrated operatic singer of Italian parentage, born at Madrid. When about ten years of age she appeared in a series of concerts with Ole Bull and Maurice Strakosch. After a course of professional study, she made her first operatic appearance (1859) in New York. Her real début, which occurred in London, took place in 1861, when she appeared as 'Amina' in *La Sonnambula*; after which she was acknowledged one of the greatest artists of her day. Her voice was an unusually high soprano, of rich, bell-like quality, and remarkable evenness of tone; to these qualities she added purity of style and high artistic finish. Equally at home in the portrayal of deep passion and the sprightly vivacity of light comedy, she was also conspicuously successful in oratorio. She was as popular throughout Continental Europe as in England and America. In May, 1868, she married the Marquis de Caux, from whom she was divorced in 1885. In 1886 she married Ernesto Nicolini, a well-known tenor, who died in 1898. In 1899 she married Baron Cederström, a Swedish nobleman. She resides in Wales, where she is the owner of a magnificent castle. After about 1890 she confined herself almost entirely to the concert platform.

PATTI (**DEMUNCK**), **CARLOTTA** (1840-80). An Italian vocalist, sister of Adelina. She was born in Florence, of musical parents, who were also her first teachers in singing. She afterwards studied the piano under Henri Herz at Paris. Her voice was a soprano of unusual compass, and of a clear silvery quality, and much power in the upper register; a slight degree of lameness, however, prevented her from appearing in opera. Her peculiarly sweet high notes brought her into favor with the public. She made her début in New York in 1861, where for some years previously she had made her home. She became very popular throughout America as a concert soprano, and was almost as successful in Europe, her first appearance there occurring in 1863, in London. Like her sister, she

was a brilliant coloratura vocalist. She married De Munck, a violoncellist, in 1871. She died in Paris.

PATTISON, **DOROTHY WYNDLOW** (1832-78). Better known as **SISTER DORA**. A famous nurse, sister of Mark Pattison (q.v.). She was born at Haukswell, near Richmond, Yorkshire. In 1864 she joined a sisterhood of the Church of England (the Sisterhood of the Good Samaritan), and early in the following year became a nurse in a cottage hospital at Walsall. In 1867 a new hospital was built, of which she had sole charge until 1877, when she resigned to become head of the municipal hospital in the same place. She had many natural gifts for her work, acquired much skill in surgery, and was tireless in philanthropic labors. Her life has been written by Margaret Lonsdale (London, 1880).

PATTISON, **MARK** (1813-84). An English scholar and writer, born at Haukswell, Yorkshire. He was educated at Oriel College, Oxford (B.A., 1836; M.A., 1840). He translated the "Saint Matthew" from Thomas Aquinas's *Catena Aurea* on the Gospels for Newman (written, 1830; printed, 1842), and also contributed biographies of Stephen Langton and Saint Edmund to the series of lives of English saints published under Newman's editorship. In 1839 he was elected fellow of Lincoln, and in 1843 was ordained priest. He was appointed to a tutorship of Lincoln in 1843, and in 1848 became examiner in the school of *literæ humaniores*. In 1853 he was again appointed examiner, and in 1855 resigned his tutorship. He was then for a time a private tutor at Oxford, but later was much in Germany. In 1861 he was elected rector of Lincoln. He also became a curator of the Bodleian Library and of the Taylor Institution. From 1845 his theological views greatly changed; he wrote for the *Essays and Reviews* (1860) an article on "Tendencies of Religious Thought in England, 1688-1750," intended as "a neutral and philosophic inquiry," and so recognized on the Continent, but not in England; and he remained a liberal member of the Anglican communion. His principal studies, however, were not theological or philosophical, but were directed originally to the preparation of a history of learning from the time of the Renaissance, and later to that of the more restricted account of the French school of philology. Of this work only fragments were executed, most important of which is the *Life of Isaac Casaubon* (1875; 2d ed. 1892). Other portions appear in the selected *Essays* (2 vols., 1889), edited by H. Nettlehip. He also wrote an excellent *Life of John Milton* (1879; reprinted, with alterations, 1880, 1883, 1885, 1887) for the "English Men of Letters" series, and edited Pope's *Essay on Man* (1869; 2d ed. 1872) and *Satires and Epistles* (1872; 2d ed. 1874). An edition by him of the *Sonnets of Milton*, with a valuable introduction, appeared in 1883. Other published volumes are *Sermons* (1885), and the *Memoirs* (to 1861), dictated in 1883, and printed in 1885. Pattison's literary work is for the main part marked by the most thorough scholarship, eminent judgment, and a skillful presentation of material. In real academic distinction he was second to none at Oxford. He was a tireless pedestrian and angler, a student of natural history, brief and often ironic in speech, contemptuous of

sham, and so reluctant in the expression of his views as sometimes quite to hamper the proceedings of committees of which he was a member.

PATTISON, ROBERT EMOBY (1850—). An American politician, born at Quantico, Somerset County, Md. When he was six years old his parents removed to Philadelphia, where he was educated in the public schools, and in 1872 was admitted to the bar. Five years later he was elected city Comptroller and discharged his duties with exceptional efficiency. He was reelected, though a candidate on the otherwise unsuccessful Democratic ticket. In 1882 his party nominated him for Governor, and he was elected by a plurality of more than 40,000, the first Democrat to hold the office in thirty years. His administration was characterized by the same energy and probity that he had shown as Comptroller. In 1890 he was again elected Governor.

PATTISON, ROBERT EVERETT (1800-74). An American clergyman and educator. He was born at Benson, Vt., and educated at Amherst College. He was ordained to the Baptist ministry in 1829, and the next year accepted a call from the First Baptist Church, Providence, R. I. In 1836 he became president of Waterville College (now Colby College), and remained until the college was obliged to suspend in 1840 from a lack of funds. He resumed preaching, and in 1843 became corresponding secretary of the Baptist Board of Foreign Missions. In 1845 he became president of the Western Baptist Theological Institute, Covington, Ky.; but he resigned in 1848 and accepted the chair of systematic theology in Newton Theological Seminary. Waterville College having reopened its doors in 1841, Dr. Pattison was again made its president in 1853, but resigned five years later on account of ill health. He was subsequently professor of systematic theology in Shurtleiff College, professor of theology in the Baptist Theological Seminary, Chicago, and vice-president and professor of moral and intellectual philosophy in Chicago University. He died at Saint Louis, Mo. His one published work is the *Commentary on the Epistle to the Ephesians* (1850).

PATTON, FRANCIS LANDEY (1843—). An American clergyman and educator. He was born at Warwick, Bermuda. He studied at Knox College, of the University of Toronto, and at Princeton Seminary, New Jersey. He was ordained to the ministry in 1865, and after holding several pastorates was, in 1871, appointed professor of didactic and polemical theology in the Theological Seminary of the Northwest (now McCormick Seminary, Chicago), where he remained ten years. During the period from 1873 to 1876 he edited the religious journal *The Interior* (Chicago), in which connection he brought charges of heresy against Prof. David Swing, resulting in the latter's trial and subsequent withdrawal from the Church. While in Chicago, he also held the pastorate of the Jefferson Park Presbyterian Church, and in 1878 was elected moderator of the Presbyterian General Assembly. In 1881 he assumed the professorship endowed for him in Princeton Theological Seminary, styled the chair of the relations of philosophy and science to the Christian religion; in 1885 he became professor of ethics in the college, and in 1888 succeeded James McCosh in the presidency. In 1891 and 1892 he was again

prominent as an opponent of the so-called heretical views of Dr. C. A. Briggs, of Union Theological Seminary. In 1902 he resigned from the presidency of Princeton University, but was soon after elected to that of the seminary. His administration of Princeton was marked by the assumption of the title Princeton University in place of the charter name, 'The College of New Jersey,' and by large donations which enabled the university to make extensive additions to its equipment and buildings. The number of students nearly doubled during this period from 1888 to 1902, and new courses were added to both the scientific and academic departments. Perhaps most important in the future development of Princeton as a university was the founding of a graduate school. President Patton became widely known as a forcible speaker and a keen, logical thinker on theological subjects. He contributed frequently to leading periodicals and wrote *Inspiration of the Scriptures* (1869), and *Summary of Christian Doctrine* (1874).

PATUX'ENT. A river of Maryland, rising in Frederick County, and flowing southeastward into Chesapeake Bay north of the Potomac (Map: Maryland, L 5). It is 90 miles long, and for the last 40 miles it is a navigable tidal estuary abounding in valuable oyster beds.

PÁTZCUARO, pát's'kwá-ró. A town of Mexico in the State of Michoacán, situated on the south shore of the beautiful Lake Pátzcuaro, 38 miles southwest of Morelia (Map: Mexico, H 8). It is irregularly built, with narrow, crooked streets, but is very picturesque in appearance, being surmounted by a church built on the top of a high hill. It is noted for the manufacture of fine furniture and beautiful featherwork. Population, in 1895, 7082. Pátzcuaro is supposed to have been the ancient capital of the Tarasca Indians.

PATZUM, pát-thoom'. A town of the Department of Chimaltenango, Guatemala, 33 miles west of the city of that name. The chief industry is wool-weaving, and in the vicinity sugarcane, grain, and coffee are produced in abundance. Mines of silver, antimony, lead, and coal are found near by. Its population in 1892 was about 6500.

PAU, pô. The capital of the Department of Basses-Pyrénées, France, on the Gave de Pau, 105 miles south-southeast of Bordeaux (Map: France, F 8). It occupies a rocky height, cloven in two by a ravine and united by a high bridge. Toward the south it commands magnificent views of the western Pyrenees. Among its chief buildings are the two Gothic churches of Saint Martin and Saint James, a palace of justice, a beautiful theatre, museum, a public library containing over 55,000 volumes, and a winter palace built in 1896 in Beaumont Park. The Château of Henry IV., erected in the fourteenth century on the site of an older castle, dominates the town and contains interesting memorials of the kings of Navarre. A striking marble statue of Henry IV. stands on the Place Royale in the centre of the town. There are linen and cloth manufactures, and a trade in Jurançon wine, grain, marble, and leather. Many swine are fed in the vicinity, and from the pork the famous *jambons de Bayonne* are made. Pau is a favorite resort of the English, especially during the winter, and is a general rendezvous for those who wish to

explore the Pyrenees. Population, in 1891, 33,111; in 1901, 34,268. Founded in the tenth century, Pau became important as the residence of the sovereigns of Navarre in the fifteenth century.

PAUER, pou'ér, ERNST (1826—). An Austrian-English pianist and writer on music, born at Vienna. He studied there with Dirzka, Sechter, and the son of Mozart, and at Munich with Lachner. He directed musical societies in Mainz from 1847 until 1851, when he went to London, but did not sever his Continental connections, and gave concerts in Germany and elsewhere. He was made Austrian Court pianist in 1866, and became a professor at the London Royal Academy of Music in 1859. In 1867 he was made principal professor in the National Training School, and from 1883 to 1896 held a similar position at the Royal College of Music. He was appointed musical examiner at Cambridge in 1879. From 1870 he gave musical lectures throughout Great Britain upon the history of music and kindred subjects, with pianoforte illustrations. He fathered German music in London and to the Augener editions he contributed *Old English Composers for the Virginal and Harpsichord*, as well as the Bach, Handel, Schumann, and other classical and romantic selections. Some of his own studies are included in the series of one hundred called *The New Gradus ad Parnassum*, which he published. His compositions include besides three operas, a symphony, quartette, quintette, songs, and pianoforte solos.

PAUL. The Apostle of Jesus Christ who was specially commissioned to work among the Gentiles. The sources from which we secure our knowledge of his life and work are his own Epistles and the Book of Acts. From these it is clear that the condition of the Church when he came to the full prosecution of his work was one which rendered that work not only most significant for the future development of the Church, but most revolutionary to the ideas which the Church's leaders entertained as to what that development should be. These leaders were the Apostles who had formed the nucleus of Jesus' discipleship during His ministry on earth. They were men of limited education, and with no great breadth of religious ideas. As a consequence their views of the necessary development of Jesus' religion practically restricted it to a reforming of Judaism in accordance with Jesus' teaching, and as this reformed Judaism went out in a new evangelism to the world, to the bringing of the world into this religion through the gateway of Judaism. In view of their Palestinian training and experience, these views were perfectly natural for the Apostles to entertain; but they were also clearly impossible for the Church to carry out, if the religion of Jesus was to realize for itself that world-wide development which the Gospels show us Jesus himself intended it should have. It was at this latter point that Paul through his work and teaching introduced into the Church new conceptions which virtually revolutionized its ideas and made possible for Christianity its development as a universal religion.

Paul's early name was Saul; he was a native of Tarsus, in the Province of Cilicia (Acts xxi. 39), where he was born about the beginning of

the Christian Era. His parents were Jews (Acts xxiii. 6; 11. Cor. xi. 22). His early training was doubtless that of the ordinary Jewish boy, though it was apparently at an early age that he was sent to Jerusalem to be educated in the Rabbinic schools of that city, having as his teacher in the sacred law the liberal-minded Gamaliel (Acts xxii. 3; see GAMALIEL). According to his own testimony he threw his whole heart into all that was taught him there, becoming one of the strictest of the sect of the Pharisees, and having no conception beyond that of a salvation to be obtained through a perfect performance of the works of the Law (Gal. i. 14; Acts xxii. 3; xxvi. 4-5; Phil. iii. 4-6).

After his Rabbinic training he returned for a while to his native city, in order to learn his trade (Acts xviii. 3). While there he may possibly have supplemented his Jewish education by attendance upon the Gentile schools, for which Tarsus was famed. From Cilicia he came back to Jerusalem, where he became prominent in ecclesiastical affairs, being apparently chosen to membership in the Sanhedrin (Acts xxvi. 10). Though in Jerusalem for some time, it is not probable that he was there during the time of Jesus' ministry, for he does not seem to have ever seen the Great Teacher. He was, however, well acquainted with Jesus' Messianic claims and was clearly conscious of the opposition to Judaism which they involved. Consequently, when, after the Day of Pentecost, this new discipleship began to assume large proportions, and take to itself a definitely organized form, he shared in the bitter hostility to the movement which animated the religious leaders of the people. Into the persecution which this produced he threw himself with energy, participating practically in the death of Stephen (Acts vii. 58; viii. 1), and following up this assault with a rigor of inquisition that made him conspicuous among his fellows (Acts xxii. 4; xxvi. 9-11; Gal. i. 13-14). In the year 34 or 35, however, while on a journey to Damascus undertaken for the purpose of searching out the disciples in that place and bringing them bound to Jerusalem, he went through the experience of a supernatural vision that brought him to his journey's end under the deep conviction of the sinfulness of the course he was pursuing (Acts ix. 1-9). Out of this state of soul he came a Christian disciple, profoundly convinced of the Messiahship of Jesus, and distinctly conscious of having received from his Master a commission to preach His religion among the nations of the earth (Acts ix. 10-18; Gal. i. 15-16).

This mission, however, he did not immediately carry out, but for the greater part of three years withdrew into the region of Arabia (Gal. i. 17). The purpose of this withdrawal it may not be possible definitely to determine, though, from the contrast in which he places it to the alternative course of conference with the Apostles at Jerusalem, it would seem that primarily it was for the sake of meditative thought upon the spiritual revolution which had taken place in his life. At the same time, it cannot be doubted that he availed himself of such opportunity of practical work as the region afforded (Gal. i. 15-23).

Upon his return to Damascus and Jerusalem he began to preach his new-found faith, evidently with some fuller conception of the Gentile direc-

tion of his mission than he had had immediately after his conversion (Acts ix. 19-22), especially in Jerusalem, where he singled out the Greek-speaking Jews, disputing with them, doubtless largely along the lines of the Messiahship of Jesus (Acts ix. 28-29; xxii. 18). His motive in making Jerusalem the place of his preaching was apparently the courageous one of returning to the scene of his former work of persecution, and bearing open testimony to Jesus before those with whom he had formerly been associated. That this, however, was not what the Master intended him to do is clear from the fact that while in Jerusalem he was made conscious through a vision that he was to leave the city and give himself to work among the more distant Gentiles (Acts xxii. 17-20).

In obedience to this command, he went to his home in Cilicia, visiting on the way the regions of Syria, where in all probability he accomplished some work of a Gentile character in the city of Antioch. Such a hypothesis at least explains the reason for the statement that refugees from the Stephen persecution in Jerusalem coming to Antioch changed the character of their ministry and preached the word to those who were not pure Jews (Acts xi. 19-20), and that, upon the successful outcome of their preaching, Paul was summoned from Tarsus to give his aid and assistance in the development of this new movement (Acts xi. 21-26).

Antioch became thus the place of Paul's labors, and here his ministry gradually reached the full Gentile character which the Master had intended it should have, resulting finally, under divine direction, in the sending out of Paul and Barnabas to the neighboring Gentile regions of Asia Minor (Acts xiii. 1-3). The remarkable success of this mission brought Paul at last to a consciousness of the full meaning of his Gentile commission (Acts xiii. 44-48), and also brought the Church to a full realization of the significance of this new departure. In fact, upon their return to Antioch, Paul and Barnabas were confronted with a grave and serious dispute. Parties representing the extreme Jewish element in the Mother Church came to Antioch insisting upon the need of circumcision in order to salvation. This was so contrary to Paul's fundamental conception of salvation by faith that surrender was impossible, and under the advice of the local Church the controversy was carried up to Jerusalem for submission to the Apostles and Elders there (Acts xv. 1-2). A clear understanding of the resultant council and the position in it of Paul and Barnabas on the one side, and the leaders of the Church on the other, can only be secured by recognizing the development through which Paul's work had gone from his own original conception of it, and especially from the original conception of it held by the Jerusalem Church. That Paul had the fundamentals of his theology from the time of his conversion may be accepted, as far as our records give any light; that these fundamentals included a clear conviction of the principles of justification by faith is almost necessary, if Paul's theology is to be understood as in any sense self-consistent—for this principle is practically essential to his thinking. But while Paul may have possessed the principle of his theology from the beginning, it is manifestly clear that the practical experiences of his work had an effect upon the application which he

gave to these principles. Few greater experiences, however, did he go through in his work than that of the wholesale conversion of the Gentiles during his first mission tour. That these experiences must have given strength to his conviction of justification by faith is of course very clear; but it is also clear that it must have widely broadened the application of that principle in the direction of the universalizing of the Gospel beyond the bounds of Judaism. If, however, such was the influence of this experience upon Paul's own views, its effect upon the slower and more conservative views of the Jerusalem Church must have been even more significant. That Paul told them fully of his commission to a Gentile work at his first visit to the city after his conversion may not be doubted; that they fairly understood his position, and frankly accepted it, would seem to be clear from the companionship with them into which the records show him to have entered; but if Paul himself at that time had but an undeveloped view of all his theology meant in the direction of a justification by faith, much less developed must have been the views on this point of those in the Jerusalem Church. It may be safely said that their conception of and agreement to Paul's position was largely theoretical until the results of this first mission tour startled them into a realization of the full significance of his commission. Treasuring as they did the Jewish origin of Jesus' religion and the Jewish character of his discipleship, this wholesale ingathering of the uncircumcised Gentiles naturally seemed to them to herald the doom of the Church.

From such a situation it was inevitable that there should come dispute and controversy. The extremists on the side of the Jerusalem Church insisted on circumcision—the distinctive feature of ceremonial Judaism—as necessary to salvation and acceptance within the Church. Paul and his followers insisted on the freedom from this rite given by the essential principle of justification by faith. It was the determination of this contention in the light of the practical results of the first mission tour that constituted the real question before the Jerusalem Council and the decision which was reached to grant the Gentiles, with a few unessential provisos, full freedom from the ceremonial law was a result which was not only a triumph for the views of Paul, but a salvation for the Church itself. For, in spite of the conviction of the Jerusalem leaders, the Church's future lay beyond Judaism, and could be reached only as the way to Christ was no longer obstructed by the forms which Judaism imposed.

From this council Paul and Barnabas returned to Antioch, and soon afterwards Paul, having disagreed with Barnabas on some matters of their practical work, took with him Silas, who had come down with them from Jerusalem, and started upon his second missionary tour (Acts xv. 30-40). On this tour he first revisited the churches established at an earlier period in Syria and Cilicia, as well as those gathered together on his first journey. From one of these latter churches he secured Timothy to be a helper in his work. Upon arriving finally at Antioch in Pisidia he essayed to go farther westward into the Province of Asia, but, being divinely forbidden, he returned northward with a view ulti-

mately of entering the Province of Bithynia, but, again, being divinely hindered, he turned westward to the seacoast town of Troas, the old classical region of Troy (Acts xv. 41-xvi. 8).

It is clear from his general policy of selecting the large city centres for his work that Paul's purpose in this further extension of his journey beyond Antioch had been to go to Ephesus and, when forbidden to preach there, to go northward to Byzantium, which at that time was within the Province of Bithynia. The divine prevention of this policy, confusing though it was, left him naturally convinced that the Master had for him some distinctive mission to perform. He was consequently in a receptive mood for the vision which came to him at Troas and called him across the water to Thrace.

In obedience to this divine direction he entered upon his first European mission, passing down along the commercial highway that gave him entrance at the important towns of Philippi, Thessalonica, and Berea and finally brought him to Athens and Corinth (Acts xvi. 9-xviii. 1). At all of these places, as far as Corinth, his mission efforts had been disappointing, either being broken off by persecution or being received with indifference and contempt. As a consequence he came at last to Corinth in a despondent frame of mind (I. Cor. ii. 3). At this last place, however, his work was greatly blessed, and for a year and a half he and his companions remained in that region establishing churches, not only in Corinth itself, but throughout the Province of Achaia (Acts xviii. 2-11; II. Cor. i. 1). It was during the early part of his stay in Corinth that, anxious for their welfare in the face of persecution, corrupting influences, and false teachings, he wrote his two letters to the Thessalonians, generally considered the earliest of his preserved writings. (See THESSALONIANS, EPISTLES TO THE.) From Corinth Paul returned by sea to Syria, stopping on the voyage at Ephesus long enough to reason in the synagogue and make promise of a return for more extended work. Landing finally at Cæsarea, he went up to Jerusalem with greetings to the Church, and then returned to Antioch (Acts xviii. 18-22).

After some time spent there he set out upon his third mission tour, visiting again the churches of Southern Asia Minor, and in fulfillment of his promise proceeding on to Ephesus. At this large centre of activity and influence he remained at work for the greater part of three years, carrying the Gospel, either personally or through his helpers, throughout the entire seacoast Province of Asia (Acts xviii. 23-xix. 20; xx. 17-35; I. Cor. xvi. 19). During this period he was in more or less contact with the Church at Corinth, whose problems of organization, Christian brotherhood, and moral life necessitated frequent communication with the Apostle. This produced considerable correspondence, portions of which are preserved in his Corinthian Epistles. It is quite clear that late in this period, in answer to an urgent summons, he made a hurried trip from Ephesus to Corinth by the direct route across the sea. The occasion of the visit was evidently a new manifestation of factional tendencies in the Church. The visit was apparently quite brief, and resulted in a practical failure to straighten out the situation. (See CORINTHIANS, EPISTLES TO THE.) Soon after his return to Ephesus from this fruitless trip Paul was obliged to leave the

city, because of disturbances occasioned by pagan resentment of his increasingly successful work. To give himself and the people at Corinth time to recover from the disappointing experiences of his recent visit, as well as to visit the Macedonian churches established on his previous journey, he selected the less direct route by the way of Troas (Acts xix. 23-xx. 1; II. Cor. i. 23-ii. 13). On the way he again wrote to the Corinthians and engaged in more or less mission work in the provinces south of Macedonia, covering the territory up to if not across the borders of Illyricum. It is quite likely that during the progress of this work he received the startling news from the Galatian churches which occasioned his letter to them. (See GALATIANS, EPISTLE TO THE.) Reaching Corinth in the late autumn or early winter of the year 55, he remained there three months (Acts xx. 1-3). During this time he wrote his letter to the Church at Rome—a church he had not founded or seen, but to the visiting of which he looked forward with earnest longing, and largely to prepare them for this visit he sent them his letter. See ROMANS, EPISTLE TO THE.

In the spring of 56 he left Corinth for Jerusalem with quite a company, who doubtless represented the churches that had been engaged in gathering a contribution for the Mother Church (Acts xx. 4. See also I. Cor. xvi. 1-4; II. Cor. viii. ix.). After a journey which was accompanied by some incidents of a foreboding nature, to all of which Paul's mind seemed resignedly receptive, he reached Jerusalem (Acts xx. 3-xxi. 15). His reception by the brethren of the Church was full of Christian fellowship; at the same time it was clear that the leaders were deeply impressed by the growing alienation from Paul among the believing Jews. As a consequence they suggested that he carry out in the temple a certain course of ceremonial observance designed to show his respect for the Law of Moses, and to disprove the charge that he everywhere urged its abandonment by the Christian Jews. This he willingly did; but his action was so misunderstood and the motive for it so misconstrued as to rouse against him a riotous demonstration on the part of the Jews in general, that would have ended his life but for the rescue of his person effected by the soldiers of the adjoining Roman garrison (Acts xxi. 17-32).

It is clear from this incident, as presented in the passage cited, that the head and front of Paul's offending in the eyes of the Jews was not so much his heralding of the Messiahship of Jesus as his denial of the continued obligation of the Mosaic Law. This is instructive as to the large significance of the controversy which ensued upon his first mission journey and which, in spite of the wise action of the Jerusalem Council, wrought itself into the Galatian and to a certain degree into the Corinthian churches. Paul's position as to the absolute essentiality of the principle of justification by faith alone apparently went to the heart of the whole problem of salvation as it was present before the early Church.

Having found it impossible to secure from the excited mob any idea of the offense of which his prisoner was guilty, and Paul himself asserting his rights of Roman citizenship, the chief captain of the guard, Claudius Lysias, summoned a council of the Sanhedrin and brought Paul before

it for examination (Acts xxi. 33-xxii. 30). This gathering, however, resulting in nothing but disorder among the members of the court, and, information having been brought of a desperate plot against Paul's life by a secret band of Jews, Claudius Lysias sent him away by night under heavy guard to Cæsarea with letters to Felix, Governor of the Province of Syria, whose official residence was at that place (Acts xxiii.).

Paul's stay at Cæsarea, which lasted some two years, was practically a continued commitment for trial. He appeared before Felix soon after his arrival at Cæsarea and pleaded his cause against the High Priest Ananias and certain of the elders from Jerusalem, who were accompanied by counsel. But, though the prosecution failed to make out their case, no decision was reached by the Governor (Acts xxiv. 1-23). Later Paul was summoned before Felix and his wife to speak "concerning the faith in Jesus Christ," but, though the Apostle "reasoned of righteousness, temperance, and the judgment to come" in such a way as to make a terrifying impression upon Felix, the fear was wholly transient; for Paul was returned again to prison, where Felix kept him through the remainder of his term of office, arranging frequent hearings from him and interviews with him, in hope of securing from the Apostle a bribe for his release. Finally, in order to please the Jews, he handed him over bound to his successor, Festus (Acts xxiv. 24-27).

Before Festus Paul appeared but once, being again confronted with his accusers from Jerusalem, who as before failed to make out a case against him. When, however, the Governor seemed about to follow in his predecessor's steps and ignore the evidence presented, suggesting that Paul go up to Jerusalem for another trial, the Apostle, on the basis of his rights of citizenship, transferred the case to Rome by appealing to Cæsar. Such action left the Governor no further choice, though he took the opportunity of Agrippa's presence in Cæsarea to bring Paul once more into court, and to have his case heard by his royal visitor (Acts xxv.). In his defense, the Apostle presented before Agrippa the course of his life and the grounds of his Christian hope, persuading the King, as he had in fact both Governors, that there was no reason for his being retained in bonds (Acts xxvi. 1-31). Beyond such personal impressions, however, his plea was of no use, since his appeal to the Emperor made transportation to Rome obligatory upon the authorities (Acts xxvi. 32).

The voyage to Italy was begun in the fall of 58, being marked by disastrous experiences which resulted in shipwreck on the island of Malta (q.v.). There the company remained through the winter, continuing their voyage in the spring and reaching at last their journey's end at the Imperial capital some time in the early half of the year 59 (Acts xxvii. 1-xxviii. 14). Here Paul was cordially welcomed by the Christian brethren of the city and kindly received by the authorities, being allowed to reside under guard in his own hired house, with freedom of intercourse among his friends and liberty of preaching his gospel (Acts xxviii. 15-31). It was during this period of imprisonment that he wrote his letters to the Philippians, the Colossians, Philemon, and the Ephesians. Of these Philippians and Philemon, especially Philemon, dwell upon the

Apostle's personal relation to the readers, though the practical problems of Christian brotherhood and moral living emerge quite clearly in Philippians. On the other hand, Colossians and Ephesians were intended to counteract doctrinal errors of a subtle nature involving a large element of nascent Gnosticism. This is especially true of Colossians, Ephesians, as an encyclical letter, emphasizing rather the principles of Christian solidarity in the membership of the churches. See the articles on the above letters.

It is a matter of considerable debate as to what was the outcome of this imprisonment at Rome, though the better critical opinion of the present day tends in the direction of holding that after some two years Paul was brought to trial before Nero, and on the absence of any real evidence against him was released. After this release he returned to the region of his former missionary labors in the East, engaging again in active work, in the course of which he was rearrested and transported again as a captive to Rome. At his second trial he was sentenced to death, which was accomplished not later than the year 65. During this return he wrote the letter to Titus, and the first letter to Timothy, both of which have to do almost wholly with the practical matters of Church organization and discipline. His second letter to Timothy was written after his reimprisonment at Rome, shortly before his death, and is practically his last word of personal counsel and encouragement to his trusted helper and friend. See the articles on these letters.

The picture of Paul stands clearly before us in the records which the New Testament gives—a man of education, if not of culture, for his time—a Roman citizen and yet a Jew, a student of the Scriptures, a zealot in the law, and withal a conscientious seeker for the way of life within the circle of its precepts—consequently an earnest persecutor of the disciples of Jesus until divinely convinced of his error, when all his energy and enthusiasm and loyal devotion were transferred to his new life and infused into his new work. In this new life and work, however, Paul manifestly remained a Jew. He did not conceive of his Christianity as having severed him from the Israel of God, but rather as having enabled him to realize the ideal of Israel's Godward relations. His doctrinal thinking consequently found its historical and logical background in the Old Testament, rising through its anthropology and its soteriology to its climax in its Christology. His doctrine of Christ controlled all the rest of his theology. It was the beginning point of his preaching and formed the main theme of his last letters to his churches. In all his thinking he was intense and characteristically logical, though he often clothed his thought in the old Rabbinic forms which he had brought with him from the Jerusalem schools, and frequently yielded to the rhetorical impulses more or less belonging to his intensity of nature. He was not metaphysical, even in treating the profoundest themes, but practical in the extreme and sympathetic on broad and comprehensive lines. Though his position in the matter of relationship to ceremonial Judaism was not that of the Jerusalem leaders, his views came to dominate the Church, and he himself became the Church's leader in its world work. On the theology of the Church since his day his influence has not been

even. During the centuries immediately succeeding the Apostolic age it largely if not completely disappeared, being revived in its doctrine of man and of salvation in the theology of Augustine and receiving again at these points its conspicuous restoration in the essential position of the Protestant Reformation. Since then these Pauline doctrines have come and gone with the rise and fall of that trend of thinking which may be termed Calvinistic. To-day they are not prominent, being dominated by a mode of thought which is characterized by a spiritualism of the feelings that has come to us from the Schleiermacher school, though Paul's supreme doctrine of Christ, which really controls his thought, contributes more to the present-day exaltation of Jesus than is popularly supposed.

BIBLIOGRAPHY. For consideration of the sources (a) from the point of criticism: consult the New Testament introductions and the critical discussions referred to in articles on the Epistles and the Book of Acts; (b) from the point of exegesis: consult the commentaries referred to in these articles. For study of the times: Schürer, *Geschichte des jüdischen Volkes im Zeitalter Jesu Christi* (Eng. trans., New York, 1896); Weber, *Jüdische Theologie* (Leipzig, 1897); Ramsay, *The Church in the Roman Empire* (New York, 1894). For study of the chronology: Burton, *Records and Letters of the Apostolic Age* (New York, 1895); Clemen, *Die Chronologie der paulinischen Briefe* (Halle, 1893); Harnack, *Chronologie der altchristlichen Litteratur*, Band i. (Leipzig, 1897). For study of the man: Baur, *Paulus* (Eng. trans., Edinburgh, 1873-75); Renan, *Les apôtres* (Eng. trans., London, 1869); *Saint Paul* (Eng. trans., ib., 1887); Conybeare and Howson, *Life and Epistles of Saint Paul* (ib., 1850-52); Lewin, *Life and Epistles of Saint Paul* (ib., 1851); Farrar, *Life and Work of Saint Paul* (London, 1879); Stalker, *Life of Saint Paul* (New York, 1884); Matheson, *The Spiritual Development of Saint Paul* (Edinburgh, 1892); Ramsay, *Saint Paul the Traveller and Roman Citizen* (New York, 1896); Cone, *Paul the Man, the Missionary, and the Teacher* (New York, 1898); Gilbert, *The Student's Life of Saint Paul* (New York, 1899). Consult also McGiffert, *History of Christianity in the Apostolic Age* (New York, 1897). For study of Paul's teaching: Ritschl, *Entstehung der altkatholischen Kirche* (Bonn, 1857); Sabatier, *L'apôtre Paul* (Eng. trans., New York, 1891); Pfeiderer, *The Influence of the Apostle Paul on the Development of Christianity* (Hibbert Lectures for 1885; New York, 1885); Knowling, *The Witness of the Epistles* (London, 1892); Holsten, *Das Evangelium des Paulus* (Berlin, 1880-98); Bruce, *Saint Paul's Conception of Christianity* (New York, 1894); Stevens, *The Pauline Theology* (New York, 1892). Consult also the accepted works on New Testament theology.

PAUL. The name of five popes. **PAUL I.**, Pope 757-767, the brother of Stephen II., whom he succeeded. He was the candidate of the Frankish party, and as Pope maintained close relations with Pepin I., whose help he needed both against the Lombards and against the Greek Emperor, who had not given up his claims to the exarchate and the Pentapolis. Pepin, however, was constant in his support of the Pope, and assured him a fairly peaceable pos-

session of the ecclesiastical territory.—**PAUL II.**, Pope 1464-71, Pietro Barbo. He was born at Venice in 1417, the nephew of Eugenius IV., to whom he owed his introduction to an ecclesiastical career. He was made a cardinal in 1440, and held a position of great influence under Nicholas V. and Calixtus III. Pius II., however, did not regard him so favorably, and his election to the Papacy as successor to Pius was largely due to the older cardinals, who had not been in sympathy with that pontiff. At the beginning of his reign he tried to form an alliance of Christian sovereigns against the Turks, but the circumstances of the time frustrated his purpose. He was obliged to oppose the claims of the French King, Louis XI., to absolute power, and demanded of him the repeal of the Pragmatic Sanction. He attempted to suppress the non-Christian or properly so-called humanistic Renaissance, especially by the dissolution of the Roman Academy, which had become a meeting-place for the enemies of religion, and by severe penalties against the scholars who combined pagan doctrine with pagan immorality.—**PAUL III.**, Pope 1534-49, Alessandro Farnese. He was born in 1468, was educated in Rome by Pomponio Leto, and went to Florence, entering into close relations with the Medici. Alexander VI. made him a cardinal in 1493; later he became Bishop of Ostia and dean of the Sacred College. He held various important offices, twice representing the Pope during his absence as legate in Rome. He strongly advocated the calling of a general council, and was a member of the commission appointed by Clement VII. to consider the question. After his elevation to the Papacy, he vigorously pursued the reforming policy he had always advocated. He first summoned the council to meet at Mantua in 1536, then at Vicenza in 1538, and again at Mantua in 1542; but each time its assembly was prevented by the discord between Charles V. and Francis I. It finally met at Trent in 1545. (See TRENT, COUNCIL OF.) Against Henry VIII. of England he took decisive steps, finally issuing in 1538 the bull of excommunication and deposition prepared three years earlier. He took vigorous steps also for the suppression of Protestantism in Italy, reconstructing the Inquisition and establishing a strict censorship of books. (See INDEX.) The reproach of nepotism is brought against him. In 1545 he is to be credited with an enlightened patronage of letters and art. He made his natural son, Pietro Luigi Farnese, Duke of Parma and Piacenza, having appointed Michelangelo architect in chief of the Vatican and of Saint Peter's, and provided for many great works.

PAUL IV., Pope 1555-59, Giovanni Pietro Caraffa. He was born at Naples in 1476. In 1494 he entered the service of the Curia, and in 1507 was appointed Bishop of Chieti, in which see he labored most earnestly for the reformation of abuses, and for the revival of religion and morality. With this view he established, in conjunction with several congenial reformers, the congregation of secular clergy called Theatines (q.v.), and was himself the first superior. It was under his influence that Paul III. organized the Tribunal of the Inquisition in Rome. On the death of Marcellus II. in 1555, although in his seventy-ninth year, he was elected to succeed him. He enforced vigorously upon the clergy the observance of all the clerical duties, and enacted

laws for the maintenance of public morality. He established a censorship, and completed the organization of the Roman Inquisition; he took measures for the alleviation of the burdens of the poorer classes, and for the better administration of justice, not sparing even his own nephews, whom he banished from Rome on account of their corrupt conduct and profligate life. His foreign relations, too, involved him in much labor and perplexity. He insisted on the restoration of Church property in England, a demand which Julius III. had in the interests of peace refused to press; and on Elizabeth's accession declared her illegitimate and not entitled to the throne. He was embroiled with the Emperor Ferdinand, with Philip II. of Spain, and with Cosmo, Grand Duke of Tuscany. Having condemned the principles of the Peace of Augsburg, he protested against its provisions.—**PAUL V.**, Pope 1605-21, Camillo Borghese. He was born in Rome in 1550. In his early life he was a distinguished canonist and theologian; and after the ordinary prelatical career at Rome he rose first to the post of Nuncio at the Spanish Court, and afterwards to the cardinalate under Clement VIII. His Pontificate is rendered memorable by the celebrated conflict with the Republic of Venice, into which he was plunged at the very outset of his career. The original ground of dispute was the question of the immunity of the clergy from the jurisdiction of civil tribunals. The Venetian Senate resisted the claim of the clergy to be tried by ecclesiastical tribunals; and further causes of dispute were added by a mortmain law, and a law prohibiting the establishment of new religious Orders or associations unless with the sanction of the Senate. Each party remaining inflexible in its determination, Paul issued a brief, directing a sentence of excommunication against the Doge and Senate, and placing the Republic under an interdict unless submission should be made within twenty-four days. The Senate persisted, and an animated conflict, as well of acts as of writings, ensued, in the latter of which the celebrated Fra Paolo Sarpi, on the side of the Republic, and on the Papal side Bellarmine and Baronius, were the leaders. Preparations were even made for actual hostilities; but, by the intervention of Henry IV. of France, the dispute was accommodated and peace restored in 1607, although dissatisfaction afterwards arose on the subject of the nomination of a patriarch. Paul's administration was a vigorous and noble one, and marked by the development of religious Orders and missionary enterprise. Consult his *Life* by T. A. Trollope (London, 1861).

PAUL I., PETROVITCH (1754-1801). Emperor of Russia from 1796 to 1801. He was the son of Peter III. and Catharine the Great. He underwent a vigorous training at the hands of his mother, and this served to harden and warp a nature which was by no means devoid of generous impulses. The memory of his father's violent death made him suspicious of all who surrounded him, and as prince or emperor prevented him from gathering a party around him. During his mother's lifetime he was allowed no share in the government, and with the exception of a journey abroad (1781-82) passed his time in brooding idleness on his estates at Gatchina. Catharine died November 17, 1796, while seriously contemplating the exclusion of Paul from the succession to the throne in favor of his son

Alexander. Paul's reign began with fair promise, but speedily degenerated into an oppressive despotism which weighed alike on the Court, the army, and the intellectual life of the nation. The system of police espionage was developed to a hitherto unparalleled degree, and swift punishment was visited on those unfortunate enough to arouse the slightest suspicion in the Emperor's diseased imagination. Reluctant at first to enter the struggle against France, he finally joined the Second European Coalition against the French Republic in 1798, and in 1799 the Russian armies under Suvaroff (q.v.) gained a series of notable victories over the French and drove them out of Northern Italy. Bonaparte's astute diplomacy, however, succeeded in breeding dissension between the Russian Emperor and his allies. Paul's discontent was intensified by the conduct of England in refusing him possession of the island of Malta, to which as grand master of the Knights of Malta, an office assumed in 1798, he laid claim. His opposition to England finally developed into open hostility, and led in 1800-01 to the formation of the Northern Maritime League by Russia, Sweden, and Denmark against Great Britain. At home, meanwhile, Paul's despotism had become unendurable, and a conspiracy was formed by some of the highest officials about the Court to bring about the Emperor's abdication in favor of his son Alexander. The leaders of the conspiracy were Count Pahlen, Count Panin, Prince Suboff, General Bennigsen, and General Uvaroff. On the night of March 23, 1801, the Imperial palace was surrounded by the troops of Count Pahlen while the conspirators, some thirty in number, broke into Paul's chamber and at the sword's point demanded that he sign the act of abdication. No certain knowledge exists of what then occurred, but it would seem that the Emperor, crazed with fear, attempted resistance, that a scuffle ensued, and that in the struggle Paul was strangled with his own scarf. Of Paul's ten children, Alexander and Nicholas ruled over Russia, while Constantine was a prominent figure during the reign of the latter. Consult: Kobeko, *Der Cäsarwitsch Paul*, 1754-96 (Berlin, 1886); Brenemann, *Aus den Tagen Kaiser Pauls* (Leipzig, 1886).

PAUL, APOCALYPSE OF. See APOCRYPHA, section on *New Testament*.

PAUL, CHARLES KEGAN (1828-1902). An English publisher and author, born at White Lackington, Somersetshire. He was educated at Eton and at Exeter College, Oxford; from 1853 to 1862 was a master at Eton, and, after twelve years as vicar of Sturminster, entered the publishing business, from which he retired in 1899. As an author he is best known for his biographies and translations: *A Translation of Faust* (1873); *Life of William Godwin* (1876); *Letters of Mary Wollstonecraft* (1879); *Biographical Sketches* (1883); *Maria Drummond* (1891); *Huysmans's En Route* (1896); and *Memories* (1899). In *Faith and Unfaith* (1891) Paul hinted at his own religious beliefs; he left the Church of England for Positivism, and in his last years entered the Roman Catholic Church.

PAUL, poul, HERMANN (1846—). A German philologist. He was born in Magdeburg; studied at Berlin and Leipzig, and in 1874 became professor in the University of Freiburg. In 1893 he

was appointed professor of German philology at the University of Munich. His publications include: *Gab es eine mittelhochdeutsche Schriftsprache?* (1873); *Zur Lautverschiebung* (1874); *Kritische Beiträge zu den Minnesingern* (1876); *Zur Nibelungenfrage* (1877); *Mittelhochdeutsche Grammatik* (5th ed. 1900). He is best known in the United States by his *Prinzipien der Sprachgeschichte* (1880; 3d ed. 1898), translated into English by Strong (1888), and retranslated with changes by Strong, Logeman, and Wheeler (1891). As editor of *Grundriss der germanischen Philologie* (1891-93; 2d ed. 1896 et seq.), he rendered valuable service to modern philology. After 1874 he with W. Braume edited the *Beiträge zur Geschichte der deutschen Sprache*.

PAUL, pól, LEWIS (?-1759). An English inventor, of whose life very little is known. About 1729 he invented a pinking machine, and his acquaintance with Dr. Johnson seems due to the fact that Mrs. Desmoulins had learned pinking from him. Paul's important patent dates from 1738, and it is the earliest machine for the spinning of wool or cotton by two pairs of revolving rollers. The factories established at Birmingham and Northampton met with no success. Two other patents taken out by Paul were a carding machine (1748) and a spinning machine (1758). They seem to have been no more successful than the first, which, however, was the basis of Arkwright's invention.

PAUL, poul, OSKAR (1836-). A German writer on music, born at Freiwaldau, Silesia. He was a pupil of Klingenberg at Görlitz, then of Plaidy, Richter, and Hauptmann at the University of Leipzig, and after sojourns in different German towns he returned to Leipzig (1866), to give private lessons in harmony. Three years afterwards he began to teach musical history in the conservatory of that city, and in 1872 he was appointed professor extraordinarius at the university. He founded and edited the periodical *Tonhalle*, which was merged into the *Musikalische Wochenblatt*; published Hauptmann's *Lehre der Harmonik* (1868); wrote *Geschichte des Claviers* (1869); *Handlexicon der Tonkunst* (1871-73); and made the first German translation of *Boëthius* (1872).

PAUL, pól, VINCENT DE. See VINCENT DE PAUL, SAINT.

PAUL, VISION OF. See APOCRYPHA, section on *New Testament*.

PAUL AND VIRGINIA (Fr. *Paul et Virginie*, pó'lá-vér'zhé'né'). A well-known romance by Bernardin de Saint-Pierre (1788), the scene of which is laid in Mauritius, where the author had spent three years. It exhibits great powers of description and emotional force, with exaggerated sentiment and a not altogether healthy atmosphere. It is the story of two playmates whose affection develops into love, and ends with the drowning of Virginia and the death of her lover from grief.

PAUL CLIFFORD. A novel by Bulwer-Lytton (1833). It is the story of a chivalrous highwayman in the time of the French Revolution. Paul Clifford, of unknown birth, brought up in evil, is arrested for theft and becomes a highwayman. As Captain Clifford he loves Lucy Brandon, but is brought before her uncle, Judge Brandon, for a robbery. He proves to be Bran-

don's stolen child, is condemned to death by his father, but escapes with Lucy to America.

PAUL/DING, HIRAM (1797-1878). An American naval officer. He was born in New York City, entered the United States Navy as a midshipman in 1811, participated in the battle of Lake Champlain (September 11, 1814), receiving a vote of thanks and a sword from Congress for his services, served under Commodore Decatur against the Barbary Powers in 1815, and in the following year was promoted to a lieutenancy. He accompanied Commodore Porter on an expedition against the West Indian pirates in 1822-23, acting as first lieutenant of the *Sea Gull*, said to have been the first steamer ever used for purposes of war; served on the *Dolphin* in 1826 when that vessel was sent to the Mulgrave Islands in search of the mutineers of the American whale ship *Globe*; cruised in the East Indies, in command of the *Vincennes*, from 1844 to 1847; was in command of the Washington Navy Yard from 1851 to 1854; and from 1854 to 1857 was commander of the home squadron, at the time the highest position in the navy. For arresting the filibuster Walker (see WALKER, WILLIAM) at Greytown, Nicaragua, in December, 1857, he was relieved from command by President Buchanan, though the Republic of Nicaragua, in recognition of his services, presented him with a sword and a large tract of valuable land, which latter Congress did not allow him to accept. On the outbreak of the Civil War he was ordered to Washington to assist Secretary Welles of the Navy Department, and in April, 1861, proceeded to Norfolk and destroyed the navy yard there. Having passed the age limit of sixty-two years, he was technically retired in December, 1861. In the following year he was promoted to the recently created grade of rear-admiral, on the retired list, and subsequently was commandant of the New York Navy Yard from 1862 to 1866, in which position he rendered important services to the Government by sending many vessels and thousands of men to the front; was Governor of the Naval Asylum in Philadelphia from 1866 to 1869, and was port admiral at Boston from 1870 to 1871. He published a *Journal of a Cruise Among the Islands of the Pacific* (1831). Consult a biographical sketch by Meade in *Harper's New Monthly Magazine*, vol. lviii. (New York, 1879).

PAULDING, JAMES KIRKE (1779-1860). An American author, born in Pleasant Valley, Dutchess County, N. Y. After a scanty education he went to New York, where, with William Irving, his brother-in-law, and with Washington Irving, he collaborated in *Salmagundi* (1807), the second series of the same (1819) being by Paulding alone. During the War of 1812 he published the *Diverting History of John Bull and Brother Jonathan*; and in 1814 the *United States and England*, a defense against British criticisms. This work attracted attention and caused him to be appointed secretary of the board of navy commissioners. In 1817 he published a defense of the Southern States and of slavery in *Letters from the South, by a Northern Man*; in 1822, *A Sketch of Old England, by a New England Man*; and in 1825 *John Bull in America, or the New Munchausen*, a satire on the writings of British tourists. Meanwhile he had published his first novel, *Koningsmarke* (1823); *Merry*

Tales of the Three Wise Men of Gotham (1826) followed, and other books, mainly humorous and satirical. In 1831 he produced *The Dutchman's Fireside*, a novel dealing with the old Dutch settlers. This, his best work, was followed by *Westward Ho!* (1832), a novel dealing with Kentucky. Next came a good biography of Washington (1835), and *Slavery in the United States* (1836). Meanwhile he had been navy agent at New York City since 1825, a position from which he was advanced in 1837 to the post of Secretary of the Navy in Van Buren's Cabinet. On his retirement in 1841 he went to a country residence at Hyde Park, where he wrote a few stories and plays, the novel, *The Puritan and His Daughter* (1849), being the most conspicuous. There he died, April 6, 1860. His select works appeared in four volumes (1867-68). Consult *Literary Life of James K. Paulding*, by his son William (New York, 1867).

PAULDING, JOHN (1758-1818). An American Revolutionary soldier, born in New York City. He, together with Isaac Van Wart and David Williams, captured Major André near Tarrytown, September 23, 1780, and for this received from Congress a silver medal bearing the inscription "Fidelity" on one side, and "Vincit amor patriæ" on the other. He was a prisoner three times during the Revolutionary War, being released the second time only four days before André's capture.

PAULI, pou'le, KARL (1839—). A German philologist. He was born at Barth, in Pomerania, studied at Erlangen and Greifswald, and, after teaching in various gymnasiums and spending several years in Leipzig, in 1893 became professor in the Lyceum of Lugano, in Switzerland. Pauli's especial study was on the languages of Italy, above all Etruscan. He published: *Etruskische Studien* (1879-80; completed in Deecke's *Etruskische Forschungen und Studien*); *Altitalische Studien* (1883-87); *Altitalische Forschungen* (1885-94); and, with Danielsson, *Corpus Inscriptionum Etruscarum* (1893 et seq.).

PAULI, REINHOLD (1823-82). A German historian. He was born in Berlin, studied there and at Bonn, and lived for several years in England, in antiquarian research and as secretary to the Prussian ambassador, Bunsen. In 1866 he lost his professorship at Tübingen because of an attack on the policy of Württemberg. In the following year he was appointed professor at Marburg and in 1870 at Göttingen. His historical works are marked by a lucid style and by painstaking research. They include: *König Alfred und seine Stelle in der Geschichte Englands* (1851); a continuation of Lappenberg's *Geschichte von England* (1853-58), an able work; *Bilder aus Altengland* (1860; 2d ed. 1876); *Geschichte Englands seit den Friedensschlüssen von 1814 und 1815* (1864-75); *Simon von Montfort* (1867); and a sketch of Cromwell (1874). Pauli edited in 1856 Gower's *Confessio Amantis*.

PAULICIANS. An Oriental Christian sect, which flourished in the eighth and ninth centuries, although survivors are found much later. It has generally been represented as an offshoot of the Manichæans (see MANICHÆISM), but recent investigations make it probable that it is of independent origin. In a work entitled *The Key of Truth*, dating in its present form probably from the ninth century, and representing the contem-

porary usages and beliefs of the Paulicians in Armenia, survivals of ancient baptismal and ordination forms are found, which indicate some connection between this Church and the older Adoptionists. The Adoptionists taught that Christ was a man who, at his baptism, became by adoption the Son of God, instead of being so by nature, or eternally (the Catholic doctrine). This type of Christology goes back to the end of the second century, when it was brought to Rome by Theodotus. (See MONARCHIANS.) The origin of the name Paulicians is uncertain, but an eleventh-century opponent of the movement traces it to Paul of Samosata (q.v.), Bishop of Antioch in the latter part of the third century, the last great Adoptionist teacher, and this is the most plausible derivation yet suggested. Ancient writers like Petrus Siculus and Photius (ninth century) say that Paulicianism arose in Armenia some two hundred years before their time. Their leader was one Constantine (Sylvanus), and the sect stood in opposition to the Catholicus, or head of the National Church, on several points of doctrine and practice. They rejected the authority of the hierarchy, and chose religious leaders of their own, the 'elect ones,' wherein lies one resemblance between them and the mediæval Manichæan sects. These facts have led many writers to speak of them as 'Protestants.' In the ninth century the Paulicians enjoyed a vigorous ecclesiastical life, especially under a leader named Baanes, from whom they are sometimes known as Baanites, but they were subjected to severe and repeated persecution at the hands of the Church and of the Byzantine Emperors. Under such provocation they for a time joined forces with the Mohammedans against all Christian powers. In the eighth century, and again in the tenth, some of them were removed from Asia Minor to the upper part of the Balkan Peninsula, to serve as an outpost against the Slavic tribes of the north, and thus a considerable Paulician population was established in Europe. Their influence penetrated into Bulgaria, and here no doubt is one source of those mediæval movements generally classed as Manichæan, which include the Bogomiles, Cathari, and Albigenses (qq.v.). A few surviving Paulicians were discovered in Southeastern Europe in the eighteenth century, and larger numbers of them in Armenia in the nineteenth. Here was found their book, *The Key of Truth*, which has thrown new light on some obscure points of their history. Consult: Gibbon's *Roman Empire*, especially vol. vi., app. 6 (ed. by Bury, London, 1896 et seq.); Conybeare, *The Key of Truth* (Oxford, 1898); Newman, *Manual of Church History*, vol. i. (Philadelphia, 1900); Lynch, *Armenia, Travels and Studies* (London, 1901).

PAULINE EPISTLES. A group of New Testament letters, claiming in their superscriptions to have been written by the Apostle Paul and comprising the following thirteen writings: Romans, I. Corinthians, II. Corinthians, Galatians, Ephesians, Philippians, Colossians, I. Thessalonians, II. Thessalonians, I. Timothy, II. Timothy, Titus, Philemon.

PAULINUS, MEROPHUS PONTIUS ANICIUS, SAINT (353-431). He was born at Bordeaux, France, and became a pupil of the poet Ausonius, who secured him the favor of the Emperor Gratian. He attained the dignity of consul

suffectus, and married a wealthy Spanish lady named Therasia. Through the efforts of Saint Ambrose he was converted to Christianity, distributed most of his property among the poor, and continued for a time to reside in Spain. He was ordained a priest in 393, at Barcelona, but soon left Spain for Rome. In 394 he went to Nola, where he had an estate. Near the city was the tomb of the martyr Felix, over which a church had been built, with a few cells for pilgrims. Here Paulinus lived for fifteen years in a strictly monastic fashion, except that his wife seems to have been with him. In 409 he was made Bishop of Nola, a position which he retained till his death. He was present at the Council of Ravenna in 419. Of his works there have been preserved 50 epistles, 32 poems, and a tract called *Passio S. Genesii Arelatensis*. His name is of frequent occurrence in the letters of Augustine and Jerome. The works of Paulinus will be found in vol. lxi. of Migne's *Patrologia Latina* (Paris, 1861). Consult Lagrange, *Saint Paulin de Nole* (Paris, 2d ed., 1882).

PAULINUS, SAINT (died 644). A missionary sent to England by Pope Gregory I. in 601, where he joined Augustine (q.v.). In 625 he was made bishop by Archbishop Justus of Canterbury, and went to Northumbria, in attendance on Ethelburga, daughter of Ethelbert, King of Kent, and wife of Edwin (q.v.), King of Northumbria. Edwin was still a pagan at the time, but in 627, through the influence of his wife and Paulinus, he caused himself to be baptized, together with many others. Soon afterwards Paulinus founded the cathedral at York. On the overthrow of King Edwin in 633 the Northumbrians relapsed into heathenism, and Paulinus fled to Kent, where he became Bishop of Rochester. He died October 10, 644. Consult Bright, *Early English Church History* (Oxford, 1878).

PAULISTS. The ordinary designation of the Congregation of Missionary Priests of Saint Paul the Apostle. This is a society founded in New York in 1858 by Father Hecker (see HECKER, ISAAC THOMAS) and some other priests. Their desire was to form a community of priests for missionary work in America, composed chiefly of those whose native tongue was English; Hecker had left the Redemptorists largely on the ground that the members of that Order working in America were mostly of German birth, and did not understand the needs of the country. The plan was approved by Archbishop Hughes, and received the Papal confirmation from Pius IX. The mother house of the community, most of whose members are converts from Protestantism, is in New York. The Paulists devote themselves especially to mission preaching, and have been the main promoters of the remarkable movement originating in the last years of the nineteenth century toward a systematized effort to extend their faith among the non-Catholics of America which has taken shape in the foundation of a central training house for such work at Washington. Their magnificent church in New York is noted for the perfection of its services, both in the direction of punctilious carrying out of the rubrics and of Gregorian music. They also carry on the Catholic Publication Society work, with a printing plant of their own, and publish a monthly magazine called *The Catholic World*.

PAULITES (ML. *Paulita*, from Lat. *Paulus*, Paul). An Order of hermits which arose in Hungary in the thirteenth century by the union of two earlier communities, those of Patach and Pisilia, under Eusebius of Gran, the founder of the latter, who united both of them in 1250 and became the first superior of the joint Order. Eusebius died in 1270; the rule of Saint Augustine was adopted in 1308, and the Order, which was confirmed by Pope John XXII., spread throughout Northern Europe, until it numbered 170 cloisters in Hungary alone, in which country many of its members filled the highest ecclesiastical offices. They were introduced into Portugal in 1420, and into France, where they were commonly known as Brothers of Death (see DEATH, BRETHREN OF) and much favored by Louis XIII. The Order in France seems to have been suppressed by Pope Urban VIII. It has practically died out everywhere except in Cracow and Poland.

PAULITSCHKE, pou-lich'ke, PHILIPP VIKTOR (1854-99). An Austrian geographer and explorer of Northeastern Africa. He was born in Moravia, was educated in the universities of Gratz and Vienna, and in 1883 was appointed docent in the University of Vienna. His first trip to Africa was in 1880, when he made ethnological studies in Egypt and Nubia; but the expedition undertaken in 1844, starting from Harar and going south through Somaliland, was much more important, especially as it covered new territory in Galla. Paulitschke's writings include: *Geographische Erforschung der Adalländer und Harrars* (1884); *Die pologie der Somal, Galla und Harrari* (1886); *in der Zeit von 1500-1750 n. Chr.* (1882), and other bibliographical studies; and the results of his own journeys: *Die geographische Erforschung der Adalländer und Harrars* (1884); *Die Sudanländer* (1885); *Ethnographie und Anthropologie der Somal, Galla und Harrari* (1886); *Die Wanderungen der Oromó* (1888); and *Ethnographie Nordostafrikas* (1893-96).

PAULLINIA (Neo-Lat., named in honor of C. F. Paullini, a German botanist [1643-1712]). A climbing plant of the order Sapindaceæ, native in Brazil. A paste made of the crushed seeds and leaves of *Paullinia Sarbilis* or *Paullinia Cupana* is called guarana, and is used in medicine. The dried paste occurs in brown cakes or sticks, with an odor of chocolate and a bitter taste, partly soluble in water and in alcohol. As the preparation of this paste is a secret, the other ingredients are not known. It yields an alkaloid, *guaranin*, which is considered to be identical with *caffeine* (q.v.), and has the same therapeutic and physiological effects. A fluid extract of guarana is official, which has been used in migraine chiefly, but also in wasting diarrhœa and as a tonic.

PAULO AFFONSO, pou'lo af-fôn'so, FALLS OF. See SÃO FRANCISCO.

PAUL OF SAMOS'ATA. Bishop of Antioch in the third century. Beyond the fact that he was born at Samosata, little is known of his early life. He was at first a sophist and obtained admittance among the clergy in some unknown way. He became Bishop of Antioch (260), probably through the influence of Zenobia, Queen of Palmyra. He was a Monarchian and his opponents do not give a good account of him. They assert that his character previous to his appointment

was in some respects unworthy of the episcopal office, and that after his elevation he was rapacious, arrogant, and vain. His heresies caused several councils to be convened to consider his case; by the last of these, held about 269, he was divested of his office and excommunicated. Trusting to the favor of both Queen Zenobia and the populace, he refused to vacate the episcopal residence, in which also the meetings of the Church were held. In 272 the Emperor Aurelian, having conquered Zenobia, referred Paul's case to the bishops of Rome and of Italy, and they decided against him. There is no notice either of the time or place of his death.

PAUL OF THEBES, SAINT. The first well-known hermit in the Christian Church, called by Saint Jerome, the founder of Monasticism. He was born at Thebes, in Upper Egypt, and at the age of fifteen fled to the desert to escape the Decian persecution. Here he lived about a hundred years in prayer and mortification, and trained Saint Antony to be his successor in the leadership of those who sought an ascetic life in retirement from the world. See ANTONY, SAINT.

PAUL OF THE CROSS, SAINT (1694-1775). The founder of the Order of Passionists (q.v.). His original name was Paolo Francesco Danei; he was born at Ovada, near Genoa. With a few companions, he began to live a hermit's life on Monte Argentario, where he believed that God revealed to him that he should found a new Order, even showing him its destined habit. The Bishop of Alessandria, after careful investigation, clothed him with this habit, and allowed him even as a layman to preach repentance and conduct spiritual exercises. In 1727 he was ordained priest, and ten years later the first permanent settlement of Passionists was made on Monte Argentario; from this time the founder took the name of Paul of the Cross. After a life of penance and labor, he died in Rome, October 18, 1775. He was canonized by Pius IX. in 1867. Consult his *Life* by the Passionist Father Pius (Dublin and New York, 1867).

PAULOWNIA, paulōnī-ā (Neo-Lat., named in honor of Anne Paulowna, daughter of Paul I., Czar of Russia). The common and generic name of an ornamental Japanese tree of the natural order Scrophulariaceae, which attains a height of 20 to 40 feet. It has somewhat the appearance of a catalpa, the heart-shaped leaves being similar, but much more downy. The flowers, borne in panicles in spring, are perfumed, violet-colored, two inches long, somewhat cylindrical, with rounded lobes at the mouth. The tree was formerly much planted in the United States, but, not proving equal to expectation, has lost in popular favor. It is not hardy north of New York, and even there and farther south it often fails to bloom for several seasons in succession. The branches are crooked, spreading, and nearly horizontal. Since the flower buds are carried over winter, a severe winter generally blights them. The growth of the tree in a favorable climate is very rapid and vigorous. When annually cut to the ground it is said to form a good hedge of young growths remarkable for the striking appearance of the leaves.

PAUL PRY. A successful comedy by John Poole, produced in 1825. The title character is

an exceedingly curious, meddling person, who on trivial pretenses interrupts every interesting situation in the play.

PAULSEN, paul'sen, FRIEDRICH (1846-). A German philosopher of the Neo-Kantian school. He was born in Langenhorn, Schleswig, and studied at Erlangen and at Berlin, where he became docent in 1875, and in 1878 professor of philosophy and pedagogy, and where his lectures were among the most widely attended in Germany. His chief works in the latter branch are "Gründung, Organisation und Lebensordnungen der deutschen Universitäten im Mittelalter," in Sybel's *Zeitschrift* (1881); *Geschichte des gelehrten Unterrichts auf den deutschen Schulen und Universitäten* (1885; 2d ed. 1896); *Realgymnasium und humanistische Bildung* (1889); and *Höhere Schulen und Universitätsstudium im 20. Jahrhundert* (1901). As a philosopher Paulsen ranks as a disciple of Fechner in metaphysics, holding his pan-psychic doctrine and agreeing with him as to the parallelism between physical and mental. In general, his agreement with Fechner is best seen in the widely known *Einleitung in die Philosophie* (1892; 7th ed. 1900), of which an English version appeared in 1895. Equally characteristic is the important genetic study of the Kantian system, *Versuch einer Entwicklungsgeschichte der Kantischen Erkenntnistheorie* (1875), and the supplementary work, *Immanuel Kant* (1898; 2d ed. 1899). His other works are: *Kant der Philosoph des Protestantismus* (1899); *Schopenhauer, Hamlet und Mephistopheles* (1900), a series of essays; *Philosophia Militans* (1900; 2d ed. 1901), a reply to Haeckel's *Welträtsel*; and the excellent manual, *Ethik* (1889; 5th ed. 1899; partial English version, 1899), which is especially noteworthy for its historical sketch and for its practical treatment of the ethics of every-day life and of politics. The last topic is considered in *Participolitik und Moral* (1900).

PAULSEN, JOHN (1851-). A Norwegian poet and novelist, born at Bergen. There he was for some time employed in the Portuguese consulate. Having entered literature with *Af Bylivet* (1875; 2d ed. 1890), thanks to Ibsen's influence, he received a State stipend and spent several years abroad, returning to Norway in 1882 only temporarily, and spending most of his time in Denmark. Among his works are: *Moll og Dur* (1876), a volume of poems; *Margherita*, one of the first Norwegian problem-stories (1880); *En datters Illustration* (1884) and *En Fremtidskvinde* (1887), both of which were translated into German, as was *Jodinden* (1892); *Nye Melodier* (1894); and a play, *Falkenström og søn*, which met with success in Norway and in Germany.

PAULUS, pou'lus, HEINRICH EBERHARD GOTTLÖB (1761-1851). A German theologian and one of the leaders of the Rationalist school. He was born at Leonberg, near Stuttgart, September 1, 1761. He studied Oriental languages at Göttingen, London, and Paris. In 1789 he was called to the professorship of Oriental languages at Jena, and in 1793 became professor of theology. Here he especially signalized himself by the critical elucidation of the Scriptures of the Old and New Testament, in so far as they presented Oriental characteristics. In 1811 he accepted the professorship of exegesis and ec-

clesiastical history at Heidelberg. He died August 10, 1851. Among his numerous writings may be mentioned: *Clavis über die Psalmen* (1791); *Clavis über Jesaias* (1793); *Philologisch-kritischer und historischer Kommentar über das Neue Testament* (1800-04); *Sammlung der merkwürdigsten Reisen in den Orient* (7 vols., 1792-1803); *Leben Jesu, als Grundlage einer reinen Geschichte des Urchristentums* (1828); *Aufklärende Beiträge zur Dogmen-, Kirchen- und Religionsgeschichte* (1830); and *Exegetisches Handbuch über die drei ersten Evangelien* (1830-33). Consult: Paulus, *Skizzen aus meiner Bildungs- und Lebensgeschichte zum Andenken an mein 50-jähriges Jubiläum* (Heidelberg, 1829); and Reichlin-Meldegg, *H. E. G. Paulus und seine Zeit* (Stuttgart, 1853).

PAULUS, JULIUS. A distinguished Roman jurist, who lived in the latter half of the second century and the earlier decades of the third. He was an assessor or associate justice under Papinianus, when the latter was prætorian prefect or chief justice of the Empire, in the reign of Septimius Severus; was exiled by Elagabalus; was recalled and made prætorian prefect by Alexander Severus. Paulus was one of the most fertile of Roman legal writers. In addition to commentaries on the civil law (16 books) and on the prætorian or equity law (78 books), he published a great number of monographs on special topics, and 48 books of 'questions' and 'responses.' He published also a succinct presentation of the entire law, civil and prætorian, under the title of *Sententiæ* (5 books), and two books of 'institutes' for beginners. He was regarded by the later Romans as the equal of his contemporary, Ulpian, and as inferior only to Papinianus. His style, however, is less clear than Ulpian's. Excerpts from his writings make up more than one-sixth of the Digest of Justinian. A part of his *Sententiæ* has come down to us in the Breviary of Alaric (q.v.), and this text is included in Huschke, *Jurisprudentiæ Antijustinianæ quæ Supersunt* (4th ed., Leipzig, 1879). A fuller text, which includes the passages preserved in the Digest, may be found in Krüger, Mommsen, and Studemund, *Collectio Librorum Juris Antijustiniani* (Berlin, 1878-90).

PAULUS, LUCIUS ÆMILIUS. A Roman general. See ÆMILIUS PAULUS.

PAULUS DIAC'ONUS (Lat., Paul the deacon) (c.720-c.800). The best historian of the Lombards. He was descended from a noble family, which had settled in Friuli. He received an excellent education either at Pavia or Friuli, and was at the former city while King Ratchis (744-49) ruled there, and became the tutor of Adelperga, daughter of King Desiderius. After the destruction of the kingdom at Pavia, if not earlier, he very likely took refuge at the Court of Duke Arichis, the husband of Adelperga. For the latter he wrote his *Historia Romana*, which was chiefly a compilation of works still in our possession, and was greatly used as a textbook for centuries after. About this time Paulus entered the monastery at Monte Cassino. In 782 Paulus journeyed to the Court of Charles the Great in order to obtain the release of his brother and other captive Lombards. His mission was successful, while he himself was induced by King Charles to remain and lend his aid in the reawakening of learning. It was here that he

made his collection of homilies, known as *Homiliarium*, which have been translated into many languages. At the request of Bishop Angilram of Metz, he also wrote *Gesta Episcoporum Mettensium* (History of the Bishops of Metz). Finally, after repeated petitions, Paulus was permitted to return to his beloved convent, probably accompanying Charles to Italy in 786. At Monte Cassino Paulus now wrote his most important work, *De Gestis Langobardorum* (History of the Lombards), which ends with the year 744. The work is remarkable on account of its pure Latin and the vast number of poetic legends of the early Germans it has preserved. Paulus was also the author of a number of theological works, and of some hymns and letters still extant. The best edition of his works is to be found in the *Monumenta Germaniæ Historica* (Hanover, 1878-79). For other editions and the like, consult Potthast, *Bibliotheca Historica Medii Ævi*, vol. ii. (2d ed., Berlin, 1896); Wattenbach, *Deutschlands Geschichtsquellen*, vol. i. (6th ed., Berlin, 1893). There is an excellent German translation of the Lombard History with a serviceable introduction by Jacobi in *Geschichtsschreiber der deutschen Vorzeit. Achtes Jahrhundert*, vol. iv. (Leipzig, 1888).

PAULUS HOOK, CAPTURE OF. See JERSEY CITY, N. J.

PAUL VERONESE. See VERONESE, PAOLO.

PAUMOTA (pā'ū-mō'tā) **ISLANDS.** A group of islands in the South Pacific. See LOW ARCHIPELAGO.

PAUNCEFOTE, pans'fūt, Lord JULIAN (1828-1902.) A British diplomat, born in Munich, Germany, of English parents. He was educated at Marlborough College, in Paria, and in Geneva, and was called to the bar in 1852. Three years afterwards he became private secretary to Sir William Molesworth, British Colonial Minister, and on the death of his chief the following year, Pauncefote went to Hong Kong, where he practiced law successfully, and in 1866 was made Attorney-General of the colony. He was appointed the first Chief Justice of the federated British Leeward Islands in 1874, knighted and made Assistant Under-Secretary for the Colonies the same year, and in 1876 was given the corresponding position in the Foreign Office. He was made Permanent Under-Secretary of State for Foreign Affairs in 1882, served as British Commissioner to Paris in the Suez Canal negotiations in 1885, and was appointed Minister to the United States in 1889. His title was changed to Ambassador when that office was created in 1893, and he was the first to bear that title in this country. Queen Victoria made him a Privy Councillor in 1894. In the Bering Sea, the Venezuelan, and other difficulties between Great Britain and the United States, Pauncefote's large experience, knowledge, and tact in dealing with international affairs were powerful upon the conciliatory side, and his friendliness to the United States was shown in his efforts to have the Clayton-Bulwer Treaty abrogated. He was a British delegate to the Peace Conference at The Hague in 1899, and for his services there was raised to the peerage as Baron Pauncefote of Preston.

PAUPERISM (from Lat. *pauper*, poor). The condition of those who are partly or wholly dependent upon private charity or public aid for

support. Technically, in law, a pauper is a person supported by the public authorities, at the expense of taxpayers. In its broadest meaning the term pauperism should not be used synonymously with poverty, or even with occasional acceptance of relief, but only to designate a state of chronic dependence. Pauperism is possible only in communities where extreme poverty and surplus wealth exist together, and in combination with a prevailing sentiment of pity. In primitive communities, where pity is lacking and the means of subsistence are often inadequate, the hopelessly ill and the aged as well as the irredeemably lazy starve or are put to death. In barbarian societies, where pity is still lacking, although some accumulations of wealth have appeared, weak or deformed children are commonly dispatched, while the aged receive scant consideration.

Chief among the more important causes of destitution in civilization are improvidence, sickness, accident, death of the head of the family, and old age. Charles Booth's investigations of English pauperism have shown that old age is, all in all, the chief cause. Destitution, however, may exist, and yet pauperism be averted through a wise administration of private agencies of relief. Destitution at one end of the social scale, abundant means in the hands of kindly disposed but thoughtless givers at the other end, and sentimentality in public administration being given, destitution is rapidly converted into pauperism. In general, we may say that improvidence, sickness, or other misfortune, and old age, are the causes of *destitution*, and that an unwise dealing with destitution is the great cause of *pauperism*.

HISTORY OF PAUPERISM. On account of the simplicity of their economic life, great poverty was rare among the Jews. The care of the poor was left to custom and religion. The gleanings of the olive and vine orchards and of grain fields belonged to the widows and orphans. (Deut. xiv. 28-29; xxiv. 19-22; xxvi. 12-13.) Charity was, however, limited by racial lines, and there was little provision for the alien. Under Christianity there was a great development of charity. Men were to feed the hungry, give the thirsty to drink, clothe the naked, shelter the stranger, care for the sick, visit the prisoner. In the early Church the free gifts of the members were distributed by the bishops and deacons to those who were known by the members to be in need. Within the Church the situation seems to have been excellent.

Greece as early as Pisastratus provided for those wounded in battle. Later those unable to work (*adunatoi*), if they possessed property valued at less than about \$60, received from 1 to 2 obols per day (10 obols = 5 cents). As wages were 2 to 3 obols a day, the amount received must have sufficed for support. In Athens poor persons found shelter in houses without doors. There were in many cities unions (*ipavor*) which provided against poverty.

In Rome the donations of food and grain were for political effect, in part at least. Gaius Gracchus supplied Rome with grain at cost. Clodius gave it free to poor citizens, and in B.C. 33 the amount spent for grain was 10,000,000 sesterces, about \$433,000, which rose in A.D. 46 to sevenfold. Caesar found 301,000 persons receiving grain and limited the number to 150,000, but

this figure was exceeded under Augustus. The conditions which entitled men to grain, were full citizenship and residence in Rome. Under Aurelius the donations consisted of bread, oil, and meat. From the time of Nerva emperors as well as private citizens gave funds for the education of children, as Forax Antonius in honor of his wife, Faustina (*Puellæ Faustiniæ*).

After Constantine great churches replaced the small communions, with the result that the effectiveness of the earlier charity of the Church was impaired. The Church received vast wealth, and great sums were given for the poor. Large institutions arose for widows and children. Rome and other cities were divided into districts in charge of deacons who dispensed alms. In Rome one-fourth of the goods were set apart for the poor. But the old voluntary offerings disappeared and donations came from the Church funds. After the fifth century the decline of charity is obvious, and beggars increased to an enormous extent.

During the Middle Ages the Church taught that almsgiving was a means of obtaining grace, but pauperism became too extensive to be adequately met by private charity. Charlemagne brought pressure on the bishops and lords to support the poor. In 779, a year of special need, he imposed a poor tax and expressly forbade begging. He also made arrangements for caring for widows, orphans, and strangers, but the system went to pieces at his death. The benefactions of the Middle Ages were numerous and varied. There were hospitals of all sorts for the aged sick, the criminal, the homeless, and for pilgrims; free baths; houses for the poor. The charitable orders were also well developed. But no systematic attempt was made to diminish pauperism. There was no discrimination between worthy and unworthy, the least deserving often receiving most. Great swarms of beggars arose and threatened to overrun Europe. (See **MENDICANCY**.) In the fifteenth century city authorities begin to take part in the relief of poverty. In 1437 Frankfort had city almoners. Cologne undertook some supervision of the poor in 1450, and Antwerp in 1458 had an *Armeemeester*. The city council became the guardian of orphans and the insane. But the measures taken to suppress mendicancy were regulative, in effect licensing it, and proved unsatisfactory.

Luther, in his letter to the German nobility, laid the foundations of a new policy. He advocated the control of poor relief by the cities. The relief should be limited to what was absolutely necessary, and should be given only after investigation; the worthy poor should be distinguished from tramps and impostors. In this scheme the idea of almsgiving as a means of salvation disappeared. Augsburg (1522), Strassburg, Breslau (1523), Regensburg, Magdeburg (1524), and other cities began a reorganization of poor relief. The question as to the relative spheres of Church and State at once arose, and was variously determined. In the main the old parishes formed the poor relief districts. Efforts were made to gather the various funds into one treasury controlled by deacons (in Hamburg there were three deacons, in Lübeck twelve), whose time of service was only one or two years. They were at first elected, but later on appointed, and they rendered yearly accounts. Alms were distributed to the poor at their homes.

or occasionally given out at the church. Necessaries of life were sold at low rates. Labor was secured when possible. But the charges were too great for continued success and there were other handicaps. The short term of the deacons made systematic effort impossible; the existence of old orders and institutions caused cross-currents, and the plans gradually failed.

The German development begins again after the Thirty Years' War. Edict after edict against begging came to naught, but some progress was made toward fixing the responsibility for support, and in the regulation of marriage. By the end of the seventeenth century poor-houses and houses of correction appear. The teaching of Thomasius and of Gallert and the Pietist movement strengthened humane feeling, and in the writings of Garve, Resewitz, Rochow, and others a literature of poor relief appeared. Many patriotic and benefit societies were founded. In Hamburg (1788) the general poor-house was created. Visitors (180) were appointed to gather information. The poor were given work, various trades were started at the poor-house, and deficient earnings were supplemented. At first results were favorable. In the first ten years the number of the poor in institutions sank from 9757 to 4751. In 1801, however, the institution had a deficit of \$15,000, which increased from year to year. In Prussia poor associations (*Armenverbände*) were organized, and rules regarding the responsibility for support were adopted. Parishes had to support residents of three years' standing, those without legal residence being cared for out of special or general funds. Schools of industry appeared. Pestalozzi gave an impetus to special institutions for children, and institutions for the deaf and blind were founded. In Gotha and Weimar children were boarded in families. The schemes adopted were, however, at that time impracticable and many were even demoralizing. Wages below a certain minimum were made good, though it was obvious that employers would lower wages to take advantage of this fact. The period of the wars also had a depressing effect. During the first thirty years of the nineteenth century begging increased. New laws were promulgated in Saxony in 1840, and in Prussia in 1842. The general law of 1870 affecting the German States, with the exception of Bavaria and Alsace-Lorraine, opened the way for the development of the poor relief of the different States according to local conditions. The Elberfeld system (q.v.) has found general adoption. This is in essence a combination of public and private charity, with unpaid visitors assigned to special districts, who investigate each case, and the treatment is adapted to individual needs. There has likewise been a development of private associations. The Inner Mission (q.v.) has reintroduced the Church care for the poor and the churches are beginning to organize, as is shown by the proceedings of the Eisenach Conference of 1892. The Catholic Church has also been active, this Church in general opposing poor relief by the State or at most merely admitting the right of the State to supplement private efforts. Germany has taken steps to do away with pauperism by the introduction also of compulsory insurance and old-age pensions (q.v.).

In Catholic countries the State has never assumed the leading rôle in poor relief. At Ypres in 1525 reform measures were introduced

which raised a storm of religious opposition and were never fully carried out, although the Sorbonne ratified them. The Council of Trent took the old attitude, but in spite of this some princes attempted the supervision of hospitals as within their executive rights. There was, however, a great development of charitable institutions under the Church. A Portuguese, Juan de Dio (1556), founded the Brothers of Charity and the modern hospitals, while Vincent de Paul is justly honored for his philanthropy and for the establishment of the Order of Sisters of Charity.

France has been the seat of the greatest development of the charity of the Church. The administration of relief has been largely through the Church, though some of the funds have been supplied by the State. Francis I. ordered each church to care for its poor, the poor relief to be in the hands of the pastors and assistants, the funds to be derived from free-will offerings. In Paris (1544) a general poor office was created with power to levy a tax, and this tax was extended to all communes in 1566, which plan was followed until 1791. Edicts against begging were numerous and the penalties often severe, but to no purpose. Under the influence of Francis de Sales and Vincent de Paul many institutions were founded, and Louis XIV. also was noted for his efforts in this direction. To supplement the hospitals, *dépôts de mendicité* were established in 1774, and in 1808 these were extended to each province, but they have since largely disappeared. In these labor was compulsory. In spite of the 2185 hospitals with an income of 38,000,000 francs listed by the *comité de mendicité*, in 1790 pauperism was a live question in France. By the time of the Revolution there was a strong demand for a reform of the poor relief system. The Constitution of 1791 established the principle of State control, and that of 1793 proclaimed that "Society owes its unfortunate citizens support by offering work and by maintaining those incapable of providing for themselves." It was proposed to acquire the private institutions. Necker initiated new measures, opening, among other things, workshops in Paris, which but served to attract the poor from the country, and thus increased the trouble. During the following years many schemes were inaugurated, but the net result was rather to cripple the old system than to establish anything enduring in its place. The Church came again to control, subsidized by the State. The Sisters of Charity regained strength. In 1796 local boards (*bureaux de bienfaisance*) were established, but were not made compulsory. They exist to-day in only about one-third of the communes whose population is less than 500, and in perhaps two-thirds of those with a population of over 1000. Relief given is both at home (*'secours à domicile'*) and in the institutions. Most of the relief is in the hands of the Church and the right to State relief is not admitted, though in recent years there are signs of opposition to management by the Church. The State has assumed charge of the work for children and for the insane. The Revolution found large numbers of foundling asylums (q.v.), and these increased until 1834, when restrictions were imposed, and instead of the reception through the *'tours'* bureaux of admission were formed and the care of the children regulated. In 1869 a special department of the Gov-

ernment was set aside for this work, and in 1874 extensive regulations relative to the boarding of children in private families were adopted. Since 1895 the law regulating medical care of the poor has made some changes, though effective institutions are lacking. The cost of public charity has greatly increased, but this is largely accounted for by the improved care given the poor rather than by great increase in the number of the dependent.

In Italy the mediæval system is most pronounced. Begging is almost universal, and there is little State control of pauperism. The law of 1862 (*legge della opere pie*), modified in 1890, established some State supervision over charitable corporations, but further development has been checked by the political situation. There are numerous institutions and endowed charities with funds aggregating \$4,000,000 or more.

In Austria poor relief is chiefly administered through the communes under the leadership of the priests. The system is known as the *Pfarrarmen* Institute (1782). The funds are obtained largely from private donations, and each commune supports its own poor, though there is no special tax for the purpose. In Lower Austria the Elberfeld system has been introduced since 1893, with some local taxation in case of emergency. Switzerland supports the helpless and provides work for the able-bodied pauper. After the freeing of the serfs Russia turned poor relief over to the local representative assemblies, which impose taxes for this purpose. In Norway and Sweden public charities are administered by the Established Church. Belgium has almshouses with compulsory labor. Holland has a system of pauper or labor colonies (*q.v.*), which have won general favor. There exist also over 4600 associations for poor relief, many orphan asylums, and other institutions. In addition there are large numbers of private organizations and institutions.

Long before the Reformation England had unsuccessfully forbidden begging. No provision was made for the destitute until 1388 (12 Richard II.). In 1536 (27 Henry VIII.) each parish was ordered to care for its poor and provide work for the able-bodied. It soon became necessary to induce the people to give money for this purpose, and at first the bishop was to use 'charitable ways and means' to persuade the unwilling donor. In 1563 it was decreed that the persistent refusal to give would bring one before the courts for punishment. A decade later a tax was levied for the poor, and public officials, overseers of the poor (*q.v.*), were created. In 1601 the famous law of Elizabeth (43 Eliz., c. 2) was enacted and became the basis of subsequent public poor relief in England and the United States. Emphasis is laid upon the 'setting to work' of the able-bodied. The overseers were given power to assess, collect, and distribute the 'rate,' as the tax was called. They cared for and apprenticed orphan children. The unwillingness of any parish to support the poor of other parishes led in time to the development of strict settlement laws (14 Charles II., c. 12). Insistence upon 'setting to work' of the able led to the establishment of the workhouse (then called the industrial house). The first one was founded at Bristol in 1697. In 1722 a general act (9 George I., c. 7) authorized workhouses wherever needed. Any pauper refusing to go to the workhouse was denied assistance elsewhere.

This gave rise to the distinction made in England and elsewhere between assistance given in an institution, technically called 'indoor relief,' and that given at the residence of the recipient or outside of any public institution, 'outdoor relief.' The introduction of the new institutions naturally gave rise to many abuses, and these with the general humanitarian sentiment of the eighteenth century, tended toward a reaction. Under Gilbert's act of 1782 the workhouses were largely given over to the old, the infirm, and to children, others receiving assistance outside of the institutions. Various parishes were allowed to form workhouse unions. By an act of 1796 'outdoor relief' was again legalized. The famous Speenhamland Act, adopted in Berkshire in 1795, started the 'allowance system.' A certain minimum of wages was considered necessary, and the difference between this and the amount actually earned was to be supplied by the State. This was extended by the act of 1796. The expenditures for the relief of the poor rose from about £2,004,000 in 1775 to £4,267,000 in 1802, and to £7,890,000 by 1818. Such a rapid increase called for investigation. A commission authorized by Parliament, after a thorough investigation (1832-34), made a remarkable report (1833-34) showing a deplorable condition of affairs. Pauperism seemed to be contagious, and in some districts nearly all the able-bodied men were receiving allowances. In 1834 (4 and 5 William IV.) radical reforms were introduced. Outdoor relief was gradually withdrawn and limited as far as possible. Able-bodied men were refused assistance outside the workhouse. The population of the workhouses was classified. The sexes were separated and only plain necessities of life were provided. The functions of overseers had already been restricted to the collection of rates, and the distribution of relief had been given to boards of guardians. This arrangement was continued. A central body of commissioners was created, which became in 1847 the Poor Law Board. This body was abolished in 1871 and its powers were lodged in the Local Government Board, which is now the body controlling the general execution of the Poor Law in England and Wales. The results have been satisfactory. New unions were formed. Conditions within the workhouses have improved. Many children have been educated in the special workhouse schools, but there is a growing tendency to send them to the regular parish schools. In many districts children are boarded out in private families. When children are ready to support themselves they are apprenticed in various trades. The workhouses of the first half of the nineteenth century have grown into numerous special institutions for the insane, blind, and deaf and dumb, so that the workhouse of to-day is not the general dumping place of the infirm and unfit. The following table, drawn from statistical reports, shows the expenses of the public relief and the number assisted.

The total sum raised by taxes during these three periods was £12,677,306, £15,087,258, £19,428,912 respectively, the sums actually given in relief rising from £7,747,947 to £8,316,411 and £9,249,724. The costs of administration have properly increased, and it is to be noted that more persons are assisted in institutions, fewer outside, while the total number has slightly increased.

ENGLAND

	Adult able-bodied poor		Other poor		Total assisted	Per cent. of population
	In institutions	Outside	In institutions	Outside		
1871-75 *	23,639	116,525	181,753	647,049	918,966	3.93
1881-85 *	24,795	79,866	164,413	522,628	791,701	2.96
1891-95 *	34,765	72,515	167,938	511,926	787,144	2.65

* Yearly average.

This means that those assisted probably receive better care than formerly.

England has also witnessed a great development of private charity, of which little mention can be made here. The Friendly Societies (q.v.), the Charity Organization Society, the Salvation Army, and Dr. Barnardo's great work for children deserve mention. Attempts to prevent pauperism have been made in cities by the destruction of slums, the building of tenements, and the opening of parks and playgrounds. Public attention has been directed to the question of old-age pensions (q.v.). The postal savings banks (q.v.) have been successful.

Scotland and Ireland have public relief patterned after that of England. In Scotland no relief is allowed to able-bodied adults. The relief is given by inspectors appointed by the parochial boards, which are under the oversight of the board of supervision.

Public relief of the destitute in the United States is based on the Elizabethan law of 1601. The public duty to give relief is recognized. How this relief shall be administered is a matter for each State to determine. There is little uniformity. At first the almshouse, or poorhouse, was the only institution for the pauper. This was maintained by the town in New England, the county elsewhere. Many of the larger cities had and still have their own institutions. Here have been intermingled the worthy poor, the sick, insane, feeble-minded, children, mothers with illegitimate children. The nineteenth century witnessed the gradual development of hospitals for the insane, which can now provide for about 75 per cent of the insane who are public charges; of institutions for children in such numbers that there is no longer any excuse for the presence of children in almshouses; of hospitals for the sick; of schools for the deaf and dumb and blind; of schools for the feeble-minded; and, in the last decade, of special institutions for the epileptic. Reforms have usually been initiated by private organizations and then been adopted by the State, which has sometimes subsidized private institutions. There is a growing tendency, however, for the State to own and manage all institutions which shelter public charges. Outdoor relief is administered by township trustees under the County Board of Supervisors (in New England the town is the unit) in rural districts. The large cities usually are independent of the county. Chicago is a notable exception. Many cities grant outdoor relief, but some, such as Philadelphia and New York, do not. Mendicancy and vagrancy are forbidden by laws and ordinances, but these are not always enforced. Little attention has been paid to settlement until recently. Now some States are beginning to make inquiries and to send home those who are not properly dependent on them. In most States there is a public body, known usually as the State Board

of Charities, which oversees the working of the charitable institutions of the State. Its members, with the exception of the secretary, who devotes his entire time to the work, are usually unpaid. Recently a few States have established a Board of Control, a smaller body of paid agents, to supervise institutions, and sometimes to purchase their supplies. Destitute aliens are a State charge. Immigration of persons likely to become public charges is forbidden by Federal laws.

The United States has witnessed a great development of private beneficence. Most of the churches have funds for the relief of poor members, and there are large charitable institutions under denominational management. The growth since 1870 of the Charity Organization Society has helped to bring order out of the chaos in private relief. One of the chief aims of this society is to coördinate various agencies and to prevent a duplication of effort. Since 1874 the National Conference of Charities and Correction, composed of philanthropists and workers in charitable and correctional institutions, has held annual meetings for the study of pauperism and allied topics, and its publications are valuable. See CHARITIES AND CORRECTION, NATIONAL CONFERENCE OF.

There are no accurate statistics of paupers in the United States. The census of 1890 gave the number of inmates of almshouses as 73,045, but this is generally conceded to be at least 10,000 short of the actual number. To these 'indoor poor' would have to be added the much larger number of persons receiving help who are not in institutions, and the insane and other defectives who are cared for in public institutions, not to mention those supported by private associations.

No attempt has been made to give any comparative statistics of the extent of pauperism in the different countries. The conditions of relief are so diverse, and the census of paupers is so inadequate, that comparative statements are misleading.

Pauperism has no panacea. With every step in human progress a certain proportion of the population, discouraged or overwhelmed by misfortune through the breaking up of old industrial relations when new ones are established, falls behind in the race. Therefore each age and each nation must attack anew the problem of preventing an inevitable destitution from becoming a hopeless pauperism. Certain fundamental principles, however, have been well established by experience, and may thus be summarized:

(1) Indiscriminate almsgiving, without careful investigation of the situation and needs of the applicant, is a fruitful cause of pauperism instead of a remedy. (2) To remove the cause and to bring the individual to self-support, if possible, must be the aim of all efforts; and (3) to accomplish this does are not sufficient, but

carefully worked out plans must be adopted and carried through. (4) This necessitates an enduring organization of experts (either private or public) to superintend and execute the chosen methods. If success is to be obtained, the various charities must work in coöperation with this central body to prevent imposture and duplication of efforts. (See CHARITY ORGANIZATION SOCIETY.) (5) The assistance given must be sufficient, but not enough to tempt the self-supporting workman to surrender his independence. (6) In the words of Malthus: "It is in the highest degree important to the general happiness of the poor that no man shall look to charity as a fund upon which he may confidently depend." (7) Beggars should be put in institutions with labor adapted to their abilities. (8) Constructive efforts, such as the creation of family pride, assistance in securing work, removal of children from demoralizing surroundings, pay far better than any palliative measures. (9) The questions as to the sort of relief, in money or in kind; the agency, whether private or public; the place, whether at home or in institutions, are matters to be determined by local antecedents and local conditions. (10) For the physically or mentally feeble there must be furnished good care under decent surroundings—that which constitutes good care naturally varying from place to place and time to time. (11) It is recognized as desirable, no matter what system of relief prevails, that there should be voluntary, unpaid coöperators to lessen the danger of officialism.

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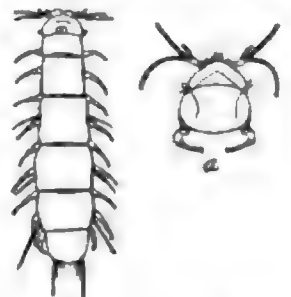
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PAUR, pour, EMIL (1855—). An Austro-American musician and conductor, born at Czernowitz. After preliminary instruction under his father he became a student at the Vienna Conservatory, and subsequently held many important appointments. In 1876 he was kapellmeister at Cassel, and in 1880 principal Court kapellmeister and conductor of the Mannheim subscription concerts. He was director at the Leipzig Stadt Theater in 1891, and two years later was called to Boston, as the successor of Nikisch of the Boston Symphony Orchestra. He became conductor of the New York Philharmonic Society concerts in 1898, and the following year succeeded Dvořák in the directorship of the National Conservatory. He conducted at the Metropolitan Opera House, New York (1899-1900). His compositions consist chiefly of songs and chamber-music.

PAUROP'ODA (Neo-Lat. nom. pl., from Gk. *παῦρος*, *pauros*, little, small + *ποῦς*, *pous*, foot). A small group of arthropods allied to the 'thousand-legs' (Diplopoda).

The few species known are minute, the body behind the head composed of 12 segments, which on the back are represented by six plates. They differ from the Diplopoda in having but a single pair of legs to a segment. The order is represented by *Pauropus lubbockii* in the East-



PAUROPUS LUBBOCKII
A. Front view of head.

ern United States and Chile, and by a flattened broad form, *Eurypauropus*, found in the United States and Europe. The species are cosmopolitan and represent an ancient type. Consult Kenyon, "Morphology and Classification of

the Pauropoda," in *Tufts College Studies*, No. 4 (Somerville, Mass., 1895).

PAUSANIAS (Lat., from Gk. Πασανίας, (1-c.460 B.C.). A son of Cleombrotus, and regent of Sparta as guardian of his cousin, Plistarchus, the son of Leonidas. He commanded the Greeks in the battle of Plataea, B.C. 479, in which the Persian army under Mardonius was overwhelmed, and eleven days later, marching to Thebes, demanded of that city the surrender of all who had been traitors to the Greek cause. After a siege of twenty days, the Thebans yielded. In B.C. 477 there was put under his command a fleet of the confederate Greeks, wherewith to drive the Persians from the islands and coast-towns, and with this he took Cyprus and Byzantium. Elated by these victories and puffed up with pride and ambition, he entered into secret negotiations with the Persians, with the view of becoming ruler, subject to the Persian monarch, of the whole of Greece. Meanwhile, he treated the allies as though he were their lord and sovereign, adopted Persian dress and manners, protected his person with a bodyguard of Persians and Egyptians, and introduced into his household habits of Oriental luxury. Being recalled by the authorities at Sparta, he was acquitted on the main charge of treason, and again returned to the Hellespont to renew his intrigues with the Persians. He was a second time summoned home and arraigned, but was a second time acquitted. He now, while still continuing his negotiations with Xerxes, began also to intrigue with the Helots, promising them freedom and citizenship if they would rise and overthrow the government. At last he was betrayed by one Argilius, whom he had commissioned to carry a letter to the Persians. Argilius, noticing that no one of those previously sent on a similar errand had ever returned, opened the letter, found directions therein for his own death, and laid the matter before the ephors. Pausanias, finding his plot discovered and himself entrapped, took refuge in the temple of Athene Chalciceus. Hereupon the people blocked up the entrance with a pile of stones, the first stone being laid by his aged mother, and left him to die of hunger. This was about B.C. 469. Consult the histories of Greece by Grote, Curtius, Abbott, Holm, Beloch, and Meyer.

PAUSANIAS. A Greek traveler and geographer, author of *Ἑλλάδος Περιήγησις*, *Hellados Periegesis*, or Guide-book to Greece. Of his early life little is known. He was probably a native of Lydia in Asia Minor, and was certainly at work on his book as late as A.D. 175, though the earlier part seems to have been published some years before. His work, in ten books, is a detailed description of what seemed to him the most important places and monuments in Greece, arranged by districts and in much of the work described in a most systematic fashion. His interest is largely religious, and while other buildings are mentioned, the chief space is devoted to temples and lesser shrines, often with interesting and curious details as to local traditions and ceremonies. In general, he pays little attention to recent art or buildings, reserving his admiration for the great works of the fifth and fourth centuries B.C. The dry details of topography are relieved by historical digressions, often of no great accuracy, anecdotes, and

legends. The style is dry and often obscure, and the manuscripts are not infrequently defective. In spite of its undoubted weaknesses, the book is an invaluable source not merely for the topography and monuments, but for the local cults, and its value increases with new exploration. For his history Pausanias of course depended on his predecessors, and for traditions and descriptions he seems to have used earlier material; but there is no good reason to doubt that his work represents personal travel and investigation, and its general accuracy is confirmed by recent discoveries. There are a number of early editions of Pausanias, but the best complete text is that edited by J. H. C. Schubert (Leipzig, 1853-54, often reprinted); a new edition with critical and explanatory notes by Hitzig and Blümner is in course of publication (Leipzig, 1896 et seq.); the fullest commentary is by J. G. Frazer, *Pausanias' Description of Greece*, translated with commentary (6 vols., London, 1898); valuable for Athens is Jahn-Michaelis, *Arch Athenarum a Pausania Descripta* (3d ed., Bonn, 1901); Harrison and Verrall, *Mythology and Monuments of Ancient Athens* (London, 1890). For the criticism of Pausanias, consult: Kalkmann, *Pausanias der Perieget* (Berlin, 1886); Gurlitt, *Pausanias* (Graz, 1890); Heberdey, *Die Reisen des Pausanias in Griechenland* (Vienna, 1894).

PAUSIAS, pa'shi-as (Lat., from Gk. Πάσις-ας). A Greek painter of the first half of the fourth century B.C., a pupil of Pamphilus and a contemporary, if not a fellow-student, of Apelles. He was a great decorative artist, especially in encaustic, and was reputed the first to paint ceilings, setting within garlands and wreaths small genre pictures, especially of children. His famous painting of Glycera, a flower girl of his native city, Sicyon, and probably his mistress, showing her with a garland in her hair, or a copy, was sold to Lucullus for two talents. His skill in foreshortening made his work prized in Rome, where a black bull at the altar, head to the front, and with such clever perspective that the length is easily guessed, was one of the great pictures in the portico of Pompey's Temple.

PAUSINGER, pou'zing-ër, FRANZ VON (1839-). An Austrian landscape and animal painter, born at Salzburg. He studied at the Vienna Academy, then under Schirmer at Karlsruhe, and under Rudolf Koller at Zurich, where he developed that keen observation of animal life, especially of the larger kinds of game, which presently brought his faithful delineations of it into great favor with sportsmen. In 1881 he accompanied Crown Prince Rudolph of Austria on his trip to the East, and afterwards supplied the illustrations to the Prince's work describing that journey. His best known pictures include: "Beechwood in the Glow of Sunlight" (1873, Vienna Museum); "Stag Fighting Dogs" (1877); "Red Deer at Feeding-Trough in Winter" (1888); "Stag Attacked by Wolves" (1893).

PAUW, pou, CORNELIS VAN (1739-99). A Dutch author. He was born at Amsterdam and educated at Göttingen. He joined the Order of Franciscans and became canon of Xanten in the Duchy of Cleves; was afterwards appointed reader to Frederick II. of Prussia. He declined

the place of an academician of Berlin and a bishopric at Breslau. He published *Recherches philosophiques sur les Américains* (1768-70; enlarged editions, 1770 and 1774); *Recherches philosophiques sur les Egyptiens et les Chinois* (1774); *Recherches philosophiques sur les Grecs* (1778). These works were translated into English (Rochdale, 1806; London, 1795, 1793 respectively). They contain curious information, but many unproved assertions made in a dogmatic spirit.

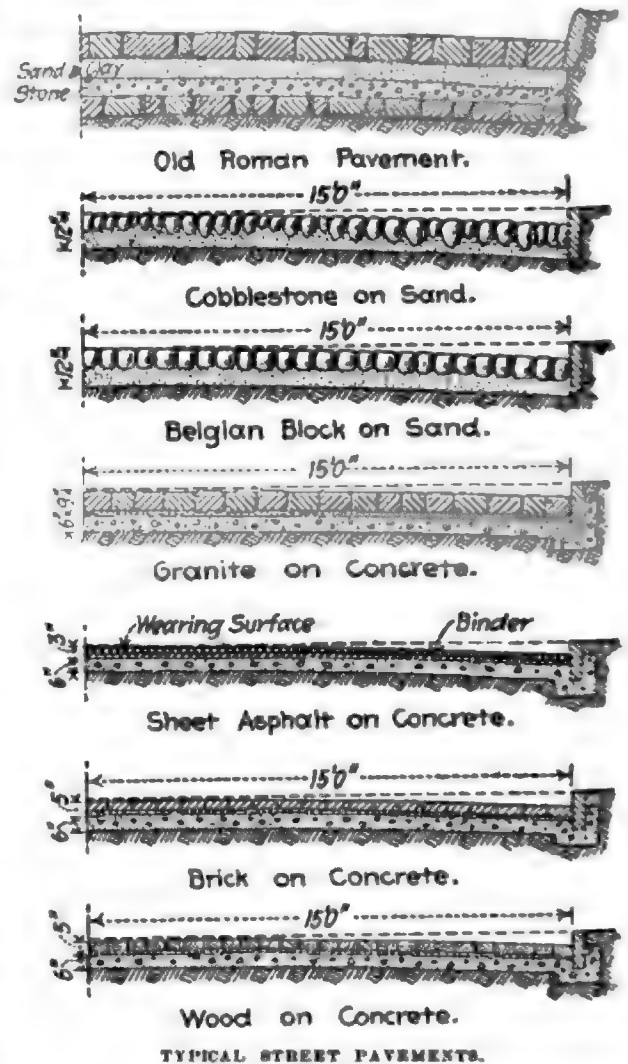
PAUWELS, pou'els, FERDINAND (1830—). A Belgian historical painter. He was born at Eeckeren, near Antwerp, April 13, 1830, and studied at the Academy of Antwerp, principally under Wappers. His first picture, exhibited in 1851, was the "Meeting of Baldwin I. with His Daughter Joan at Constantinople in 1206." His "Coriolanus" gained him the Roman prize. He remained four years at Rome. Upon his return to Antwerp he achieved fame with his "Widow of Jacob van Artevelde" (1857, Brussels Museum) and "Banished by Alva" (1861). From 1862 to 1872 he was professor in the Art School at Weimar, and painted, besides other pictures, the "Reception by Louis XIV. of a Deputation from the Doge of Genoa" (1864, Maximilianeum, Munich); "Queen Philippa of England Relieving the Poor of Ghent" (1866); and several mural paintings in the Wartburg, illustrating the history of Luther. He returned to Antwerp in 1872, and finished the historical cycle of wall paintings by Groux in the Cloth Hall of Ypres. In 1876 he became professor at the Academy of Dresden, which position he resigned in 1901. His later works include: "Count Philip of Alsace Visiting a Hospital at Ypres" (1877; Dresden Gallery); "Admonition" (Leipzig Museum); "Christus Consolator" (1893). His style is grandiose, his color luminous, and his figures are full of character.

PAVANE (It. *pavana*, probably a variant of *pavone*, *paone*, peacock; so called from the stately character of the dance; commonly derived, however, from It. *Padrana*, *Padovana*, Paduan, from *Padova*, Padua, as being supposed to be the place where the dance originated). An ancient Italian dance which spread from that country into Spain, thence to France, and eventually to England and Scotland. It was most popular during the sixteenth century, and was especially so in Spain, and at the Court of James V. of Scotland. It was a solemn, stately dance, generally accompanied by a song. The music was always written in even time and the steps were simple and slow, the performers alternately advancing and retreating. There were various modifications of the pavane, the most important being the Spanish, which introduced a number of elaborate figures.

PAVEMENT (OF. *pavement*, *paviment*, Fr. *pavement*, from Lat. *pavimentum*, pavement, beaten floor, from *pavire*, to beat, Gk. *παβειν*, *paiein*, to beat, Skt. *pavi*, thunderbolt). This term, in its broader sense, includes any firm, hard covering for areas subjected to the wear and tear of human feet, or of hoofs and wheels, designed to keep the feet or wheels from the ground or earth, and to present a more or less dry, durable, and smooth surface. Under this definition would be included the paved floors of cathedrals and other public buildings often

of an ornamental character (see **TILES**), as well as the surfaces of courtyards, walks, streets, and highways, on which stones or other durable materials are placed. In the modern and more restricted sense, pavements are generally limited to the wearing surface of that portion of improved streets lying between the curbs, thus excluding the sidewalks.

The early history of pavements is involved in obscurity. Strabo says Babylon was paved 2000 years B.C., and Livy relates that about A.C. 170 Rome was paved from the ox market to the Temple of Venus. Before the Christian Era the Romans had learned to construct solid and durable pavements, composed of several layers of stone, mortar, and cement, the upper surface being quite smooth. Portions of these early pavements are said to have been in use within comparatively recent times. Excavations at



Pompeii reveal some of the old Roman streets just as they appeared when the city was destroyed A.D. 79. The stone blocks were large, many-sided, with their vertical edges carefully fitted, the whole resting on a solid foundation, composed of several layers. The material used was lava stone. It is said that the streets of Cordova, in Spain, were both paved and lighted as early as A.D. 950, under the Caliph Abderrahman III., but most mediæval cities were unpaved until about the twelfth century, and nearly all pavements from that time on until well into the nineteenth century were of rude construction, cobblestone being a common material.

Paris first had pavements, it is believed, about 1184, when its population was estimated at 200,000. In 1698 the pavements of Paris were described as being "of square stones of about eight or ten inches thick; that is, as deep in the ground as they are broad on top." Tillson says that the English Parliament ordered the London Strand paved in the fourteenth century, but adds: "It is said that the first regular pavements were laid in 1533, when the city had a population of 150,000. Holborn had some pavements in 1417. Square granite blocks were introduced by acts of Parliament for Westminster in 1761, and for London generally in 1766." In the United States, cobblestone pavements were laid as early as 1650, or thereabouts, in both Boston and New York.

During the second quarter of the nineteenth century the cities of both Europe and America began to look about for better pavements and to experiment with stone and wood blocks, and (in Europe) with asphalt. From 1850 to 1875 bricks were tried in America. During the period from 1875 to 1900, and more particularly from 1890 to 1900, the theory and practice of street paving was put on a more satisfactory basis than ever before, and thousands of miles of new pavements were laid.

Asphalt was first used in Paris in 1838, but not on a large scale until 1854. It was introduced in London in 1869. In both these cities the material was rock asphalt. What is believed to have been the first asphalt pavement in the United States was laid in Newark, N. J., in 1870, by E. J. de Smedt. In 1871 some asphalt was laid in New York and a little later in Philadelphia. The material in each of these three cases was Trinidad asphalt. In 1876-77 both rock and Trinidad asphalt were laid in Washington. The good results obtained in that city led to the rapid introduction of asphalt there and elsewhere, but comparatively little rock asphalt has been laid in America.

Brick was used to pave roads in Holland as early as the seventeenth century and has been used extensively for both roads and city streets since. Brick pavements are said to have been used in Japan for more than a hundred years. The first brick pavement on a roadway in the United States was laid at Charleston, W. Va., in 1870, and in 1873 the city adopted the system for certain streets. This example was followed by many Central Western cities, but Philadelphia was the first large city to make use of this material, laying some brick roadway pavement in 1887.

Wood blocks were laid in New York as early as 1835-36, and in 1839 wood pavements were already in use in both Philadelphia and Boston, being mentioned in a report made to the Franklin Institute (Philadelphia) by a committee on paving materials. London laid its first wooden pavement in 1839; Glasgow, in 1841; Paris, much later.

Stone blocks of the modern type, of 3 × 9 inches, granite, with mortar joints, were laid on Blackfriar's Bridge, London, in 1840. Glasgow laid granite blocks in 1841. A concrete foundation was used in London, the first in that city, in 1872, and tar and gravel joints were employed in both London and Liverpool about the same time, although used in Manchester, England, prior to 1869. Prior to 1849 scarcely any pave-

ments but cobblestone were used in New York. About 1850 the Belgian blocks were introduced. Granite blocks similar to those now used were introduced in New York about 1876, succeeding some much larger blocks, known as the Guidet patent. Concrete foundations for stone pavements were not used regularly in New York until 1888. Large stone blocks were used in Saint Louis as early as 1818, being from three to 12 inches thick, 6 to 14 inches long, and 6 to 10 inches deep, set on 6 inches of sand. In 1842 stone blocks of about the present size and shape were used in Saint Louis.

In America the pavements now being laid are principally asphalt, brick, and stone block.

Rock asphalt is used to some extent in London, Paris, and other European cities, and stone blocks are common. Brick does not appear to have gained the footing in Europe that it has in America. There is still another sort of improved street surface which is very common on roads and on streets of light traffic throughout the United States, Canada, Great Britain, and at least the western part of Continental Europe, namely the compacted broken stone, known as macadam or telford. See ROADS.

Foundations are to pavements what floors are to carpets; or, conversely, the visible parts of pavements are but the wearing surfaces of streets. Failure to recognize the importance of good foundations has been the bane of most American and many foreign pavements. If the foundation yields, through deficient drainage or bad material and workmanship, the destruction of the pavement follows. In some soils natural drainage is ample. Where it is not, either a drain in the centre or at one or both sides of the street is required to remove the subsoil water. These drains may be of stone, tile, or sewer pipe, according to the relative cheapness of the several materials in the locality concerned and the character of the drainage work. Drainage provided, and the surface on which the pavement is to be laid shaped and compacted, the foundation is next put in place. For serviceability nothing surpasses concrete as a foundation. The chief argument against it is its cost, which may range from 50 cents per square yard upward. The thickness of the concrete should rarely be less than six inches, and may run as high as ten inches. Sometimes broken stone, alone, is used for foundation, and again stone, brick, or wood is laid directly on sand.

If the traffic is not heavy, sand, gravel, or broken stone may sometimes be used with a fair degree of success, particularly if the earth beneath is well compacted and thoroughly drained. Asphalt should always have a concrete foundation, except where laid on top of an existing pavement of some other material, which will form a good bed. The finished surface of the foundation should be brought to such a curve, or crown, crosswise of the street, as will shed the rainfall to the gutters. A four-inch crown on a street 30 feet wide is considered good practice. Greater widths should have more crown, but the increase is not necessarily proportional.

Cushion coats, composed of one to two inches of sand, are generally placed on concrete foundations for all materials save asphalt, and also on brick laid flatwise for foundations. They allow the separate blocks or bricks to be brought to a firm bed by ramming or rolling. They also pro-

vide for uneven depths in blocks or bricks, thus aiding in bringing the finished pavement to a true surface.

Fillers are employed to close the joints between blocks and bricks. They are often of some water-proof cement, thus rendering the pavement impervious, as well as binding it together. Where bituminous in character, like asphalt, coal tar, or the two combined, they also yield somewhat to contraction and expansion, without permanent rupture, as is the case with the Portland cement and other burnt stone fillers. *Portland cement filler* is a grout composed of 1 part cement and 1 or perhaps 2 parts fine sand, mixed with sufficient water to cause it to run easily, thus filling the interstices. *Murphy grout* is a patented filler composed chiefly of ground iron slag, carbonate of lime, and sand, mixed with water. *Bituminous cements* are many and variable, but may be classed as coal-tar pitch and asphalt. Residuum oil (obtained in the refining of petroleum) is generally, but not always, used with asphalt cements. (See ASPHALT.) Coal-tar pitch alone becomes brittle and cracks or breaks in winter, while in summer it becomes hot and flows. It is designated commercially by the degree of hardness to which it has been distilled. In and near New York it is common to mix 100 pounds of No. 4 coal-tar pitch (commercially known as paving cement), 20 pounds asphalt, and 3 pounds residuum oil. This last combination is used with hot gravel to fill the joints in block stone pavements. Where asphalt is used, some 10 per cent. of its weight in residuum oil is sometimes added. All the bituminous cements are poured hot. Sand alone is also used as a filler, but not where imperviousness is desired.

Ramming is employed on stone, wood, and brick pavements to bring the blocks or bricks to a firm bed and even surface. Rolling with steam or other rollers is a necessity with sheet asphalt and is sometimes done with other pavements.

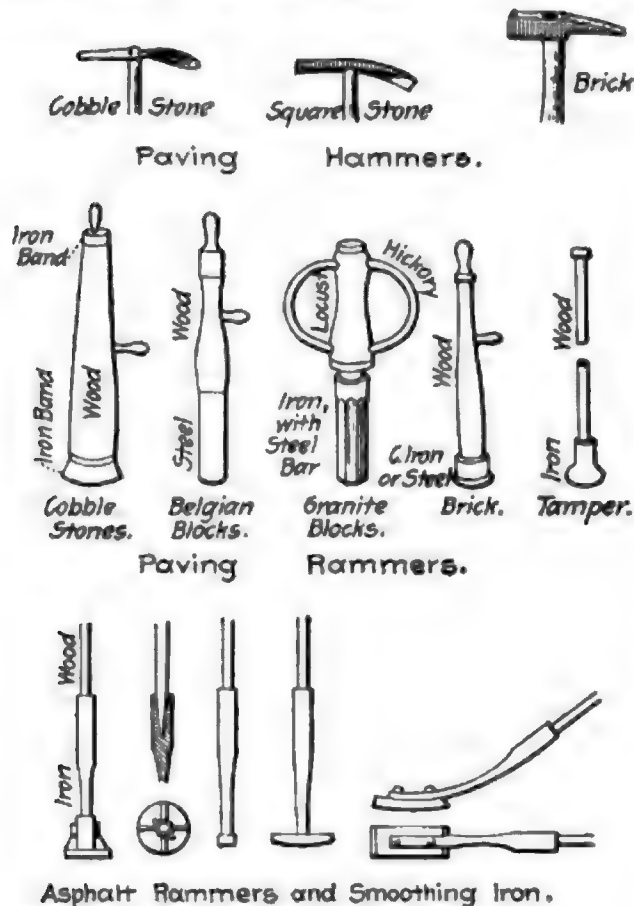
CHOICE OF PAVING MATERIALS depends on a variety of factors, such as serviceability, durability, cost of construction, repairs, and maintenance, ease of cleaning, noiselessness, and other sanitary or related qualities. Under serviceability, the main factors are a minimum resistance to traction and a good foothold for horses, or absence of slipperiness. Asphalt fulfills the first of these conditions most admirably, and probably brick comes next. Asphalt is slippery, both in wet weather and on heavy grades. Brick is less slippery. Newly laid wood gives a smooth pavement, but it is liable to wear unevenly and to be slippery in wet weather. For durability, or long wearing powers, the best stone blocks cannot be excelled, and under heavy traffic they are very serviceable, although offering more resistance to traction than several other materials. In first cost, asphalt and the best stone blocks generally rank high; but this is largely offset by their durability and low cost of repairs. Brick pavements are very cheap in some localities, and if placed on good foundations they are sufficiently durable. Wood may be cheap also, but unless specially treated wood is used it generally proves expensive to keep in repair and requires frequent renewals. For ease of cleaning nothing can surpass asphalt, and it gives rise to less noise than either stone blocks or brick. Brick is also easily cleaned, and far quieter than stone blocks. The latter are not only noisy, but also hard to clean,

and unpleasant to ride over, on account of their roughness. The smoothness of asphalt and brick, and the quickness with which their surfaces dry after a rain or a sprinkling, make them great dust-spreaders, but the ease and thoroughness with which they may be cleaned render an avoidance of this nuisance comparatively easy. The large joints of stone blocks collect and retain dirt, but, as it is next to impossible to clean all of it from between the stones, it dries and spreads when subjected to the sun and wind. The dampness of wood pavements is one of the chief objections urged against them. They absorb unclean water readily and tend to keep the streets in a slimy condition, particularly in moist climates and on streets not freely exposed to the sun and wind.

COST of pavements varies widely with local conditions, particularly the depth and character of the foundations, the kind and quality of the wearing surfaces, the inclusion (or absence) in the contract of maintenance guarantees, and the freight rates. The variations are even greater when the cost of grading is included. For comparative purposes the cost of grading, draining, and curbing should be omitted; and the maintenance guarantees, if any, should be described. In fact, without full details relating to the various factors involved, comparative figures of cost are often worse than useless. Roughly, the cost per yard of asphalt and granite was, in 1900, about \$2.25 to \$2.75; brick, \$1.50 to \$1.75; all for American cities, and excluding both extremes. With sand foundations and second or third class work the prices would be less, but the tendency is to insist on concrete foundations and good work generally for all three kinds of pavements, asphalt, granite, and brick ranking in the order named in this particular. The best wood pavements, on concrete, cost about the same as brick. The life of pavements, or the period for which they may be used without renewing the wearing surface, is given by Tillson as follows: Granite blocks, 25 to 20 years; Belgian blocks, 20 years; asphalt and cobble, each 18 years; brick, 15 years; wood, 10 to 15 years; macadam, 8 years.

TOOLS for paving work include hammers, rammers, tamping irons, crowbars, sand and gravel screens, and brooms, besides special asphalt tools and machinery and a variety of tools and machines common to road and other work, such as rollers and concrete-mixers. The graders, scrapers, and other apparatus used in preparing the earth sub-grade, and also the rollers used to compact the natural earth and various classes of paving material, will be described under ROAD AND STREET MACHINERY. Concrete-mixers are described under CONCRETE. Pavers' hammers have a head at one end for pounding the blocks, and a sort of combination chisel and scoop at the other, to facilitate the preparation of the sand cushion and to pry out or loosen single blocks in the setting. Different-shaped hammers are used for cobble than for squared stones, and still different ones for brick. Rammers, also, vary in shape and weight, according to the character of the blocks for which they are designed. For stone, the weights are 40 to 45 pounds; for brick, 25 to 30 pounds; for earth, about 20 pounds. Several shapes of tamping irons are used for street asphalt, to facilitate work along curbstones and to meet other spe-

cial needs. These rammers have cast-iron heads and wooden handles. The smoothing irons are of the same materials, but are slightly convex to the pavement, and are mounted on handles curved at the lower end. Both the tamping and smoothing irons are heated in fire-boxes, mounted on wheels. Screens for sand and gravel are of the familiar type used by masons, consisting of wire meshes of the desired size, mounted in wooden frames. The brooms used for brushing sand and gravel into joints are



TOOLS USED IN STREET-PAVING.

short and stiff, of rattan, wood fibres, or wire. The Perkins surface heater, used in repairing sheet asphalt, is composed of gasoline burners, surrounded by wire and asbestos cement. The burners are supplied from a gasoline tank mounted on wheels, the same mounting also serving as a support to the burner frame and mat when the heater is being wheeled about. When in use, the burner frame rests on the asphalt pavement, with a small air space below the mat.

ASPHALT PAVEMENTS are divided into sheet and block. Sheet asphalt consists of a binder and a wearing surface, the binder serving to unite the foundation and the wearing surface. The binder is composed of small pieces of broken stone, united with asphaltic cement. The mixture is spread on the foundation in a layer sufficiently deep to give the requisite thickness after having been rolled. A final thickness of one inch is considered ample by some, but one and one-half and even two inches is not uncommon. The wearing surface is composed of sand, carbonate of lime (powdered limestone), and asphaltic cement, mixed hot in varying proportions. The object is to use enough powdered limestone to fill the voids in the sand as completely as possible,

and enough asphaltic cement to bind the whole together. It is also desired to make the pavement impervious to water. The consensus of opinion is that the wearing surface should contain 9 to 10 per cent. of bitumen and have a final thickness of about two inches. It should be spread on the binder while the mixture is hot, say at a temperature of 250° F. The spreading is effected by men with rakes, who are followed by other men with hand rollers. Next hydraulic cement is scattered over the surface. After this comes first a five-ton and then a ten-ton steam roller. Thus, three rollers are used in succession, the lighter ones first, in order to prevent distortion of the asphalt while soft. Generally, the asphalt is laid clear up to each curb, special care being taken with the gutters, but sometimes brick or stone is used in place of asphalt in the gutters. The need of special precautions here is the danger from the water that gravitates to the gutters. It is claimed for the Alcatraz and Bermudez products that they may be laid in gutters without harm, but some conservative engineers did not regard this as proved up to the close of 1900. Cracks are liable to occur in sheet asphalt subjected to wide variations in temperature. Most of the asphalt pavements laid in America have been composed of Trinidad sheet asphalt, but in recent years both the Bermudez and Alcatraz products have been employed. See ASPHALT.

ASPHALT PLANTS, used to prepare the material for laying sheet asphalt pavements, include melting kettles, sand-heaters, mixers, and various accessories. The asphalt arrives at the plant in barrels. These are cut away and the asphalt and the residuum oil or other flux are heated and thoroughly mixed in the kettles. The mixing may be effected by revolving paddles, or by pumping in air at the bottom of the kettles. The sand is dried and heated in jacketed revolving cylinders, fitted with angle bars to keep the sand well agitated. The drum is set at a slight angle, so the sand will find its way out. It falls into elevators, which take it to a bin on or above the mixing platform. In case pulverized limestone cannot be had in the vicinity of the plant a limestone-grinding mill is provided. All the ingredients being ready, the asphaltic cement, sand, and limestone are admitted to the mixer. This is an iron box, with a capacity of 8 or 16 cubic feet. Two parallel revolving shafts, each fitted with steel blades, and revolving in opposite directions, are placed in the bottom of the box and effect a thorough mixing of the several materials. When mixed, the finished paving material is dumped from the mixer into a cart or wagon and hauled to the street.

ROCK ASPHALT PAVEMENTS are composed of crushed limestone or sandstone, naturally impregnated with bitumen. If the natural product does not have the desired proportion of bituminous matter this is rectified by mixing a richer or poorer rock with the first. The mixture is powdered, sifted, then kept heated for two hours at 300° to 325° F., after which it is carted to and spread upon the street. After a light rolling, followed by hand tamping, the surface is covered lightly with hydraulic cement and rolled with a steam roller. The European rock asphalt pavements are all made from bituminous limestone, but in America both sandstone and limestone bituminous rock are used,

sometimes mixed together. Little trouble from cracking arises with the rock asphalts; they are generally considered more durable and more slippery than the artificial asphalt mixtures. In Paris some of the asphalt pavements are prepared by adding enough bitumen to the rock asphalt to bring the total bitumen up to 15 or 18 per cent. The mixture is heated to such a consistency that it can be spread or floated into a layer about one and one-half inches deep. It is not rolled. Other asphalt pavements in Paris are compressed.

BLOCK ASPHALT is formed by mixing crushed trap rock and asphaltic cement at a temperature of some 300° F., and molding the mixture in machines, under a pressure of 120 tons to each block. The blocks measure 4 × 12 inches on the street surface, and are either 3 or 4 inches deep. They are laid much like brick. It is claimed for asphalt blocks that they are made of a uniform composition and at a uniform temperature, always under cover, thus yielding a product of constant quality; also that they are available for use in small places where the erection of a plant for the preparation of street asphalt would be out of the question.

BRICK PAVEMENTS are composed of tough, hard, non-absorbent brick, designed to withstand the hammer-like blows and abrasive action of hoofs and wheels and to resist the action of water and frost. In size, shape, and general appearance they resemble ordinary building brick, but they are made and burned with more care. (See **BRICK**.) Where feasible, brick should have a concrete foundation. On the latter a two-inch cushion of sand is laid. The bricks are set edgewise on the sand, their lengths running across the street and joints being broken. At street intersections each quarter of the area is laid diagonally, so the length of the brick will be at right angles to the direction of the traffic, when the latter is turning corners. The bricks are rammed to bed them firmly. Such bricks as sink below the surface are replaced with deeper ones. Although the bricks are set in as close contact with each other as is feasible, open spaces remain. Nearly all the fillers described above have been used for brick pavements. Sand is not suitable, as it quickly washes out. There is great difference of opinion as to the relative merits of Portland cement grout and the bituminous fillers. Both kinds of filler are poured over the surface of the pavement and swept into the joints with brooms. After this has been done the pavement is covered with a thin layer of sand. Expansion joints are sometimes provided, both lengthwise and crosswise the streets, the former at each curb line, and the latter at intervals of 25 to 50 feet. They are made by filling a narrow space or spaces between bricks with some form of bituminous cement.

WOOD PAVEMENTS are composed of blocks of wood, either round or rectangular, laid with the grain or fibre perpendicular to the foundation. The rectangular blocks are most commonly 3 × 9 inches × 4 to 6 inches deep. The round blocks are 4 to 8 inches in diameter, and about 6 inches deep. Blocks of hexagonal and other special shapes have been tried, but experience has shown that the special forms have no advantage commensurate with their cost. The round and the rectangular blocks are sawed to the desired lengths from logs or from plank,

respectively, gang saws sometimes being used. The bark, and in some cases the sap-wood, is cut from the round blocks by machinery. The blocks are sometimes treated chemically with creosote or some other wood preservative. Unless this is done it is questionable whether wood should be used for paving purposes. The round blocks necessarily have large spaces between them to be filled; the rectangular blocks are sometimes laid close together and sometimes with spaces. Various fillers are used. Expansion joints are often, but not always, inserted at the curb, of sand, and covered with bituminous cement or other materials. Probably round cedar blocks have been more freely used in America than any other wood. In Europe pine, fir, and more recently Australian hard woods, known as Karri and Jarrah, have been employed. For the best results, wood should be laid on a concrete foundation, but this has seldom been done in the United States. In Chicago round cedar blocks are laid as follows: Not less than two inches of sand is spread over the surface to be paved. On this a flooring of two-inch hemlock plank is laid, supported also at the centre and each end by 1 × 8-inch boards, laid flatwise in the sand. The blocks are set on end on the plank. The spaces between the blocks must be at least three-quarters of an inch, but not more than one and one-half inches in size. The joints are filled with clean, screened dry gravel, thoroughly rammed in, after which the whole pavement is covered with hot coal-tar pitch, and this in turn is covered with three-quarters of an inch of roofing gravel. At Indianapolis rectangular red cedar blocks were laid in 1894 and 1896, and heart-wood Southern yellow pine later on. The first blocks were not treated, but the later ones were creosoted. The blocks were laid on a concrete foundation, with a one-inch sand cushion, and latterly with expansion joints at the curb. The joints were partially filled with fine sand, after which the pavement was rolled, then covered with hot paving pitch and fine gravel. The cedar blocks were five inches, and the pine blocks four inches deep. Since 1900 creosoted wood blocks have been gaining in favor in the United States. Some of the London hard-wood pavements have been of blocks 3 × 9 × 5 inches deep, laid close. At the gutters three courses were laid parallel to the curbs, the blocks having been dipped in a boiling mixture of four parts of tar and one part of pitch, and there being a one-inch sand filled expansion joint at each curb. The main part of the street was covered with blocks laid crosswise. The filling is effected with boiling tar and pitch, first covering the entire surface, then worked into the joints; after which cement grout is floated over the pavement, then sand thrown over all. Soft-wood pavements of the same period in London were not less than six inches deep, creosoted, and had their joints filled with a grout of blue lias lime and sand.

STONE BLOCK PAVEMENTS are most commonly of granite, some of the harder and tougher sandstones, and trap rock, the latter being the least satisfactory of the three. The lengths and depths are quite variable in different cities, but in the best work the widths range from 3 to 4 or 4½ inches, with a tendency to 3½ inches in American cities. The governing condition of width is the foothold for horses. Depths should be at

least one and one-half times the narrow and medium widths, to give a firm setting that will prevent rocking on the base. In American cities common dimensions are as follows: Widths, $3\frac{1}{2}$ to 4 inches; lengths, 9 to 12 inches; depths, 6 to 8 inches. In a number of European cities there is a tendency to square or nearly square blocks, approximating 6 inches on a side, with depths of 6 to 8 inches. Square blocks (or Belgian; see below) are also used in the United States, but not frequently of granite, as is the case abroad. The blocks should be as nearly rectangular and flat as is possible on the tops, sides, and ends. The blocks are generally laid crosswise of the street, and diagonally at intersections. A sand cushion is used when the blocks are laid on concrete, as they should be almost invariably, since stone blocks are generally used where the traffic is heavy. The filler most commonly employed for the joints is first gravel, then hot paving cement. Medina sandstone is sometimes laid as close as possible, and filled with asphaltic cement, Portland cement, or Murphy grout. *Belgian blocks*, so named from their use in Belgium, have tops five or six inches square, bottoms somewhat less, but generally not more than one inch smaller each way, and depths of seven to eight inches. These blocks have been extensively used near New York, and trap rock, being plentiful and cheap in that vicinity, has been employed for the purpose. The trap does not break to a true surface readily and is not easily worked, so it is difficult to get good surfaces with Belgian block of this material. It is very durable, but wears smooth and slippery. Belgian blocks are almost if not quite always laid on a sand or earth base, since one of the objects in their selection is cheapness; their joints are filled with sand. Trap-rock blocks are also got out and laid in oblong form, much like granite and sandstone in general outline, but with far less regular surfaces. Limestone has been used for block pavements, but to a small extent, as it is too soft to be durable.

All blocks should be laid diagonally at street intersections, as is done with brick. The securing and dressing of stone blocks does not differ materially from the quarrying and working of other dimension stone. *Cross-walks* are laid at street intersections. They are composed of two parallel rows of bluestone, granite, or sandstone, according to the locality and the kind of pavement, with a row of blocks between. The cross-stones are $1\frac{1}{2}$ to 2 feet wide, 4 to 6 feet long, and 6 to 8 inches thick. In the best modern work they are laid with a keystone at the centre of the street, and with diagonal joints each way, at right angles to the direction of the traffic in turning corners.

COBBLESTONES are seldom used now. Their only merit is low first cost. They are laid with best results on a base of six inches of loamy sand, which gives a firm bedding and tends to hold them tightly in place. They are set on end. The stones should be not less than four inches nor more than eight inches in diameter at the head, not under five inches nor over ten inches deep, and only rounded stones should be used.

MAINTENANCE. The greatest enemy to good pavements is the frequent street openings so common, and often so necessary where subways for pipes and wires are not provided. (See **SWAYS**.) All street openings to gain access to

pipes and wires should be under the control of the city department responsible for the maintenance of the pavements. Great care should be taken in refilling all trenches, the dirt being thoroughly tamped to prevent future settlement. In America maintenance for a period of years is sometimes included in contracts for pavements, but chiefly for asphalt. The periods are of varying lengths, but generally five to ten years. Maintenance guarantees amount, of course, to a higher contract price for what on its face is original construction, but is really maintenance as well. When the guarantees expire, a contract for maintenance only is sometimes made with the original or a new contractor. See articles on **ASPHALT**; **BRICK**; **CONCRETE**; **QUARRYING**; **ROAD AND STREET MACHINERY**; **ROADS**; **STREETS**.

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PAVEMENT ANT. See **HOUSE-ANT.**

PAVET DE COURTEILLE, pâ'vâ' de kōōr'-tā'y', ABEL (1821-89). A French Orientalist, born in Paris. He was a grandson of De Sacy and studied under him in the Ecole des Langues Orientales. After four years as instructor in the Ecole Jeunes, in 1854 he became professor of Turkish in the Collège de France. It was in Turkish especially that he made important research. He published: *Conseils de Nabi Efendi à son fils Aboul Khair* (text and translation, 1857); *Histoire de la campagne de Mohacz, par Kémal Pacha Zadeh* (1859); *Les prairies d'or de Maçoudi* (with Barbier de Meynard, 1861-64); *Mémoires de Baber* (1871); *Miradj Nameh* (1882); *Tezkéreh-i-evliyâ* (1889); and, most important of all, the *Dictionnaire turco-oriental* (1870).

PAVIA, pâ-vē'â. The capital of the Province of Pavia, Italy, situated on the left bank of the Ticino, two miles above its confluence with the Po, 18 miles south of Milan, with which it is connected both by river and canal (Map: Italy, D 2). An ancient covered granite bridge of seven arches and an iron railway bridge connect the city with the suburb of Ticino, on the right bank of the river. Through the town with its narrow streets runs the Corso Cavour. The city is still mostly surrounded by its old walls, and has an imposing appearance, but bears a sombre impress of antiquity. In former times it was called the 'city of a hundred towers,' but few of these now remain. Some of the edifices are by Bramante. The oldest church is San Michele, a fine example of the Lombard-Romanesque style. The cathedral, containing some good paintings, was commenced in 1486, but was never finished. It is now being restored. In a beautiful chapel attached to it are the ashes of Saint Augustine in a magnificent Gothic sarcophagus. The Certosa di Pavia (q.v.), the most splendid monastery in the world, lies five miles north of the city. Pavia has a famous university with an imposing and interesting building. (See **PAVIA, UNIVERSITY OF**.) The Palazzo Malaspina contains a museum with a collection of paintings and an-

tiquities and is associated with the lives of Boëthius and Petrarch. The other chief objects of interest are two theatres, an old castle built by the Visconti and now converted into a barrack, a huge bronze statue of Pope Pius V., a marble statue of Italia, and monuments to Garibaldi and to Volta. The Collegio Borromeo was founded in 1563 and the Collegio Ghislieri in 1569. Both offer scholarships. There are also an episcopal seminary, a lyceum, a technical school, an art and industrial school, and a Deaf and Dumb Institute. Pavia has manufactures of machines, hats, organs, chemicals, and leather. There are also important marble works. The yearly fair is largely attended, and the chief trade is in wine, rice, oil, silk, and cheese. Population (commune), in 1881, 34,826; in 1901, 35,447.

Pavia, the ancient *Ticinum*, was founded by the Ligurii. It became a place of considerable importance after the fall of the Roman Empire. It came into the possession of the Goths and Lombards, and the latter made it the capital of their Italian Kingdom, which was conquered by Charles the Great in 774. In 924 the city was taken and destroyed by the Hungarians. It became independent in the twelfth century. After having been weakened by civil wars, it was conquered by the Visconti of Milan in 1359. From this time its history is merged in that of the Duchy of Milan and of Lombardy. Here, on February 24, 1525, the forces of Charles V. defeated the French and captured Francis I. The city was stormed and pillaged by Napoleon in 1796.

PAVIA. A town of Panay, Philippines, in the Province of Iloilo, situated six miles north-west of Iloilo. Population, 10,220.

PAVIA, UNIVERSITY OF. One of the oldest universities of Europe. It had its inception in a law school that flourished before the twelfth century, and even in the first half of the fourteenth century there still existed traces of the older institution. Galeazzo II. Visconti obtained from Charles IV. a charter for a Studium Generale in 1361, which conferred upon it all university privileges, and in 1389 it received the same privileges from Pope Boniface IX. In 1398 it was removed to Piacenza. With the death of Galeazzo it declined and by 1404 it ceased to exist. In 1412 it was restored by Filippo Maria Visconti, and it soon vied with the leading Italian universities, particularly in Roman law. It had a large attendance of foreigners. In the sixteenth and seventeenth centuries its fame declined, but after its reorganization in 1770 by Maria Theresa and in 1817 by Emperor Francis I. it again assumed considerable importance among European universities. In 1902 it consisted of the faculties of law, medicine, and surgery, mathematics and natural science and philosophy, and the School of Pharmacy. The attendance was over 1300. The Collegio Ghislieri, founded in 1569, prepares students for the university. The library contains 160,000 volumes, 100,000 pamphlets, and 1100 manuscripts.

PAVIE, PA'VE. THÉODORE-MARIE (1811-96). A French Orientalist. He was born at Angers. Early travels in the United States, Central America, and Canada resulted in the publication of his *Voyage aux États-Unis et au Canada* (2 vols., 1828-33); and subsequent travels through Asia, and the study of Asiatic languages, especially Sanskrit and Chinese, formed the foundation of

valuable historical and literary contributions to the *Revue des Deux Mondes*, the *Journal Asiatique*, and the *Bulletin* of the French Geographical Society. They also led to appointments as professor of Sanskrit literature in the College of France from 1853 to 1857, and as professor of Oriental literature in the university of his native town, where he died May 12, 1896. His principal work is the *San-koué-tchi* (2 vols., 1845-51), a history of China in the thirteenth century; other works are: *Fragments du Mahābhārata* (1844); *Les trois religions de la Chine* (1845); *Bhodjaprabandha* (1855), a History of Bhoja, King of Malwa; and numerous books of travel.

PAVILION (OF. *pavillon*, *parcillon*, Fr. *pavillon*, tent, from Lat. *papilio*, butterfly, tent, pavilion). A portion of a building, under a separate roof, originally of a tent-like form, with the slope of the roof either straight or curved. The term is used generally to describe a wing or dependency of a large structure, usually of lighter construction or greater height. This form is much used in France. The higher parts of the new buildings at the Louvre are good examples of pavilions.

PAVING. See PAVEMENT.

PAVLOGRAD, pāv'lō-grād'. A town in the Government of Ekaterinoslav, Russia, situated on a tributary of the Samara, 50 miles east of Ekaterinoslav (Map: Russia, E 5). It has a gymnasium and carries on a large trade in flour and grain. The town was founded in 1779, and is settled by Zaporogian Cossacks. Population, in 1897, 17,188.

PAVLOVO, pāv'lō-vō. An industrial town in the Government of Nizhni-Novgorod, Russia, situated on the Oka, 40 miles southwest of Nizhni-Novgorod. It has steel works and match factories. There are a museum of cutlery and models, and a library. Population, in 1897, 12,200.

PAWNBROKING (from *paen*, OHG. *pfant*, Ger. *Pfand*, pledge, from OF. *pan*, pawn, pledge; usually considered identical with OF., Fr. *pan*, piece of a garment; more probably from OF. *paner*, Sp. *apandar*, to plunder, *apañar*, to take away + *broking*; connected with AS. *brūcan*, OHG. *brūhen*, Ger. *brauchen*, to use, need, Lat. *frui*, to use, enjoy). The business of lending money on the security of personal effects left in the possession of the lender. Pawning has existed in some form in all ages and among all peoples. It is much older than banking, with which it was originally connected. The Chinese, Greeks, and Hebrews borrowed on pledges. In mediæval times pawnbroking was synonymous with usury. In Europe the business was carried on at first by Jews and later by Lombards. Pawnbroking is a legitimate business, but since the expense of administering small loans is very great, the pawnbroker has often been allowed to charge as high as 100 per cent. where the regular rate of interest is only 6 per cent. Recognizing the great disadvantage under which the poor borrower labors, efforts have been made to carry on the business in the interest of the borrowers. This effort has taken the form of *monts de piété* on the Continent. France is especially successful in maintaining these institutions. They are associated with the town councils, hospitals, and charity bureaus. When endowed they charge no

interest, and the highest interest is 12 per cent. The Paris institution acts as the poor man's safe deposit, as it has excellent facilities for storage and makes a practice of disinfecting goods. The objections to its methods are: (1) the amount of time the system takes; and (2) the undervaluation of goods. Belgium follows French methods. The pawnbroking business has been controlled since 1618. The *monts de piété* are managed by councils and charity administrators, while their funds are borrowed from the charity department.

Germany has royal, municipal, and private pawn shops. The private pawn shops are regulated and any city may prohibit them. The municipal pawn shops are usually in connection with the savings-bank and are self-supporting. In Austria-Hungary the private pawn shops are in the majority. The Imperial Pawn Shop of Vienna, founded in 1707 by Joseph I., is now self-supporting, but, because of the origin of its capital, one-half of its profits go to the poor. The remainder is used in extending the business. In Spain the *mont de piété* is connected with the savings-bank. Denmark regulates its pawn shops. Sweden has had successful private companies since 1880. Few pawn shops are found in Switzerland, only one in Berne. Saint Petersburg and Moscow are the only cities of Russia maintaining municipal pawn shops.

The charter of the Bank of England gives that institution power to lend on plate and non-perishable commodities at 5 per cent. In 1695 the directors seriously considered establishing pawn shops. Pawnbroking was first regulated by James I., then under George III. The law of 1872 is very favorable to pawnbrokers, but since 1894 there has been an increased interest in plans for improving the position of those who borrow money on pledges. General Booth proposed a scheme, but the funds were not at hand to develop it.

In the United States the business has until recently been entirely in the hands of private pawnbrokers, who do business under State regulations or municipal ordinances. The State regulations may provide for a license, a bond, regulation of interest charges, methods of sale, and the disposition of the surplus. The city ordinances usually place the pawn shops under police control, providing for daily inspection or daily reports. The laws are generally inadequate. Only a few States forbid a charge above the legal rate of interest. Where a sale of goods requires an advertisement and by auction, the law is frequently evaded or not enforced. It is very seldom, if ever, that the borrower receives any surplus from the sale of his goods. The difficulties in regulation arise from the character of the business and the lack of ordinances. Since pawnbroking can exist only in large centres of population, the problem of regulation has been one of local rather than general interest. The ignorance or pride of the borrowers prevents them from making necessary complaints to the authorities. Low licenses invite a motley crowd of pawnbrokers. Where the regulations permit only four or five pawn shops to exist, as in Providence, Washington, or Baltimore, they are respectable, but the large number of shops in Boston and Philadelphia cannot be easily controlled. Some of the maximum charges are: Baltimore, 30 per cent.; Boston, 132 per cent.; Buffalo and Chicago, 120 per cent.; Cleveland, 300 per cent.; Pitts-

burg, 240 per cent.; and Providence, 180 per cent. The smallest pawns do not pay pawnbrokers even at 100 per cent. Municipal pawn shops were proposed for Philadelphia in 1816 by Dr. Mease. The oldest philanthropic concern in the United States is the Pawnors' Bank of Boston, started in 1859, which underwent many losses and discouragements. It is now the Collateral Loan Company, and pays a regular dividend. In 1894 Dr. Greer of Saint Bartholomew's Protestant Episcopal Church in New York City started a pawnbroker's shop in his parish. Out of this developed the Provident Loan Company, which opened its doors May 21, 1894, at 279 Fourth Avenue. The company is incorporated, with a board of fifteen directors, and has a subscribed capital of \$100,000. Only jewelry and articles of considerable value, but small in bulk, are received. Bedding and furniture are barred because of lack of room. As a result the people reached are independent workers, who need money to tide over a period of sickness or lack of work. One per cent. a month, or one-third the legal rate, is charged. In competition with the Provident Loan Society, pawnbrokers have reduced their charges, sometimes even lower, or they have advertised that they will lend at the same rate as the Provident Loan Society. The report for 1902 states that \$3,866,325 was lent on 130,158 pledges; the average amount of each loan was \$29.70; and the average amount lent per day was \$12,942.70. The average loan of the pawn shops is much lower, sometimes being as low as \$1.41 in one month. More than 99 per cent. of the pledges were redeemed. This enterprise pays 6 per cent. on the capital.

After opposition from the pawnbrokers, who were well organized, Illinois passed a compromise measure, authorizing lending societies, but only permitting loans on personal property and limiting the capital to \$50,000. The State Pawnors' Society opened its office in Chicago November 1, 1898. The society has a board of directors elected by the stockholders, with two additional members selected respectively by the Governor and the Mayor. The maximum interest charged is one per cent. per month, with an additional charge of one-half per cent. for storage and insurance. The pressure for loans has been heavy. The society pays 6 per cent. dividends. At the time the office opened there were 67 pawn shops in Chicago. The Chattel Loan Association of Baltimore, established May 12, 1898, expects ultimately to do a pawnbroking business. The Worcester Collateral Loan Association, the Workingmen's Loan Associations of Boston and Providence, the Provident Loan Company of Buffalo, and the Hebrew Free Loan Association of New York deal with chattel mortgages and indorsed loans.

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PAWNEE, *pa-né'*. The most important tribe of the Caddoan stock (q.v.) of North American Indians. They formerly claimed a large territory upon the Platte River, in what is now Nebraska, ranging from the Niobrara on the north to the Arkansas on the south, and occasionally extending their forays far down into Texas or New Mexico. They were in chronic

warfare with every surrounding tribe with the exception of the Omaha, Ponca, and Oto, whom they treated as wards and dependents. The few remaining are now associated with the Ponca, Oto, and Tonkawa upon Oakland Reservation, Oklahoma.

The Pawnees call themselves *Skihiksihiks*, 'men of men,' or 'super-excellent men.' The popular name appears to be derived from the Pawnee *pariki*, 'a horn,' referring to their peculiar scalp-lock, which was dressed to stand nearly erect. This mark indicates a Pawnee in the pictographs of the plains tribes and undoubtedly also gave origin to the tribal sign, now interpreted to mean 'Wolf People.' They have four bands or grand divisions, viz. *Shau-i*, or Grand (i.e. 'principal'), *Kitkehaki*, or Republican, *Pitahauerat*, or Tapage ('noisy'), and *Skidi*, or Loup ('Wolf'). The Skidi were originally a distinct and hostile tribe, which had preceded the Pawnee proper, by whom they were conquered and incorporated. Traditional and historic evidence shows that the Pawnee and Arikara migrated from the south, probably from about the middle Red River, adjoining the cognate Caddo tribes. The Skidi and Arikara may have preceded the others by perhaps a century, the latter continuing up the Missouri, while the Skidi halted at the Platte, where they were overtaken by the Pawnee proper. The dialects of the Pawnee, Skidi, Arikara, and Wichita are all so closely related as to constitute but one language. The Pawnee appear to have been known to the Spaniards as early as 1626. They are noted upon Marquette's map of 1673 about where they were found in 1804 by Lewis and Clark, viz. the lower Platte near its confluence with the Missouri. By treaty in 1833 they ceded their lands south of the Platte and came under the supervision of an agent. Some civilizing work was started among them, which prospered for a little time until the hostile Sioux drove them south of the river, compelling them to abandon their fields and villages. About the same time, in 1838, the great smallpox epidemic carried off at least 2000 of their number. In 1849 probably a greater number perished by cholera. Since then their history has been one of swift and certain decline from disease, removal, and unceasing warfare in which the Pawnee found every man's hand against him. They have never, however, as a tribe been at war with the whites, but, on the contrary, have frequently furnished a contingent of scouts in our various difficulties with the Northern plains tribes. One main factor in the introduction of disease has been the great overland trail, which passed directly through their territory. In 1858 they ceded all their remaining original territory except a strip 30 miles long by 15 wide upon the Loup River. In 1874 they sold this and removed to their present location in Oklahoma.

Like all the tribes of Caddoan stock, the Pawnee were principally agricultural and sedentary, building large circular houses of logs covered with earth, and raising abundant crops of corn, pumpkins, and other Indian vegetables, which they dried or cached for winter use. The skin tipi was used only for temporary purposes when upon the buffalo hunt, away from their permanent villages. They are of good physique, somewhat more robust than the regular hunting tribes, and were noted for their running and

walking powers. It is said that their warriors could cover one hundred miles in twenty-four hours on a foot trot without stopping to eat or sleep. They were devoted to religious ceremonies, the Skidi being particularly noted for their bloody rite of human sacrifice, offered to the Morning Star, as the spirit of fertility on the occasion of the annual corn planting, the victim being a captive girl. See *PETALESUANO*.

The best early estimate of their population is that by the missionaries Dunbar and Allis in 1835, who give them 10,000. In 1840, after the smallpox, the same authorities estimated them at about 7500. In 1847 they were about 8400, but were again terribly reduced by the great cholera epidemic in 1849. Later official estimates are 4686 in 1856; 3416 in 1861; 2376 in 1874 (just before removal to Oklahoma); 1440 in 1879; 824 in 1889; 629 in 1901.

PAWNEE CITY. The county-seat of Pawnee County, Neb., 75 miles south-southeast of Lincoln, on the Chicago, Rock Island and Pacific and the Burlington and Missouri River railroads (Map: Nebraska, H 3). It is chiefly important as the commercial centre of a productive section engaged in farming and stock-raising. Population, in 1890, 1550; in 1900, 1969.

PAWTUCKET. An important manufacturing city in Providence County, R. I., 4 miles north of Providence, on both sides of the Pawtucket River, at the head of navigation, and on the New York, New Haven and Hartford Railroad (Map: Rhode Island, C 2). Pawtucket covers an area of nearly nine square miles. It has Daggett Park, Collyer Monument, and a Soldiers' Memorial Monument, several interesting bridges of various types, Sayles Memorial Library, Home for Aged Poor, Emergency Hospital, and a State armory. Among the more prominent business structures are the Safe Deposit Building, Industrial Trust Building, Providence County Savings Bank, Taylor Building, and Kinyon Block. Other points of interest are Ten-Mile River and Pawtucket Falls, 50 feet in height, noteworthy alike for beauty of scenery and as the source of great water power.

Pawtucket is well known for the extent and variety of its manufactures, which include cotton, silk, and woolen goods, plush, velvet braid, webbing, various kinds of machinery, foundry products, gymnasium supplies, electrical supplies, thread, hair-cloth, yarns, and wire. There are also numerous dyeing, bleaching, and finishing establishments. The government is vested in a mayor annually elected, a bicameral council, and in administrative officials, the majority of whom are elected by the council. The school committee is independently chosen by popular vote. Pawtucket spends annually in maintenance and operation over \$700,000, the municipal budget balancing at nearly \$1,325,000. The principal items of expense are \$135,000 for the operation of the water-works, \$135,000 for schools, \$50,000 for the police department, \$40,000 for the fire department, and \$38,000 for municipal lighting. The water-works, which were built in 1878 by the city at a cost of over \$1,840,000, are owned and operated by the municipality. Population, in 1890, 27,633; in 1900, 39,231.

The portion of the city of Pawtucket on the

west side of the river was originally the principal village in the town of North Providence, which was incorporated in 1765. This town was divided in 1874, and the village of Pawtucket was consolidated with the town of Pawtucket on the east side of the river as the town of Pawtucket, which in 1886 was incorporated as a city. The portion of Pawtucket on the east of the river was originally in Massachusetts, and was incorporated as the town of Pawtucket in 1828, having been set off from the parent town of Seekonk. In 1862 the town of Pawtucket, Mass., was ceded to Rhode Island, and remained a separate town until its consolidation with the village of Pawtucket in North Providence in 1874. The first cotton factory in the United States was established here in 1790 by Samuel Slater. This mill is still standing. Consult Greene, *The Providence Plantations* (Providence, 1886).

PAX (Lat., peace), called also **PACIFICALE** and **OSCULATORIUM**. The 'kiss of peace,' and also a sacred utensil, employed in some of the solemn services of the Catholic Church in the ceremony of giving the so-called 'kiss of peace' during the mass. The practice of saluting each other—the men, men, and the women, women—during public worship, and particularly in the *agape*, or love-feast, is frequently alluded to by ancient writers, as Cyril of Jerusalem, and Augustine. All the ancient liturgies, without exception, refer to it as among the rites with which the eucharist was celebrated; but they differ as to the time and the place in the eucharistic service in which it is introduced. The ceremony commences with the celebrating bishop or priest, who, after kissing the altar, salutes the deacon, not (in modern times) by an actual kiss, but by placing the hands upon his shoulders and slightly inclining the head toward him. By the deacon the salute is tendered to the other clergy assisting. Originally, the laity also were included, but this has long since been abandoned. It is when the mass is celebrated by a high dignitary that the utensil called the pax is used. The pax is sometimes a crucifix, sometimes a reliquary, sometimes a tablet with a figure sculptured or enameled upon it. Having been kissed by the celebrant, and by him handed to the deacon, it is carried by the latter to the rest of the clergy. The pax is omitted in the mass of Maundy Thursday (q.v.), to express horror of the treacherous kiss of Judas.

PAXOS, pāk'sōs, or **PAXO**. One of the Ionian Islands (q.v.). It lies nine miles south of Corfu, and about the same distance from Acarnania, Greece (Map: Greece, B 2). It is about five miles long and two miles broad, and is mainly a hilly mass of limestone with an absence of potable water. It is noted for its fruit and the fine quality of its olive oil. Goats and mules are raised. Population, in 1896, 3814.

PAXTON. A city and the county-seat of Ford County, Ill., 103 miles south-southwest of Chicago, at the junction of the Lake Erie and Western and the Illinois Central railroads (Map: Illinois, D 3). It is the seat of the Rice Collegiate Institute. Among its industrial establishments are hardware manufactories, machine shops, flour mills, carriage works, brick and tile plants, etc. The water-works are owned

by the municipality. Population, in 1890, 2187; in 1900, 3036.

PAXTON, JOHN RANDOLPH (1843—). A Presbyterian clergyman. He was born at Canonsburg, Pa., graduated from Jefferson College in 1866 and from the Western Theological Seminary, Allegheny, in 1869. He served in the 140th Pennsylvania Regiment from 1862 until the end of the war, rising to the rank of second lieutenant. His first pastorate was at Churchville, Md., from which he proceeded to the Pine Street Church, Harrisburg, Pa., then to the New York Avenue Church, Washington, D. C., and in 1882 he became pastor of the West Presbyterian Church, New York City. In 1893 he resigned his charge because of ill health, but resumed preaching at the New York Presbyterian Church in 1898.

PAXTON, Sir JOSEPH (1801-65). An English architect and horticulturist, born at Milton-Bryant, near Woburn, Bedfordshire. As superintendent of the gardens of Chatsworth, in the employ of the Duke of Devonshire, he designed the large conservatory of Chatsworth (1836-40). This experience led him to propose a crystal palace of glass and iron for the great London Exhibition of 1851. It was the first time these materials had been employed on so extensive a scale. His design obtained for him great popularity and the honor of knighthood. The Crystal Palace of 1851 was removed from Hyde Park, but became the germ of the nobler and more splendid palace at Sydenham, the construction of which he superintended; the grounds were also laid out by him.

PAXWAX. See FAXWAX; LIGAMENT.

PAY AND ALLOWANCES. A military term used to denote the rate of pay and allowances granted to officers and enlisted men of the military and naval services of the United States.

ALLOWANCES to officers and enlisted men are made on a basis of requirement and rank; and may be either in kind, or in lieu of, the amount to which such officer or soldier by regulation is entitled. The money allowance of clothing is allotted half-yearly for the first year, estimates for clothing being made quarterly as follows: On January 1st, for a supply to last until June 30th; on April 1st, until September 30th; on July 1st, until December 31st; on October 1st, until March 31st. Commanding officers settle the clothing accounts of their men six months after enlistment and afterwards on June 30th and December 31st of each year. (For allowances of forage, see **FORAGE**.) Soldiers receiving allowance or commutation in lieu of food (ration) are paid according to a scale, which varies in amount from 25 cents per diem, allowed enlisted men on conclusion of furlough; 40 cents per diem to sergeants of post non-commissioned staff, on duty at stations where there are no other troops; 75 cents per diem to a soldier on detached duty, to \$1.50 per diem to a soldier traveling under orders from a station, where his rations have been regularly commuted—which is the maximum allowance in lieu of rations for enlisted men. The allowance of baggage permitted officers and men will be found under **BAGGAGE**.

Whenever there are sufficient quarters in a barracks or station, permanent quarters are assigned to the field and staff officers of the garri-

son. Regimental officers are provided with quarters according to convenience of location and the rank of the recipient. Bachelor quarters are assigned to officers without families. On the arrival of a command at a new station the original assignment of quarters is made by a board of officers consisting of the commanding officer, the two senior line officers present, the senior surgeon, and the quartermaster. Allowances in lieu of quarters are according to rank and circumstances.

from, or between Cuba, Hawaii, and the Philippines by the shortest regularly traveled routes.

Retired officers detailed for duty at colleges are entitled to full pay, but not commutation of quarters. The maximum pay of a colonel is established by law at \$4500 per annum, and that of a lieutenant-colonel at \$4000. An aide-de-camp to a major-general is allowed \$200 per year in addition to the pay of his rank; an aide-de-camp to a brigadier-general is allowed \$150 per year additional; and an acting commissary

TABLE OF PAY OF COMMISSIONED OFFICERS UNITED STATES ARMY

GRADE	Pay of officers in active service					
	Pay of grade		Monthly pay			
	Yearly	Monthly	After 5 years service	After 10 years service	After 15 years service	After 20 years service
			10 per cent.	20 per cent.	30 per cent.	40 per cent.
Lieutenant-General.....	\$11,000	\$916.67	.....	.....	.....	.....
Major-General.....	7,500	625.00	.....	.....	.....	.....
Brigadier-General.....	5,500	458.33	.....	.....	.....	.....
Colonel.....	3,500	291.67	\$320.83	\$360.00	\$375.00	\$375.00
Lieutenant-Colonel.....	3,000	250.00	275.00	300.00	325.00	333.33
Major.....	2,500	208.33	229.17	250.00	270.83	291.67
Captain, mounted.....	2,000	166.67	183.33	200.00	216.67	233.33
Captain, not mounted.....	1,800	150.00	165.00	180.00	195.00	210.00
Regimental Adjutant—Captain, mounted.....	2,000	166.67	183.33	200.00	216.67	233.33
Regimental Quartermaster—Captain, m'ted..	2,000	166.67	183.33	200.00	216.67	233.33
Battalion and Squadron Adjutant.....	1,800	150.00	165.00	180.00	195.00	210.00
Regimental Commissary.....	1,800	150.00	165.00	180.00	195.00	210.00
First Lieutenant, mounted.....	1,600	133.33	146.67	160.00	173.33	186.67
First Lieutenant, not mounted.....	1,500	125.00	137.50	150.00	162.50	175.00
Second Lieutenant, mounted.....	1,500	125.00	137.50	150.00	162.50	175.00
Second Lieutenant, not mounted.....	1,400	116.67	128.33	140.00	151.67	163.33
Chaplain.....	1,500	125.00	137.50	150.00	162.50	175.00

GRADE	Pay of retired officers					
	Pay of grade		Monthly pay			
	Yearly	Monthly	After 5 years service	After 10 years service	After 15 years service	After 20 years service
		
Lieutenant-General.....	\$8,250	\$672.50	.....	.....	.....	.....
Major-General.....	5,625	468.75	.....	.....	.....	.....
Brigadier-General.....	4,125	343.75	.....	.....	.....	.....
Colonel.....	2,625	218.75	\$240.00	\$262.50	\$281.25	\$281.25
Lieutenant-Colonel.....	2,250	187.50	206.25	225.00	243.75	250.00
Major.....	1,875	156.25	171.87	187.50	203.12	218.75
Captain, mounted.....	1,500	125.00	137.50	150.00	162.50	175.00
Captain, not mounted.....	1,350	112.50	123.75	135.00	146.25	157.50
Regimental Adjutant—Captain, mounted.....	.....	.....	.....	.....	.....	.....
Regimental Quartermaster—Captain, m'ted..	.....	.....	.....	.....	.....	.....
Battalion and Squadron Adjutant.....	.....	.....	.....	.....	.....	.....
Regimental Commissary.....	.....	.....	.....	.....	.....	.....
First Lieutenant, mounted.....	1,200	100.00	110.00	120.00	130.00	140.00
First Lieutenant, not mounted.....	1,125	93.75	103.12	112.50	121.87	131.25
Second Lieutenant, mounted.....	1,125	93.75	103.12	112.50	121.87	131.25
Second Lieutenant, not mounted.....	1,050	87.50	96.25	105.00	113.75	122.50
Chaplain.....	1,350	112.50	123.75	135.00	146.25	157.50

For allowances of food and ration, see RATION. The use of public horses by officers receiving mounted pay is regulated by department commanders, according to local exigencies. A captain or lieutenant of artillery is allowed the use of a battery horse if serving with a light or mounted battery. The sum of \$100 is allowed for the transport of each horse entitled to forage, and an attendant to accompany them. If such sum does not cover the actual cost, the excess must be prepaid by the owner, who is also required to pay all the expenses of the attendant other than his transportation. Commutation of quarters of commissioned officers is at the rate of \$12 per month per room. When traveling an officer is allowed mileage at certain fixed rates, and actual expenses only for sea travel to,

of subsistence \$100 per year additional. Assistant surgeons are entitled to pay of captain after five years' service; and an acting judge advocate, detailed by the Secretary of War, to the pay and allowances of a captain of cavalry. Retired officers receive 75 per cent. of pay (salary and increase) of their rank, a retired chaplain receiving 75 per cent. of the pay (salary and increase) of his rank (captain, not mounted).

After five years' service the soldier's pay is increased by two dollars per month, and after ten years an additional dollar per month is granted for every five years of his service up to thirty years.

In the British army, where the rates of pay are lower than in the United States, service in India is made more attractive by the numerous

TABLE OF MONTHLY PAY OF ENLISTED MEN OF THE UNITED STATES ARMY.

RANK AND SERVICE	First two years	Third year	Fourth year	Fifth year and re-en- listed pay
REGIMENT, CORPS, BATTALION				
Battalion Sergeant-Major—Engineers.....	\$26	\$37	\$48	\$59
Battalion Quartermaster-Sergeant—Engineers.....				
Sergeant-Major—Cavalry, Infantry.....				
Quartermaster-Sergeant—Cavalry, Infantry.....	34	35	36	37
Commissary-Sergeant—Cavalry, Infantry.....				
Senior Sergeant-Major—Artillery.....				
Squadron Sergeant-Major—Cavalry.....	25	26	27	28
Battalion Sergeant-Major—Infantry.....				
Color Sergeant—Cavalry, Infantry.....				
Junior Sergeant-Major—Artillery.....				
COMPANY, TROOP, BATTERY				
Sergeant, first-class—Signal Corps.....	45	46	47	48
Sergeant—Engineers, Ordnance, Signal Corps.....	34	35	36	37
Quartermaster-Sergeant—Engineers.....				
First Sergeant—Engineers.....				
First Sergeant—Artillery, Cavalry, Infantry.....	25	26	27	28
Corporal—Engineers, Ordnance, Signal Corps.....	20	21	22	23
Cook—Engineers, Signal Corps.....				
Sergeant—Artillery, Cavalry, Infantry.....				
Quartermaster-Sergeant—Artillery, Cavalry, Infantry.....	18	19	20	21
Cook—Artillery, Cavalry, Infantry.....				
Mechanic—Coast Artillery.....				
Stable Sergeant—Field Artillery.....	17	18	19	20
Private, first-class—Engineers, Ordnance, Signal Corps.....				
Artificer—Field Artillery, Infantry.....				
Farrier, blacksmith, saddler—Cavalry.....	15	16	17	18
Corporal—Artillery, Cavalry, Infantry.....	14	15	16	17
Wagoner—Cavalry.....				
Trumpeter—Cavalry.....				
Musician—Artillery, Infantry, Engineers.....	13	14	15	16
Private—Artillery, Cavalry, Infantry, Signal Corps.....				
Private, second-class—Engineers, Ordnance.....				
BAND—ARTILLERY, CAVALRY, INFANTRY, ENGINEERS				
Chief musician.....	60	61	62	63
Drum Major.....	25	26	27	28
Chief trumpeter—Artillery, Cavalry.....	22	23	24	25
Principal musician.....				
Sergeant.....				
Cook.....	18	19	20	21
Corporal.....	15	16	17	18
Private.....	13	14	15	16

opportunities it offers for extra pay, originally commonly described as "Batta." Allowances, also, are paid at a higher rate than at home.

Half Pay is practically any form of reduced pay, and the term is still frequently used to describe the rate of pay of a retired or disabled officer.

PAYER, pi'ér, JULIUS VON (1842—). An Austrian Polar explorer and painter. He was born at Schönau, near Teplitz, Bohemia, was educated in the military academy at Wiener-Neustadt, and entered the army in 1859. Subsequently attached to the general staff, he was intrusted with the survey of some of the most inaccessible regions in the Alps. In 1869-70 he took part in the second German expedition to the North Pole, and contributed much to the knowledge of the eastern coast of Greenland. In 1872 he was appointed with Weyprecht to lead the Austrian expedition to the North Pole, which resulted in the discovery (1873) and exploration (1874) of Franz Josef Land, and was described by him in *Die oesterreichisch-ungarische Nordpolexpedition in den Jahren 1872-74* (1876). Upon his return he retired from the military service to devote himself entirely to painting. studied for two years in Frankfurt under Hasselhorst, three years in Munich under Wagner, and four years in Paris. From the first he worked on large canvases, painting stirring episodes from his Arctic experience. In 1883 he was awarded the great gold medal in

Munich for "The Bay of Death," the best of four pictures illustrating the Franklin expedition. In 1884 he lost the sight of one eye, and this delayed the completion of the other pictures in the series, of which "Leaving the Ships" was exhibited in 1886, and "The Death of Franklin" in 1889. For the Museum of Natural History in Vienna he executed mural paintings of "Views in Franz Josef Land," and "Never Retreat" (1892). He won gold medals also in Berlin (1886) and Paris (1889).

PAYMASTER. An officer in the military or naval service charged with the payment of troops and other duties involving the receipt and disbursement of public funds. The pay department of the United States Army is under a paymaster-general, with the rank of brigadier-general, who under the direction of the Secretary of War has charge of the payment of the army. There are two assistant paymasters-general with the rank of colonel; three deputy paymasters-general, with the rank of lieutenant-colonel; and twenty paymasters, with the rank of major. The chief paymaster of a department, under the direction of its commander, has control of all paymasters in the command, and is responsible for them so far as the payment of troops is concerned.

In the United States Navy a paymaster has charge of the public funds carried on board ship (or at a navy yard or shore station), also of the clothing and provisions for the enlisted men. Under directions of his commanding officer, he makes such purchases as may be necessary from

time to time. At shore stations paymasters are also keepers of the 'general store,' from which all departments of the station draw supplies. The numbers of the different ranks of the pay corps and the pay (which is the same as for officers of the line) are given in the section on *Navy* in the article UNITED STATES.

PAYMASTER-GENERAL. An officer of the British Ministry, but not of the Cabinet, charged with superintending the issue of all moneys voted by Parliament. He has no control over the sums issued, paying merely on the order of the department concerned. He is always either a peer or a member of the House of Commons, and changes with the Ministry. The paymaster-general is assisted by a deputy and a staff of clerks, the annual cost of the whole department amounting to about £25,000.

PAYMENT. In law, the satisfaction or discharge of a legal obligation by the delivery of money, or something which the creditor accepts in lieu of money. Payment is, therefore, employed in a more limited sense than performance, which implies the fulfillment of any legal obligation, as carrying out the provisions of an agreement or contract to do work or furnish materials to another. In order to be effectual, payment must be made to the proper party, that is, either to the one to whom it is due, personally, or to some other person lawfully authorized by him to receive it, and it must be of the exact amount due. It should be made at the exact time and place agreed upon, or implied by law, in order to avoid a claim for interest from that time, or the commencement of an action. In general where no place for payment has been previously agreed upon by the parties, the debtor must seek the creditor, or he may be considered as in default. The chief consequences which may ensue on a default of payment are, in general, to give the creditor the right to have immediate recourse to any security, as to sell an article pledged as security, or to foreclose a mortgage or other lien, and if the contract is a continuing one and payments become due in installments to rescind the contract, refuse to proceed further, and sue the debtor for the amount then due and unpaid. Where payment is made to one of several joint creditors, the debtor is discharged, even though the one to whom he paid it does not account to his fellow creditors. The effect of a valid payment is to discharge the debtor from his obligation. See CREDITOR; DEBTOR; LEGAL TENDER; NEGOTIABLE PAPER. Consult the authorities referred to under CONTRACT.

PAYN, JAMES (1830-98). An English novelist. He was born in Cheltenham; graduated at Cambridge in 1852, and adopted literature as a profession. He contributed largely to periodicals; became coeditor with L. Ritchie of *Chambers's Journal* in 1858, and in the following year was made sole editor, which position he held until 1874. From 1883 to 1896 he was the successor of Leslie Stephen as editor of the *Cornhill Magazine*. The novel *Lost Sir Massingberd* (1864) was the first of his works to attract attention, and after its appearance he published more than one hundred novels, among which are *Cecil's Trust* (1872); *Fallen Fortunes* (1876); *By Proxy* (1878); *A Grape from a Thorn* (1881); *The Heir of the Ages* (1886); *The Eavesdropper* (1888); *Gleanings of Memory* (1894); and *In Mar-*

ket Overt (1895), *Another Burden* (1897), and a collection of essays, *The Backwater of Life* (1899), published posthumously with an introduction by Leslie Stephen.

PAYNE, HENRY B. (1810-96). An American politician and capitalist, born at Hamilton, N. Y. He graduated at Hamilton College in 1832, and two years later began to practice law at Cleveland, Ohio. In 1849 he was elected to the State Senate by the Democrats, and was their candidate for United States Senator in 1851 and for Governor in 1857. At the Charleston convention in 1860 he exerted his influence to check the secession movement and during the Civil War remained a strong Union man. In 1872 he led the Ohio delegation at the Baltimore convention which nominated Horace Greeley for the Presidency. Three years later he was elected to Congress by a fusion of Democrats and Liberal Republicans, and was one of the representatives of the House on the Electoral Commission in 1877. He was elected United States Senator in 1884 and served from 1885 until 1891. He was for many years interested in various industrial, railroad, and mining projects, and accumulated a large fortune.

PAYNE, HENRY CLAY (1843—). An American politician and Cabinet officer. He was born in Ashfield, Mass., was educated at Shelburne Falls Academy, and in 1859 began a business career in Northampton. In 1863 he removed to Milwaukee, Wis., where he successfully engaged in mercantile business. From 1875 to 1885 he was postmaster of Milwaukee. Subsequently he became largely interested in electric railway and lighting companies, effected a consolidation of various competing companies, and became president of the combined corporation. From 1887 he was for several years president of the Milwaukee and Northern Railroad, and in 1893 was appointed one of the receivers for the Northern Pacific Railroad. Meanwhile he was remarkably successful as a political manager; served for many years as chairman of the Republican State Central Committee in Wisconsin; in 1880 became a member of the Republican National Committee, and of its executive committee, and in the Presidential campaigns of 1896 and 1900, as vice-chairman, conducted the Republican campaign in the West. In 1897 he was offered the post of Ambassador to Germany by President McKinley, but declined. In January, 1902, he succeeded Charles Emory Smith as Postmaster-General in President Roosevelt's Cabinet.

PAYNE, JOHN (1842—). An English poet and translator, born August 23, 1842. He was a solicitor by profession, and lived a retired life. He was one of a cluster of Neo-Romantic poets inspired by Rossetti, Morris, and Swinburne. Others of the group are Théophile Marzials (q.v.) and Arthur O'Shaughnessy (q.v.). Payne's verse comprises: *A Manque of Shadows* (1871); *Intaglios*, a sonnet sequence (1871); *Songs of Life and Death* (1872); *Lautrec*, a vigorous narrative poem (1878); and *New Poems* (1880). For the Villon Society he translated Villon's *Poems* (1878); the *Arabian Nights* (9 vols., 1882-84); *Tales from the Arabic* (1885); *Aladdin and the Enchanted Lamp* (1885); Boccaccio's *Decameron*; *Quatrains of Omar Khayyam* (1898); and *Poems of Shemseddin Mohammed Hafiz of Shiraz* (3 vols., 1901).

PAYNE, JOHN HOWARD (1791-1852). An American actor and playwright; best known, however, as the author of *Home, Sweet Home*. Born in New York, he lived in childhood at East Hampton, L. I. Payne showed great precocity. At thirteen years of age, while a clerk in a mercantile house in New York, he secretly edited a weekly paper, *The Theatopian Mirror*. He was a student of Union College, when the bankruptcy of his father interrupted his education, and he decided to go on the stage, as the best means of supporting the family. He made his debut at the Park Theatre, New York, February 24, 1809, as Young Norval in *Douglas*. This enterprise proved an artistic and pecuniary success, and he subsequently appeared before large and enthusiastic audiences in Boston, Philadelphia, and Baltimore. In 1813 he sailed for England, and made his appearance in London at Drury Lane Theatre as Master Payne, 'the American Roscius,' in his original part of Young Norval. His performances were well received by the public. After this he supported himself in England as actor, manager, and playwright, but, owing to his lack of business ability, was often in financial embarrassments. In 1815 Payne published in London a selection of poems called *Lispings of the Muse*. His fugitive writings, besides verse, including many articles in criticism, one of the best known being an essay on "Our Neglected Poets," published in the *Democratic Review* in 1838.

Payne adapted many plays from the French and produced a number of original ones, among them *Brutus, or the Fall of Tarquin*, *Thérèse*, *Virginia*, and the comedy of *Charles II*. The song *Home, Sweet Home*, occurs in his opera of *Clari, or the Maid of Milan*, which was produced at the Covent Garden Theatre in May, 1823. The music was adapted by Henry R. Bishop from an old melody which Payne had heard in Italy. The publishers of this song are said to have cleared 2000 guineas by it within a year, and the opera was very successful; by all this, however, Payne himself profited but little. In 1826-27 he edited in London a periodical called the *Opera Glass*. In 1832 he returned to America. He was appointed American consul at Tunis, Africa, in 1842; was recalled in 1845; and reappointed in 1851. He died there April 9, 1852, and was buried in the Cemetery of Saint George at Tunis. In 1883 his remains were brought to Washington. Consult: Harrison, *John Howard Payne* (new ed., Philadelphia, 1885); Brainard, *John Howard Payne: A Biographical Sketch* (Washington, 1885).

PAYNE, JOSEPH (1808-76). An English educator, born at Bury Saint Edmunds. He was chiefly self-educated, and in 1830 founded a school that developed into the successful Denmark Hill Grammar School for boys. In 1845 he and his wife founded the Mansion House School at Leatherhead and stayed there up to their retirement to Bayswater, London, in 1863. Payne's educational ideas were founded upon those of Jacotot, and he wrote in condemnation of the Eton system. In 1872 he was made the first professor of education at the College of Preceptors. His works were edited by his son, Dr. J. F. Payne, and published in two volumes: *Lectures on the Science and Art of Education* (1883) and *Lectures on the History of Education, with a Visit to German Schools* (1892).

PAYNE, PETER (c.1380-1455). An English Lollard; born near Grantham in Lincolnshire. He studied at Oxford, where he learned Wiclifite doctrines, was principal of Saint Edmund Hall (1410-14), and in 1416 was excommunicated, having failed to appear for trial on the charge of heresy. He fled from England to Prague, where Queen Elizabeth protected him, and where he became a prominent member of the Taborite Party. As such, he appeared in many religious conferences and by his extreme views did much to block a union of quarreling sects. The story of the latter years of his life, which were passed in Bohemia, is full of confusing detail, and it is uncertain whether Payne submitted after the defeat of the Taborites. All of his writings dealt with the defense of Wiclif's teachings. Consult Baker, *A Forgotten Great Englishman* (London, 1894).

PAYNE, WILLIAM HAROLD (1836—). An American educator, born in Farmington, Ontario County, N. Y. In 1858 he was appointed principal of a school in Three Rivers, Mich., and he held the same position in other schools of that State, concluding with Adrian, where he remained ten years, and was then elected to the newly created chair of pedagogy in the University of Michigan (1879). He was chancellor of the University of Nashville, Tenn., and president of the Peabody Normal College from 1888 until 1901, when he returned to the University of Michigan. He wrote: *School Supervision* (1875); *Educational Doctrine* (1882); *Contributions to the Science of Education* (1887); and translated three of Compayré's works: *History of Pedagogy* (1886); *Lectures on Teaching* (1888); and *Elements of Psychology* (1890).

PAYNE, WILLIAM MORTON (1858—). A critic and educator, born in Newburyport, Mass. He was assistant librarian of the Chicago Public Library (1874-76), teacher in Chicago high schools after 1876, literary editor of the *Chicago Morning News* (1884-88), of the *Chicago Evening Journal* (1888-92), and afterwards associate editor of the *Dial*. He is known especially for his criticism of modern literature—English, French, German, Italian, and Scandinavian. His essays are in part gathered in *Our New Education* (1884), *Little Leaders* (1895), and *Various Views* (1902).

PAYNE SMITH, ROBERT (1819-95). An English theologian and Orientalist. He was born at Chipping Campden, Gloucestershire, and entered Pembroke College, Oxford, where he pursued Oriental studies, and took the Sanskrit scholarship in 1840 and a Hebrew scholarship in 1843. After his ordination he spent three years in pastoral work at Crendon, Long Winchenden, and Thame, then became classical master at the Edinburgh Academy and later preached also at Trinity Chapel. In 1853 he went to London as head master of the Kensington proprietary school, and pursued his favorite Oriental studies at the British Museum. In 1857 he became sub-librarian at the Bodleian Library, and here he began his great work, the *Theaurus Syriacus*, the first part of which was published in 1868. From 1865 to 1870 he was regius professor of divinity at Oxford, and in 1869 he delivered the Bampton lectures, published as *Prophecy a Preparation for Christ* (1869). In 1870 he became Dean of Canterbury. His posi-

tion in the Church was one of sympathy with the evangelicals and his popularity extended widely, even in Non-Conformist bodies. For fifteen years he was a member of the Old Testament revision committee. Besides the Syriac lexicon and the Bampton lectures, he published: *S. Cyrilli Alexandriæ Archiepiscopi Commentarii in Lucæ Evangelium Quæ Supersunt Syriace* (1858); *Saint Cyril's Commentary on Saint Luke's Gospel*, in English (1859); *The Third Part of the Ecclesiastical History of John, Bishop of Ephesus, now first Translated from the Original Syriac* (1860); *Catalogi Codicum Manuscriptorum Bibliothecæ Bodleianæ Pars Sexta, Codices Syriacos, Carshunicos, Mendæos Completens*, and commentaries on Daniel, Jeremiah, Samuel, and Genesis.

PAYSANDÚ, pî'sân-doo'. A port of Uruguay, situated on the Uruguay River, 170 miles north of Buenos Ayres (Map: Uruguay, F 10). The city has handsome public buildings, a good system of public schools, a library, and several scientific and benevolent societies. Its principal industry is the preservation of beef for the foreign market, especially ox-tongues, to a brand of which it gives its name. It has regular communication by steamer with Buenos Ayres and Montevideo and is the station of a United States commercial agent. The city is the largest in the country next to Montevideo, and had a population in 1898 of 26,000. Paysandú was founded in 1782. It has played an important part in the civil and foreign wars of the Republic.

PAYSANS, pá'zân', LES (Fr., The Peasants). A gloomy tale by Balzac (1844), of which only the first part appeared before his death. In it he traces the effect produced on economic conditions by the transfer of land-ownership to the peasant class, brought about by the revolutions of 1789 and 1830, and the despoiling of the peasants in turn by the shrewd bourgeois. The strongest character is the usurer Rigou, who is depicted as a scheming, silent, and finally successful sharper.

PAYSON, EDWARD (1783-1827). A Congregational minister. He was born at Rindge, N. H.; graduated at Harvard College in 1803; studied theology with his father, the Rev. Seth Payson, pastor at Rindge; and from 1807 till his death was pastor of the Congregational Church at Portland, Maine. His sermons, published at various times, were much read and gave him a wide reputation. His complete works were published with a memoir by Asa Cummings (3 vols., Philadelphia, 1859).

PAYTA, pí'tá. A seaport of Northern Peru, situated at the head of a bay south of Cape Blanco (Map: Peru, A 5). It is a wretched village of 4000 or 5000 inhabitants, but as a port it is the second in importance in the country, and the harbor is one of the best on the Pacific Coast. It is connected by rail with Piura, the capital of the department, and has an important trade with Guayaquil, the exports amounting to over \$2,500,000 annually. The chief exports are cotton, tobacco, Panama hats, hides, and salt. The town has a United States consular agency.

PAZ, pás, LA. The name of several places in Spanish America. See LA PAZ.

PAZ, püth, ENRIQUEZ DE. A Spanish dramatist, commonly called Enriquez Gomez (q.v.).

PAZAND, pá-zäind', or **PAZEND**. See PAHLAVI LANGUAGE AND LITERATURE.

PÁZMÁNY, päz'mä-ny', PETER (1570-1637). An Hungarian cardinal and author. He was born at Grosswardein of Protestant parents, but went over to the Roman Catholic Church in 1583, and entered the Society of Jesus. He was an ardent Catholic and carried on almost single-handed the work of the Counter-Reformation in Hungary. In 1629 Urban VIII. made him cardinal. For Catholic education in Hungary he did much by the foundation of the Pazmaneum (1623) in Vienna and of several other schools. His published works were edited by Bognár (Budapest, 1894 et seq.). Consult Schwicker, *Peter Pazmány* (Cologne, 1888).

PAZ SOLDÁN, pás sól-dän', MARIANO FELIPE (1821-86). A Peruvian historian and geographer. He was born in Arequipa, studied law there and at Lima, and practiced in both cities. He held high judicial offices in Lima, and was sent to the United States in 1853 to report on penal systems. This mission resulted in the foundation of a detective bureau in Peru and of great improvements in the prisons of the country. Paz Soldán held for many years the post of director of public works. He wrote: *Atlas geográfico del Perú* (1861); *Historia del Perú independiente* (1866); *Diccionario geográfico estadístico del Perú* (1877); and *Historia de la Guerra del Pacífico* (1884).

PEA (modern singular of *pease*, AS. *piec*, *piose*, *pea*, from Lat. *pisum*, Gk. *πίσος*, *pisos*, *πύσος*, *pison*, *pea*), *Pisum*. A genus of plants of the natural order Leguminosæ. The common pea or garden pea (*Pisum sativum*) and the field pea (*Pisum arvense*) are natives of the south of Europe and of Asia. They are both climbing annuals, with pinnate leaves, ovate leaflets, and branching tendrils in place of a terminal leaflet. Peas have been cultivated in the East from time immemorial, and were apparently introduced into Europe very early in the Middle Ages. Their cultivation extends from warm climates, as India, to the cooler regions of the North. The seeds of the garden pea are used for culinary purposes both in a green and in a ripe state. There are two main types of garden peas, those having smooth round seeds, and those with wrinkled seed. The former are the earlier and hardier. The wrinkled varieties are better in quality. Some varieties have edible pods. The green succulent pods of these are eaten in much the same manner as green beans. These are grown to a considerable extent in Europe and offered by seedsmen in America, but are not popular. There are innumerable varieties both of the field pea and of the garden pea. Some of the latter have long stems, and require for their support stakes of six or eight feet in height; others are of humbler growth; and certain dwarf kinds, preferred as most convenient in many gardens, succeed very well without stakes. The largest kinds are sown in rows about four feet apart. A calcareous soil is desirable, but good crops are secured on almost any good wheat or maize soil. Peas are cultivated to a considerable extent as a field crop in the Northern United States and Canada, and both the grain and

straw are used in feeding stock. The plant withstands light frosts, and may therefore be grown as early in spring as the ground can be worked. Semi-dwarf varieties are preferred for field culture, since they lodge less and the crop is more easily harvested.

A plant found on some parts of the shores of Great Britain, as well as of Continental Europe and North America, known as the sea pea, has been commonly referred to the genus *Pisum*, and called *Pisum maritimum*, although botanists now generally refer it to *Lathyrus*. It much resembles the common pea; has large reddish or purple flowers on many-flowered stalks; and its seeds have a disagreeable bitter taste. The other species of *Pisum* are few. But the name pea is often given to species of other papilionaceous genera. The sweet pea (q.v.) and everlasting pea are species of *Lathyrus*. The chick pea (q.v.) is a species of *Cicer*.

FOOD AND FEEDING VALUE. Both green and dried peas are much used as articles of diet. The shelled green pea has the following average percentage composition; water, 74.6; protein, 7.0; fat, 0.5; total carbohydrates, 16.9; and ash, 1.0. Dried peas have the following percentage composition: water, 9.5; protein, 24.6; fat, 1.0; total carbohydrates, 62.0; and ash, 2.9. Dried peas are used for soups and purées, cooked in other ways, and sometimes baked like beans. They are rich in protein, and, being readily digested if cooked soft, are a valuable food. As food, green peas are especially prized for their delicate flavor, which is retained when they are properly canned. The varieties with edible pods (pods and seeds) have the following percentage composition: water, 81.8; protein, 3.4; fat, 0.4; total carbohydrates, 13.7; ash, 0.7. Pea meal is too sodden to be fed alone, and should always be mixed with bran, ground oats, or corn meal. Pea vines have the following percentage composition: water, 15.0; protein, 13.7; fat, 2.3; nitrogen-free extract, 37.6; crude fibre, 24.7; and ash, 6.7. In Northern regions peas, especially when ground, replace corn to some extent, and, on account of the large amount of protein they contain, have a high feeding value. See **PEA INSECTS**. See **Plates of FLOWERS**; **USEFUL LEGUMES**.

PEABODY. A town, including several villages, in Essex County, Mass., two miles west of Salem; on the Boston and Maine Railroad (Map: Massachusetts, F 2). It has the Peabody Institute, with a library of 37,000 volumes, established in 1852 by George Peabody, and the Eben Dale Sutton Reference Library. There is a public park (Emerson). The Essex County Agricultural Society is permanently established in Peabody. The city is a manufacturing centre of considerable importance, its products including leather, morocco, shoes, gloves, leather-working machinery, thermometers, electrical supplies, marine hardware, glue, etc. The government is administered by town meetings. There are municipal water-works and a municipal electric light plant. First a part of Salem and then of Danvers, Peabody became a separate town under the name of South Danvers in 1855. In 1868 its present name was adopted in honor of George Peabody, who was born here and lived here for some years. Population, in 1890, 10,138; in 1900, 11,523.

PEABODY, ANDREW PRESTON (1811-93). A Unitarian clergyman. He was born at Beverly, Mass., graduated at Harvard college in 1826, studied in the divinity school, and was tutor in mathematics there. In 1833 he was settled over a Unitarian church in Portsmouth, N. H., where he remained till 1860, when he became Plummer professor of Christian morals and chaplain of Harvard University, retaining this position till 1881. He edited the *North American Review* (1854-63). Among his numerous works are *Lectures on Christian Doctrine* (1844); *Reminiscences of European Travel* (1868); *Manual of Moral Philosophy* (1873); *Christianity and Science* (1874; new ed. 1890); *Christian Belief and Life* (1875); *Moral Philosophy* (1887); *Harvard Reminiscences* (1888); *Harvard Graduates Whom I Have Known* (1890). Consult the memorial sermon by James De Normandie (Boston, 1893).

PEABODY, CECIL HOBART (1855-). An American mechanical engineer, born in Burlington, Vt. He graduated in the department of mechanical engineering at the Massachusetts Institute of Technology in 1877, and in 1893 became professor of marine engineering and naval architecture there. In the interval he had been professor of mathematics in the Sapporo Imperial Agricultural College of Japan (1878), and assistant professor of mechanical engineering in the University of Illinois, and of steam engineering in the Boston Institute. His publications include: *Thermodynamics of the Steam Engine* (1889); *Valve Gear for Steam Engines* (1892); *Steam Boilers* (with Miller, 1897); and *Manual of Steam Engine Indicator* (1900).

PEABODY, ELIZABETH PALMER (1804-94). An American educator, born at Billerica, Mass. She was for a time connected with the school of Amos Bronson Alcott, in Boston, of which she wrote an account entitled *A Record of Mr. Alcott's School* (3d ed. 1874); but later she came under the influence of Friedrich Fröbel (q.v.) and was one of the most active in introducing the kindergarten system into the United States. She published a number of works, including: *Crimes of the House of Austria* (1852); *Kindergarten Culture* (1870); *Kindergarten in Italy* (1872); *Reminiscences of Dr. Channing* (1880); and *Letters to Kindergarteners* (1886).

PEABODY, EPHRAIM (1807-56). A Unitarian divine. He was born at Wilton, N. H.; graduated at Bowdoin College 1827, and at the Harvard Divinity School 1830; was settled over a Unitarian church in New Bedford (1838-46), when he became pastor of King's Chapel, Boston, where he remained till his death. He was the founder of the Boston Providence Society. His sermons, with a memoir, appeared in Boston in 1857, and a selection from his writings in 1858 entitled *Christian Days and Thoughts*.

PEABODY, FRANCIS GREENWOOD (1847-). An American clergyman and theologian, born in Boston. He graduated at Harvard in 1869, and in divinity three years later, was pastor of the First Parish Church in Cambridge, Mass., from 1874 until 1881, when he became Parkman professor of theology in the Harvard Divinity School. Five years afterwards he was appointed Plummer professor of Christian morals at Harvard University. His publications include:

Short Addresses to Young Men on Personal Religion (1896); *Afternoons in the College Chapel* (1898); and *Jesus Christ and the Social Question* (1900).

PEABODY, GEORGE (1795-1869). An American merchant and philanthropist, born February 18, 1785, in a parish of Danvers, Mass. (now known as Peabody). Dependent upon himself for support, he went at the age of sixteen or seventeen to Georgetown, D. C., where, in 1813, he became associated with Elisha Riggs, a wholesale dry goods merchant in Georgetown. Twice during the War of 1812 he was a volunteer in the defense of his country. The firm removed to Baltimore in 1815, and afterwards established branches in New York and Philadelphia. In 1829 Peabody became the head of the firm and continued to reside in Baltimore during the next few years. In 1835, as one of three commissioners of the State of Maryland, he negotiated in London a loan of \$8,000,000 and declined to receive the large commission to which he was entitled. Later (retaining a branch in Baltimore) he founded the house of George Peabody and Company in London, and there he remained until his death. During his long absence from the United States he maintained the liveliest interest in his native land. This was shown by a liberal gift to promote the American exhibit in the World's Fair of 1851; by a contribution for the second Kane expedition to the Arctic seas; and by a series of banquets on Independence Day, which were attended not only by his countrymen, but by Englishmen of official rank and of other distinctions. During the latter years of his life his gifts increased in amount and were devoted to a great variety of purposes. To his native place he gave about \$200,000 to found the Peabody Institute and Library, and to North Danvers \$50,000 for a like institution. To the publication funds of the Massachusetts Historical Society and the Maryland Historical Society he contributed \$20,000 each, and to the Peabody Academy of Sciences in Salem, Mass., \$140,000. To Harvard and to Yale he gave \$150,000 each, for the establishment in Cambridge of a museum of archaeology, and in New Haven of a museum of natural history. Phillips Academy at Andover, and Kenyon College, in Ohio, received \$25,000 each. During the Civil War he gave \$10,000 to the United States Sanitary Commission. Three other gifts transcended those which we have already named. As a token of affection to the city of Baltimore, where he laid the foundation of his fortune, he gave more than a million and a quarter of dollars to found the Peabody Institute, which comprises a library, an art gallery, a conservatory of music, and arrangements for the delivery of public lectures and for the bestowal of prizes in the public schools. To the city of London he gave two and a half millions of dollars for the construction of lodging houses—a fund which has since increased enormously. To a separate board, known as the Trustees of the Peabody Educational Fund, he gave more than \$3,000,000 to promote education in the Southern States. This is perhaps the most influential of all his gifts. Such munificence, then without parallel, brought him gratitude and honor from England and the United States. The Queen offered to make him a baronet, or to give him the Grand Cross of the Bath;

but he declined both honors, and expressed a preference for a letter from the Queen, which he presently received and placed in the Institute at Danvers. Congress caused a gold medal to be struck in acknowledgment of his gifts for education, which had aggregated about \$7,000,000. Oxford made him a D.C.L. in 1867.

George Peabody was never married. His death occurred in London, November 4, 1869. His body was brought to the United States by H.M.S. *Monarch*, convoyed by a French and an American vessel, and received by an American squadron. Many eulogies were delivered, of which the most important are those of Robert C. Winthrop (Boston, 1870), S. T. Wallis (Baltimore, 1870), Edward Everett (*Orations*, vol. iii., Boston, 1869), and H. W. Foote (Boston, 1869). A biography has also been published by Phoebe A. Hanaford (Boston, 1870), and a *Brief Sketch* by J. L. M. Curry (Cambridge, 1898). A bronze statue of Peabody, by William W. Story, stands near the Royal Exchange in London and a replica of it in front of the Peabody Institute in Baltimore.

PEABODY, SELIM HOBART (1829—). An American educator, born at Rockingham, Vt. He graduated at the University of Vermont in 1852, and during the following years held professorships of mathematics, physics, and engineering at several colleges. From 1880 until 1891 he was president of the University of Illinois, and in 1893 was chief of the department of liberal arts at the World's Columbian Exposition. In 1899-1900 he was editor and statistician of the United States Commission to the Paris Exposition, and in 1900 superintendent of the division of liberal arts at the Pan-American Exposition. From 1892 to 1895 he was president of the Chicago Academy of Sciences, and from 1889 to 1891 president of the National Council of Education.

PEABODY-BIRD (named from the Peabody Glen in the White Mountains). A local name in New England for the white-throated sparrow (*Zonotrichia albicollis*). It is one of the largest and handsomest sparrows of North America, second in size only to the fox-colored sparrow, from which it differs markedly in color. The peabody-bird is variegated brown, black, and white above, clear gray beneath, with a pure white throat, and prominent black, white, and yellow stripes on the head. It breeds from northern Michigan and New England northward to Labrador, and winters from New England to Florida. It is most remarkable for its very agreeable, though brief, song, consisting of two low soft notes followed by a thrice-repeated triple note clearly whistled. In Massachusetts it is usually interpreted as *I—I, Pea-bod-y, Pea-bod-y, Pea-bod-y*; in Maine, *All day, whit-tle-ing, whit-tle-ing, whit-tle-ing*; in Canada, *Swe-et Can-a-da, Can-a-da, Can-a-da*.

PEABODY COLLEGE FOR TEACHERS. A coeducational training school in Nashville, Tenn., founded in 1875 through a benefaction of \$1,000,000 by George Peabody, planned to foster the cause of intellectual development in the South. Dr. Barnas Sears, president of Brown University, became the agent for putting the plan into practical operation, and soon realized the necessity of establishing a college for the specific purpose of training teachers for the

public schools. Nashville was selected as the most favorable location, and upon the offer of the trustees the buildings and endowment of the University of Nashville were accepted as a foundation. The college was opened with thirteen students, under the presidency of Dr. Eben S. Stearns, who was succeeded in 1887 by Dr. William H. Payne. James Davis Porter became president in 1901. The development of the institution has been rapid, as shown by the increase in students from 178 in 1887 to 607 in 1901, when there were 36 instructors. The degree of licentiate of instruction is conferred by the college, and makes the holder eligible without examination for any teaching position in the State. The university confers the degrees of bachelor and master of arts, sciences, and letters. The college is supported by the State, the University of Nashville, and the Peabody Board, which maintains nearly two hundred scholarships, distributed by the general agent of the Peabody Fund. The holder of a scholarship, which is good for two consecutive years, receives \$100 per year, and railroad fare to Nashville and return. The college is equipped with well-arranged studios, laboratories, a gymnasium, and a library containing, in 1903, 20,000 volumes. The Winthrop Model School affords opportunity to the students to observe methods of teaching in actual application. In 1902 the building and grounds were valued at \$200,000, and the income was about \$80,000.

PEABODY EDUCATIONAL FUND. A fund founded in 1867 by George Peabody (q.v.) for the purpose of promoting "intellectual, moral, and industrial education in the most destitute portion of the Southern States." The gift of foundation consisted of securities to the value of \$2,100,000, of which \$1,100,000 were in Mississippi State bonds, afterwards repudiated. In 1869 an additional \$1,000,000 was given by Mr. Peabody, with \$384,000 of Florida bonds, also repudiated later. The trustees, chosen from the most prominent public men in the United States, had authority to expend forty per cent. of the principal during the first two years, after which the amount was to remain unchanged for thirty years, when the fund might be used and distributed for educational purposes. The main purpose of the fund was to aid elementary education, and that by strengthening existing schools rather than by founding new ones. Only schools having an attendance of more than 100 and a school period of ten months were to be aided. To such schools \$300 was to be given; to those having an attendance of 200, \$600 was given; and to those having an attendance of 300, \$1000 was given. All grants were made on condition that the district contributed twice as much as the Peabody Board, and in all cases the board worked in unison with State and local school authorities. Especial attention was given to the support of normal schools, particularly those on independent foundations. Scholarships were granted to numerous students of \$200 in value, later of \$100 and traveling expenses. In 1875 the Peabody Normal School was established at Nashville, Tennessee. The annual distribution of the products of the funds averages about \$75,000 per year, and in the thirty years of the Fund, terminating in 1898, a total of more than \$2,500,000 was distributed. The States benefited were Alabama, Arkansas, Florida,

Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas, Tennessee, Virginia, and West Virginia.

Consult: *Reports of the Peabody Educational Fund* (1867 to date), and Dr. J. L. M. Curry's *History of Peabody Educational Fund* (Cambridge, Mass., 1898).

PEACE (OF. *pais*, *paiz*, Fr. *paix*, from Lat. *pax*, peace; connected with *pangere*, Gk. *πηνύω*, *pēgnynai*, to fasten, Skt. *pāśa*, bond, and perhaps with Goth., OHG. *fahan*, AS. *fōn*, Ger. *fangen*, to seize, take). In law, in a general sense, the internal good order of a community that is violated by the commission of offenses against the law. This general sense is expressed in England by the phrase the 'King's peace,' and in the United States it is commonly called the 'peace of the State or Commonwealth.' It is also sometimes called the 'public peace.' Originally the expression 'the King's peace' was used in a narrower sense with reference to the sanctity of the King's house, or to the special protection of the King's servants, or those to whom he had accorded the same protection.

This general good order or peace was in the earlier days protected only by the hundred court and the ealdormen; but the present special peace officers are the conservators of the peace (in England), justices of the peace, constables, and sheriffs (qq.v.).

Offenses against the public peace are criminal offenses, also known as breaches of the peace, the wrongfulness of which consists either in an act by the offender which is an actual disturbance of public peace and order, as in the case of riot or affray, or an act which is a constructive rather than an actual disturbance of the peace in that it has a tendency only to cause public disturbance or disorder, as unlawful assembly, or seditious libel.

The more common forms of offenses against the peace are riot, affray, forcible entry and detainer, unlawful assembly, challenge to fight, and seditious libel. In addition to these well-defined offenses, there are other offenses against the peace, having no specific name, which are punishable as misdemeanors. Thus, in some States the malicious killing of another's horse and the causing of a disturbance in the home of another have been held to be offenses against the peace.

Forcible entry and detainer is strictly not an offense at common law. It was made so, however, by an early English statute, and is now regarded as a common-law offense.

Seditious libel is an offense against the peace as tending directly to a breach of the peace by giving affront to public opinion, as by libels vilifying officers of the Government, the courts of justice, or even the sovereign or chief officers of a foreign government.

Ordinary libels are also sometimes classified as offenses against the public peace, but they are more properly considered as an independent class of offenses. Consult the authorities referred to under **CONSTABLE**; **LAW, CRIMINAL**; also Inderwick, *The King's Peace* (London, 1895); Pollock, *The King's Peace*; Pollock and Maitland, *History of English Law* (2d ed., London and Boston, 1899). See **AFFRAY**; **BREACH (of the Peace)**; **FORCIBLE ENTRY AND DETAINER**; **CONSTABLE**; **JUSTICE OF THE PEACE**, etc.

PEACE CONFERENCE. See **HAGUE PEACE CONFERENCE**.

PEACE CONVENTION. The name given to a convention held in Washington, on the invitation of Virginia, in February, 1861, just before the outbreak of the Civil War, for the purpose of arranging a peaceful settlement of the difficulties between the North and the South. Fourteen free States and seven slave States were represented, and each State was allowed only a single vote. Ex-President Tyler presided over the convention. A committee, upon which each of the twenty-one States was represented, submitted a report, which was adopted, recommending the adoption of certain specified amendments to the Federal Constitution. These amendments generally favored the South, but were not wholly satisfactory to either section, and were not favorably received by either House of Congress. A number of prominent political leaders of the time were members of the convention.

PEACE OF GOD. An attempt of the Church in the latter part of the tenth century and early part of the eleventh century to do away with private warfare. Various synods in France sought to compel persons who were accustomed to bear arms to agree not to use them, but to submit their differences to the judgment of regular tribunals. The method of enforcing these decrees was by spiritual penalties. The whole scheme proved a failure, partly because the nobles loved fighting too well, partly also because there were no tribunals suited to judge differences arising between the nobles. The Church thereupon substituted the so-called Truce of God (q.v.).

PEACE RIVER. One of the largest tributaries of the Mackenzie system, in Western Canada (Map: Canada, F 5). It rises in the north central part of British Columbia, and flows east through the Rocky Mountains, then northeast through Athabasca Territory until it joins by several arms the Great Slave River at the western end of Lake Athabasca. Its length is about one thousand miles, but, though of navigable depth through most of its course, it is obstructed by a number of rapids. Its valley is fertile.

PEACH (OF. *pesche*, Fr. *pêche*, It. *pesca*, *persica*, from Lat. *persicum*, from Gk. *περσικόν*, *persikon*, peach, neu. sg. of *Περσικός*, *Persikos*, Persian, from *Περσίς*, *Persis*, OPers. *Pārsa*, Persia; so called because the first peaches known to the Greeks came from Persia). A deciduous orchard fruit believed to have originated in China, where it has been cultivated from very remote times. It was early introduced into Europe by way of Persia, hence its specific name, *Prunus Persica* (order Rosaceæ). The peach is a small, much branched tree, 15 to 20 feet high, with lanceolate leaves, triplicate buds usually at each node, the two outer of which are flower buds and the middle one a leaf bud, and flowers which usually blossom before the leaves appear. The fruit is a drupe, varying much in size and color of flesh and downy skin. Peaches have been variously classified. Popularly they are separated into two groups—clingstones and freestones. These two classes gradually merge into each other in the different varieties, and even the same variety may be a clingstone or a freestone in different seasons. Price has classified the nearly 300 varieties of peaches grown in North America into the following five races: (1) Peen-To, a flat, medium-sized, greenish white, very early peach, suited for commercial culture

only in Florida and some of the Gulf States. (2) South China race. Rather small, oval, somewhat flattened fruit, with an extended recurved apex. (3) Spanish or Indian race. Fruit late, nearly always yellow, with a hairy down. (4) North China race. Fruit large, oval, with slightly recurved beak. (5) The Persian race, which includes the great majority of large, yellow or white fleshed varieties grown in the Northern United States. Certain smooth-skinned peaches are popularly called nectarines. They may originate as seedlings or bud variations ('sports'), and may be propagated and cultivated like other varieties of the peach.



PEACH BLOSSOMS AND LEAVES.

In America peaches are grown in orchards like apples; in England and Middle Europe they are usually trained against walls, or other protection, cultivated in pots and under glass. The tree is hardy, withstanding a winter temperature of -12° to -18° F. Should a few warm days occur in winter and the fruit buds start into growth, they may be easily killed at a much higher temperature. The chief difficulty in peach-growing arises from the danger from late spring frosts. The peach, like the almond, blossoms early unless held in check by cool spring weather or some artificial means; hence, there is often more difficulty in growing peaches in the South than in the North. These facts tend to confine the commercial culture of peaches to particular localities. In America the peach regions include certain more or less continuous areas from Connecticut to Georgia, the eastern and southern shores of the Great Lakes, much of southern Illinois, parts of Missouri, Kansas, and eastern Texas, and nearly the whole of California. Of these different peach areas the most widely known are those located in Maryland, Delaware, Georgia, and Michigan.

Peaches are propagated from seed, which is usually stratified with moist sand in the fall, and left exposed to the freezing and thawing of winter, which softens and cracks the pits. In spring the pits are planted 6 to 8 inches apart in rows wide enough to admit of horse cultivation, and the following August or September the seedlings are budded with improved varieties, since the

peach does not, except in a few instances, reproduce true to seed. (See BUDDING.) In the Southern States the seedlings are often budded in June, and the budded trees are set in the orchard in the fall or following spring. In the North trees budded one fall are allowed to grow the following season before transplanting to the permanent orchard. Peaches thrive best on light, sandy, gravelly, or shaly soils, though larger trees are grown on heavier soils. High or rolling lands are desirable to insure good soil and air drainage, for the peach must be planted in protected localities free from late spring frosts. Early blooming is sometimes delayed by planting on northern or northeastern slopes. Thoroughly whitewashing the trees in fall or winter also has a tendency to delay blossoming. The trees are usually set in the orchard about 20 feet apart each way, though where careful attention is given to pruning and fertilizing, as in some commercial orchards, they may be set as close as 15 feet apart each way. The peach is not a long-lived tree, even under the most favorable conditions, seldom exceeding thirty years. The life of a commercial orchard is seldom more than seven to nine years. The trees come into bearing about the third year after setting in the orchard. The best peach-growers advocate clean cultivation in the orchard up to about the middle of summer, when a cover crop is sown and cultivation stopped. Trees thus treated ripen up their wood better and are less likely to winter-kill than if cultivated longer in the season. Potash and phosphatic fertilizers are most in demand in the peach orchard. By planting leguminous cover crops and turning these under each spring other nitrogenous fertilizers will seldom be required. Barnyard manure is not considered desirable in the peach orchard unless the land is very poor. It affects the quality of the fruit unfavorably and is likely to produce a rank unripened growth of wood.

Commercial peach-growers quite generally thin their peaches to stand 5 or 6 inches apart after the usual 'June drop' occurs. Peaches are borne only on wood of the preceding season's growth; hence by carefully heading back this new growth each spring they are really thinned in part at the same time. In heading in it is customary to remove about one-half of the new wood growth of the previous season. In harvesting, the fruits are gathered when full grown and well colored, but before they begin to soften, graded according to size, and marketed in various forms of small packages. Besides being extensively used as a dessert fruit, peaches are canned in enormous quantities, evaporated, and sold as dried peaches, and also used to some extent in the manufacture of peach brandy.

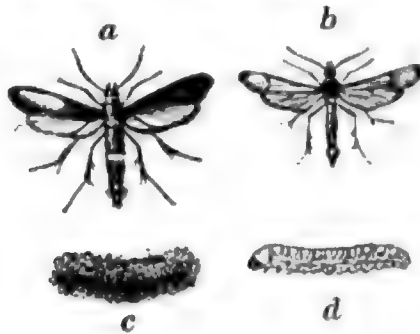
PEACH DISEASES. Among the most serious fungous troubles of the peach are the black spot and the brown or fruit rot. The black spot (*Cladosporium carpophilum*) causes dusky brown or black spots on the side of the fruit. These spots are individually seldom more than $\frac{1}{8}$ inch in diameter, but by coalescence often injure a large area. The tissues underneath become affected and hard, and the peach lop-sided, often cracked. The brown rot (*Monilia fructigena*), which also attacks cherries and plums, causes the rotting of all these fruits as they are ripening, and is one of the most serious diseases to which they are subject. The affected fruits, which turn brown

and appear decayed, soon become covered by an ash-colored coating of spores. The disease spreads rapidly, especially among early varieties. The twigs are also likely to be destroyed, and where the flowers are attacked, which evidence seems to show may happen, no fruit is set. These diseases may be largely prevented by thorough spraying with Bordeaux mixture. (See FUNGICIDE.) The fungicide should be diluted about one-third, because the foliage of the peach is very subject to injury from the copper compounds used in spraying. One of the most injurious fungous diseases of the peach tree and foliage is the leaf-curl, due to *Exoascus deformans*. This fungus attacks the leaves, defoliating the tree. Its presence may be ascertained by the occurrence of reddish or yellowish blisters upon the leaves, which become curled or crumpled. This disease is more prevalent in damp, foggy regions than in dry, airy ones. It can be prevented by applying Bordeaux mixture of full strength to the trees before the buds begin to swell, followed after the leaves appear with a single application of the same fungicide, diluted as above. Two diseases of unknown cause are peach rosette yellows. In rosette the twigs are stunted and the leaves bunched in rosettes. It is mostly confined to the South. The yellows is also shown in the appearance of the leaves. They are narrow, tufted, and of a yellowish color. The fruit ripens prematurely and is streaked through the flesh with red. Both of these diseases are contagious, and diseased trees should be dug out and burned as soon as discovered. Badly infested regions have been rid of the disease in this way.

BIBLIOGRAPHY. For a classification of peaches see Price, *The Peach* (Texas Agricultural Experimental Station, Bulletin 39); Hume, *A Monograph of the Peen-To Group of Peaches* (Florida Agricultural Experimental Station, Bulletin 62); Powell, *A Monograph of the Chinese Cling Group* (Delaware Agricultural Experimental Station, Bulletin 54); Gould, *Peach Growing in Maryland* (Maryland Agricultural Experimental Station, Bulletin 72); Taft, *Peach and Plum Growing in Michigan* (Michigan Agricultural Experimental Station, Bulletin 103); Davis, *Peach Growing in West Virginia* (West Virginia Agricultural Experimental Station, Bulletin 82); *The Peach*, Kansas State Horticultural Society (Topeka, 1899); Fulton, *Peach Culture* (New York, 1899); Smith, *Peach Growing for Market* (United States Department of Agriculture, Farmers' Bulletin No. 33). See PEACH INSECTS. See Colored Plate of DRUPES.

PEACH'AM, HENRY (c.1576-c.1643). An English author, born at North Mimms, Hertford, and educated at Trinity College. In 1606 he published his first volume, *Graphice, or the . . . Art of Drawing with the Pen and Limning in Water Colors*. That he was a fair draughtsman is clear from his illustrations in *Minerva Britannica* (1612), a work on heraldry. After two years of foreign travel, he settled in London, made the acquaintance of Ben Jonson and John Selden, and became well known in literary circles. His best known works are: *The Compleat Gentleman* (1622), of which many editions were published; *The Art of Living in London* (1642); and *The Worth of a Penny, or a Caution to Keep Money* (1641, with imprint, 1647).

PEACH INSECTS. The principal enemy of the peach in the United States is the peach-tree borer, which is the larva of a sesiid moth (*Egeria exitiosa*). The moth, which has partly transparent wings and closely resembles a wasp, is a day flier. It appears in the Northern United States and Canada from about the middle of



PEACH-TREE BORER.

Stages of *Egeria exitiosa*: a, adult female; b, adult male; c, cocoon; d, caterpillar.

July to August; in the South, much earlier. Its eggs are laid on the bark of the peach-tree near the surface of the ground. As soon as the larva has hatched it works downward in the bark to the root, forming a tunnel which soon becomes filled with gum. As the larva increases in size, it devours the bark and sap-wood, causing an exudation of gum which ultimately makes a thick mass about the base of the tree. Larvæ of different sizes may be found all through the fall and winter months, and the full-grown ones transform into pupæ within pod-like cases made from the castings mixed with gum and threads of silk. The pupa state lasts about three weeks or more. This insect is not confined absolutely to peach, but sometimes occurs upon plum, and the

presence of the larvæ is readily detected by the exudation of gum, when they may be either removed by hand or, after some scraping, the application of hot water is effective to some degree. The best remedy, however, consists in protecting the lower part of the trunk of the tree by a band made of stiff paper or straw.



PEACH-TWIG BORER.

a, a new shoot of peach withering from attack of larvæ of *Anarsia lineatella*; b, the larva (enlarged).

The peach-twig borer (*Anarsia lineatella*) is a moth whose hibernating larvæ injure the trees in early spring, when they bore into the shoots of new leaves, killing the growing terminals and preventing the development of the branch. It is an Old World insect, which has done vast damage on the Pacific coast, and somewhat in the East. It also attacks related fruit trees.

The fruit-tree bark-beetle (*Scolytus rugulosus*) frequently damages the peach, making small holes like shot-holes through the bark. The beetles will lay their eggs by preference in devitalized trees, but will occasionally attack healthy trees. Where this insect is abundant it will be well to girdle one or more trees to be used as traps. The issuing beetles will lay their

eggs by preference in the trees thus injured and later they may be cut down and burned.

The San José scale is a serious enemy to the peach (see SAN JOSÉ SCALE), while the peach-tree bark-louse (*Lecanium persicæ*) is another scale-insect enemy of this tree. The leaves are attacked by the New York weevil (*Ichthyocerys noveboracensis*) and by the peach-tree leaf-roller (*Ptycholoma persicana*), as well as by the larva of *Callimorpha lecontei*. Spraying with an arsenical poison is a remedy against these insects. The peach-tree aphid (*Myzus persicæ*) and the black peach-aphid (*Aphis persicæ-niger*) are the only other enemies of any importance. These are combated by kerosene emulsion.

Consult Saunders, *Insects Injurious to Fruits* (Philadelphia, 1889), and the various circulars and bulletins of the Division of Entomology, United States Department of Agriculture, especially *Farmers' Bulletin No. 80*.

PEACH TREE CREEK, BATTLE OF. A battle fought on July 20, 1864, near Atlanta, between a part of the Federal Army, under General W. T. Sherman and a part of the Confederate Army of the Tennessee, under Gen. John B. Hood. General Joseph E. Johnston had foreseen that General Sherman would probably divide his army in the neighborhood of Atlanta, and had planned to attack at Peach Tree Creek, less than ten miles north of Atlanta, and, if repulsed, to fall back to intrenchments nearer the city. When General Hood succeeded General Johnston, on July 18th, he adopted the plan and ordered General Hardee and General A. P. Stewart to attack the Federal right, consisting of the Army of the Cumberland, under General George H. Thomas, while crossing the stream, July 20th. General Cheatham was to prevent General McPherson from coming to the aid of General Thomas. The attack was ordered to be made at 1 p. m., but was delayed until 4 p. m., by which time the Federal troops had crossed and thrown up rough intrenchments. The artillery was well handled and a furious attack was repulsed with great slaughter. Meanwhile General McPherson had advanced more rapidly than was expected, and General Hood withdrew General Cleburne's division from General Hardee to oppose him, and a further attack was useless. The Federal troops engaged amounted to 21,655 and the Confederate to 20,250. The Federal loss in killed, wounded, and prisoners was 1600; the Confederate, 2500. The result of this battle was to hasten the fall of Atlanta. Consult Johnson and Buel (ed.), *Battles and Leaders of the Civil War*, vol. iv. (New York, 1887).

PEACOCK (from *pea*, AS. *pawa*, from Lat. *pavo*, peacock, connected with Gk. *ραός*, *taos*. Pers., Ar. *taurus*, *taus*, peacock + *cock*, AS. *coc*. Bret. *kok*, Alb. *cocos*, Skt. *kukkuta*, *cock*, onomatopoeic in origin), or **PEAFOWL**. A kind of pheasant of which only two species are known, natives of the East Indies; birds of a large size, and somewhat remarkable for magnificence of plumage. The bill is of moderate size, somewhat arched toward the tip; the cheeks nearly naked; the head crested; the tarsi rather long, and armed with a single spur; the wings short; the upper tail-coverts prolonged far beyond the tail and forming a splendid train capable of being erected and spread out into a great disk, the true tail being at the same time erected to sup-



1 PEACOCK - PAVO CRISTATUS
 2 GUINEA FOWL - NUMIDA MELEAGRIS
 3 VULTURINE NOVA GUINEA FOWL - NUMIDA VULTURINA
 4 DOMESTIC TURKEY - MELEAGRIS GALLOPAVO
 5 WILD TURKEY - MELEAGRIS GALLOPAVO
 ALL ABOUT 1/2 NATURAL SIZE

port it. The common peacock (*Pavo cristatus*) has for crest an aigrette of 24 upright feathers, with slender almost naked shafts and broad tip. The tail consists of 18 brown stiff feathers, and is about six inches long. The train derives much of its beauty from the loose barbs of its feathers, while their great number and unequal length contribute to its gorgeousness, the upper feathers being successively shorter, so that when it is erected into a disk the eye-like or moon-like spot at the tip of each feather is displayed. The blue of the neck; the green and black of the back and wings; the brown, green, violet, and gold of the tail; the arrangement of the colors, their metallic splendor, and the play of color in changing lights, render the male peacock an object of universal admiration—a sentiment in which the bird himself seems to participate, as he struts about to display himself. When the disk is erected, the peacock has the power of rattling the shafts of its feathers against one another in a very peculiar manner, by a strong muscular vibration. The peahen is much smaller than the adult male bird, has no train, and is of dull plumage, mostly brownish, except that the neck is green. Individuals with white plumage not infrequently occur, in which even the eye-like spots of the tail are but faintly indicated; and pied peacocks have the deep blue of the neck and breast contrasted with pure white. The ‘japanned peacock’ (*Pavo nigripennis*) is probably a variety; it has deep blue wing-coverts and the female is grayish white.

The peacock is generally supposed to have been known to the Hebrews in the time of Solomon, but it is not certain that the word commonly translated ‘peacocks’ in the account of Solomon’s importations from Tarshish (II. Chronicles ix. 21) does not signify *parrots*. It is commonly stated that it first became known to the Greeks on the occasion of Alexander’s expedition to India, but Aristophanes mentions it in plays written before Alexander was born. It has taken a considerable part in the folk-lore and religious history of most peoples familiar with it. It is regarded as sacred by various Indian castes, was made the emblem of certain classic divinities, and its plumes are still thought ‘unlucky’ by many persons. The peacock became common among the Greeks and Romans; a sumptuous banquet in the latter days of Roman greatness was scarcely complete without it; and wealth and folly went to the excess of providing dishes of peacocks’ tongues and peacocks’ brains. Throughout the Middle Ages, also, a peacock was often presented at the tables of the great, on state occasions, the skin with the plumage being placed around the bird after it was cooked.

The peacock is now common in most parts of the world; generally kept, however, except in warm countries, for ornament rather than profit, although both the flesh and the eggs are very good. It readily partakes of all the ordinary food provided for the poultry yard, and is fond of buds and succulent vegetables. It is hardy enough even in cold climates, except that few eggs are laid and the young are difficult to rear. The adult birds sit on trees or on the tops of houses or stacks during the keenest frosty nights, never, if they can avoid it, submitting to the confinement of a house. A sketch of its history in civilization will be found in Stallybrass’s English translation (London, 1891) of

Hehn’s work entitled *Cultivated Plants and Domestic Animals in Their Migrations*.

Peacocks are found wild in almost all parts of India and Siam. In general habits they resemble other pheasants. They roost at night in trees, for safety, but find their food and make their nests on the ground. When alarmed on the ground the bird cannot readily take wing, and is sometimes run down by dogs or by horsemen. The female lays about ten eggs, dirty brown in color. The other species is the Javanese peacock (*Pavo muticus*), a native of some of the southeastern parts of Asia and neighboring islands. It is nearly equal in size to the common peacock, but of perhaps more brilliant although very similar plumage. The cheeks and around the eyes are yellow; the neck, and other fore parts, greenish with golden reflections. The crest is longer than that of the common peacock, its feathers less equal, and webbed along their whole length. Consult the works of Jordan, Hume, Oates, Legge, Seebohm, Blyth, and other writers on East Indian ornithology; Darwin, *Variation of Animals and Plants Under Domestication* (2d ed., London, 1875); Gubernatis, *Zoological Mythology* (ib., 1872); De Kay, *Bird Gods* (New York, 1898). See Plate of PEACOCKS, ETC.

PEACOCK, EDWARD (1831—). An English antiquary, born at Hemsworth, in Yorkshire, December 22, 1831. He was educated by private tutors. In 1857 he was elected fellow of the Society of Antiquaries. His antiquarian works comprise mainly the *Army List of Roundheads and Cavaliers* (1863; enlarged 1874); *Instructions for Parish Priests*, by John Myre (Early English Text Society, 1868); *A List of the Roman Catholics in the County of York, in 1604* (1872); *Index to English-Speaking Students Who Have Graduated at Leyden University* (Index Society, 1883); *The Moncton Papers* (Philobiblon Society, 1885). Between 1870 and 1874 he published three novels.

PEACOCK, GEORGE (1791-1858). An English mathematician and divine, born at Thornton Hall, Denton. He was educated at Richmond, and at Trinity College, Cambridge, where he became second wrangler (1813), fellow (1814), and tutor and lecturer (1815). He was a fellow student with Herschel, Babbage, and Woodhouse. These four translated Lacroix’s *Differential and Integral Calculus* (1816), and were instrumental in the introduction of the Continental notation of the calculus into Cambridge. In 1836 he was elected Lowndean professor of astronomy at Cambridge, which office he retained until his death, although he soon treated it as a sinecure. In 1839 he became Dean of Ely and removed thither. Peacock was one of the founders of the Cambridge University Philosophical Society (1819). Fellow of the Royal Astronomical, Geological, and other societies. In 1838 and 1843 he was member of the commission for standard weights and measures, and advocated a system of decimal coinage. In 1850 he was member of the royal commission and in 1855 of the Parliamentary commission for drawing up new statutes for the university and colleges. His principal mathematical works are: *Collection of Examples of the Application of the Differential and Integral Calculus* (1820); contributions to the *Encyclopædia Metropolitana* (1825-26); *Treatise on Algebra* (1830; 2d ed., 2 vols., 1842-

45); *Report on the Recent Progress of Certain Branches of Analysis* (British Association Reports, 1834); *Remarks on Decimal Nomenclature of Coins, Weights, and Measures* (1841). He also wrote the *Life of Thomas Young* (1855).

PEACOCK, THOMAS LOVE (1785-1866). An English novelist and poet. He was born at Weymouth, October 18, 1785, and, his father dying soon afterwards, was educated in a somewhat desultory fashion at home and at a private school until he was thirteen. He made his first publication, in poetry, before he was twenty, but his independent poems have not added much to his fame. In 1812, on one of his tours in Wales, he made the acquaintance of Shelley and his wife, Harriet, and for several years the friendship then begun is the most notable thing in his life. Shelley made him his executor, with Byron, and it is to him that we owe our best materials for the poet's biography. In 1816, by the publication of *Headlong Hall*, he 'took his station and degree' in literature, which was not to be materially altered in the course of a long life. At the beginning of 1819, by the happy custom of the times, he obtained an important position under the East India Company because he was a clever novelist and a good Greek scholar. With James Mill, he was appointed one of the examiners of Indian correspondence, a post demanding statesmanlike qualities and business ability not always found in a poet and novelist. He continued at India House for thirty-eight years, succeeding Mill as chief examiner in 1836, and finally retired on an ample pension, to live thenceforth quietly with his books and his garden, at Halliford, on his beloved Thames, until his death, January 23, 1866.

Though the charming ballads scattered throughout his books show undoubted poetic ability, it is as a satirist that Peacock will be principally remembered. He describes *Maid Marian* (written 1818, published 1822) to Shelley as "a comic romance of the twelfth century, which I shall make the vehicle of much oblique satire on all the oppressions that are done under the sun"—a phrase which, if we widen it to include the oppressions of cant and ignorance, is not a bad summary of the most of his work. In the ordinary qualifications of the novelist—plot-construction, human interest, character-drawing—he is deficient. But in genial satire (aided by a real passion for beauty and a singularly pure and elegant style) he has had few equals in recent literature; in fact, his fiction has been called by a good judge the best modern representative of the Aristophanic comedy. His characters, despite their suggestion of Shelley or Coleridge or Canning, are rather types than real people; like Ben Jonson and his school, he presents 'humors' in preference to men. His other books are: *Melincourt* (1818); *Nightmare Abbey* (1818); *The Misfortunes of Elphin* (1829); *Crotchet Castle* (1831), which contains his highest comedy; and *Gryll Grange* (1861), the mellow product of his old age. His principal works were published in collected editions in 1875 (ed. Sir Henry Cole) and 1891 (ed. Garnett), with valuable critical and biographical matter. Consult also Saintsbury, in *Essays in English Literature, 1780-1860* (1st series, London, 1890).

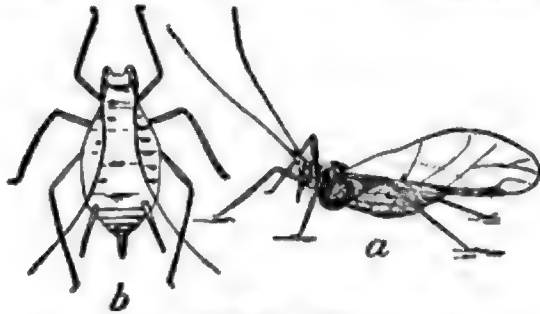
PEACOCK-FISH. A gorgeous European wrasse (*Ctenilabrus pavo*).

PEACOCK-PHEASANT. A pheasant, closely allied to the peacocks, of the genus *Polyplectron*, of which several species inhabit the Indo-Chinese region and the neighboring islands. The best known species is *Polyplectron Chinquis*, which is brown with a black head, and has the upper plumage adorned with large ocelli resembling those of a peacock's tail. They frequent the forests of hilly regions. The female has the peculiar habit of using her large tail as a shelter for her young. These birds have two great spurs upon the heel, which are especially strong in *Polyplectron bicalcaratum* (see Plate of PHEASANTS) of the Malay Peninsula.

PEA INSECTS. The pea in Europe is attacked by seven species of weevils, by the larva of seven species of moths, and by two species of flies. In the United States there are probably twenty species of insects which are especially injurious to this crop. The pea-weevil (*Bruchus pisorum*) is very abundant. It probably originated in Oriental regions, is scarcely known in the colder countries of Europe and Canada, but is very abundant throughout the United States—so abundant, in fact, that in eating green peas we consume a larva or grub with nearly every pea. The beetles appear on the vines when the peas are in blossom, and the eggs are deposited singly upon the surface of the pods. The larva bores through the pod into a pea, and when full-grown transforms to pupa, the adults issuing at varying periods from the end of July until late in the autumn, frequently in the Northern States remaining in the pea until the following spring, when many are planted in the seed. The insect hibernates in the adult condition and has only a single generation each year. It does not breed in dried peas, and the new generation for another year is dependent upon the beetles which are contained in planted seed or which escape from the store-room. The simplest and most effective remedy consists in holding seed peas in a closed receptacle over one year; the beetles which issue die without being able to lay their eggs in the field. Late planting is also frequently effective, and weevilly peas may be made safe by fumigation with bisulphid of carbon.

Certain of the blister-beetles are frequently injurious to both beans and peas by devouring the leaves, particularly the ash-gray blister-beetle (*Macrobasis unicolor*), which also feeds upon other leguminous plants. The beetles are abundant in June and July, and are handled by spraying with Paris green or by driving them, in the early morning, into windrows of straw or hay, where they are burned. In their early stages these insects are beneficial by destroying the egg-pods of grasshoppers. The maturing pods of peas and cowpeas and other leguminous plants are frequently damaged by the boll-worm or corn ear-worm (larva of *Heliothis armiger*); and the young plants as they come from the ground are frequently damaged by cutworms. (See CUTWORM and OWLET MOTIL.) The European pea-moth (*Scenasia nigricana*) has been introduced into Canada, where it has injured peas for a number of years. It is probably only a question of time when it will make its appearance in the Northern United States. A plant-bug (*Halticus Uhleri*) damages peas and beans in some of the Central States, and several species of leafhoppers infest the plant.

The most serious enemy to the pea crop of recent years has been the destructive green pea-louse (*Nectarophora destructor*), which caused a loss of many hundreds of thousands of dollars to pea-growers in the United States during 1899 and 1900. During the first season of its abundance it overran and laid waste fields of peas from Nova Scotia and Maine to Virginia and Maryland, as well as in neighboring States, destroying about 50 per cent. of the crop. The loss during 1899 was estimated at \$3,000,000, and during 1900, as early as June 15th, at \$4,000,000. The insect multiplies with great rapidity, and in favorable seasons is always likely to do enormous damage. The remedies which have been employed are spraying with kerosene soap emulsion and the use of the brush and cultivator method. In the latter case, the peas have been grown in rows sufficiently wide apart to admit of a one-horse cultivator, and the lice are brushed from the plants with boughs of pine, the cultivator following immediately afterwards and burying the lice. Early planting and



GREEN PEA-LOUSE.

a. Winged female of *Nectarophora destructor* in feeding position; b. wingless female.

very late planting have also been advised, but rotation of crops by which no leguminous crop immediately follows another one offers apparently the best chance of immunity. Consult: Chittenden, *Insects Injurious to Beans and Peas*; and *The Destructive Green Pea Louse* (Department of Agriculture, Washington, 1901).

PEALE, pēl, CHARLES WILSON (1741-1827). An American portrait painter and author. He was born at Chesterton, Md., April 16, 1741. In 1768-69 he lived in Boston, where he studied with Copley, and in 1770 went to London, where he was a pupil of Benjamin West. In 1774 he returned to America and practiced portrait painting at Annapolis, and two years later settled in Philadelphia. He fought in the Revolution, commanding a company at Trenton and Germantown, and painted the portraits of many prominent Revolutionary officers. He painted fourteen likenesses of Washington, the earliest of which represents him in the uniform of a Virginia colonel, and is the only one surviving of those painted before the Revolution. The most notable one, ordered by Lafayette for the French King, was purchased during the French Revolution and presented to the National Institute, where it is still preserved. Another portrait of Washington was painted in 1780 for Princeton College. Other portraits include those of Lincoln, Greene, Rochambeau, Reed, Gates, De Kalb, Jefferson, Jackson, and Clay. There is a portrait of Hamilton in the New York Historical Society. At eighty-one years of age he painted "Christ Healing the Sick," and two years later a portrait of himself, which is now in the

Philadelphia Academy. He died in Philadelphia, February 22, 1827. Consult: Dunlap, *History of the Arts of Design in the United States* (New York, 1834); Johnston, *Original Portraits of Washington* (Boston, 1882).

PEALE, PATRICK. The pseudonym of the German poet and novelist Gustav Anton von Seckendorff (q.v.).

PEALE, REMBRANDT (1778-1860). An American portrait and historical painter and author. He was born in Bucks County, Pa., February 22, 1778, the son and pupil of Charles Wilson Peale. From 1796 to 1801 he practiced portrait painting in Charleston, N. C., and then went to London, where he studied under West, returning to the United States in 1803. In 1807 and again in 1809 he visited Paris, where he painted the portraits of distinguished Frenchmen. In 1810 he returned to America and practiced portrait painting at Philadelphia, New York, Charleston, and at Baltimore, where he established a museum and picture gallery. In 1820 he went abroad again, visiting France and Italy, and in 1833 he established himself in London. Peale painted several portraits of Washington, the most notable of which, executed in 1823, was exhibited in Rome, Florence, and London, and was bought by Congress upon his return to America in 1832. His other works include the "Court of Death" (1820), in private possession, Saint Louis; the "Roman Daughter" (1810), Boston Museum; and the "Ascent of Elijah;" portraits of Gilbert Stuart, Thomas Jefferson, and Mrs. Madison, New York Historical Society; of Cuvier and Houdon, Pennsylvania Academy; and an equestrian portrait of Washington, Independence Hall, Philadelphia. He was also a skillful lithographer, and in 1827 won a silver medal at the Franklin Institute, for a portrait of Washington. He lectured on natural history, and is the author of *An Account of the Skeleton of the Mammoth* (London, 1802). His other publications include: *Notes on Italy* (Philadelphia, 1831); *Graphics* (1841); and *Reminiscences of Art and Artists* (1845). He died in Philadelphia, October 3, 1860.

PEAN, pēn (OF. *pane*, *panne*, Fr. *panne*, skin, fur, from ML. *panna*, *penna*, skin, from Lat. *pannus*, cloth, or *penna*, feather). One of the furs borne in heraldry (q.v.).

PEANUT (*Arachis hypogæa*). An annual plant of the order Leguminosæ, also called groundnut, earthnut, ground-pea, goober, and pindar in various localities. It grows from one to two feet high with thick, greenish, hairy stems and spreading branches. After the flower has fallen the peduncle bends downward and pushes into the ground, where the fruit or pod develops. The pods are pale yellowish, wrinkled, slightly curved, often contracted in the middle, and contain from one to three seeds. The peanut is thought to be a native of Brazil, where a number of species of the genus are indigenous. Soon after the discovery of South America it was introduced into the Old World and is now grown in all the warm regions of the globe. Only since 1866 has it been an important crop in the United States, where it is mainly grown in the Southern and Southeastern States, particularly Virginia, North Carolina, Georgia, and Tennessee. The conditions best suited to the culture of the peanut are an early and warm spring, a hot and moist summer, and a limy, sandy, friable loam. Lime in some

form must be added to soils deficient in this element. The soil is finely pulverized from four to five inches deep and the seed planted about one inch deep in rows from 28 to 36 inches apart and from 12 to 16 inches in the row when danger of late spring frosts has passed. About two bushels of nuts in the pod are required to plant an acre. After planting and during the growing period of the crop the soil is kept loose and open and free from weeds. The crop is harvested before frost in the fall, the plants being loosened by means of a special plow, then taken up and put into shocks. After drying from fifteen to twenty days the pods are picked. Fifty bushels of pods and from one to two tons of hay or straw per acre is considered a good yield. In special establishments known as recleaners or factories the pods are polished and sorted before being put upon the market.

FEEDING VALUE. Peanuts are used as a forage crop and as hay. The ripe nuts and the cake which remains after the oil is expressed are also fed. The percentage composition of a number of peanut products follows:

COMPOSITION OF PEANUT KERNELS, FORAGE, ETC.

	Water	Protein	Fat	Nitrogen free extract	Crude fibre	Ash
Peanut kernels.....	7.9	27.2	45.3	13.1	3.9	2.6
Peanut vines (green).....	31.9	7.4	3.4	27.1	23.0	8.2
Peanut hay	7.8	10.8	1.7	43.6	20.4	15.7
Peanut hulls (shells).....	12.9	6.3	2.3	16.9	38.6	3.0

Peanut kernels resemble other leguminous seeds in being rich in protein. The fat content is also high. Since peanut hay is apt to contain considerable dirt, it should be fed from low mangers or troughs. If immature pods are left on the vines, no other food is necessary during the winter. It has been estimated that pigs under 100 pounds would make from \$12 to \$20 worth of pork from an acre of peanuts if fed a moderate allowance of corn or corn meal in addition. Pasturing pigs has the advantage that the animals gather the crop and save the cost of harvesting. Peanuts make a soft pork and lard, a disadvantage that may be overcome by feeding corn exclusively for a month before slaughtering. Peanut cake mixed with less concentrated feeds has been found to be a useful cattle food. A material called 'peanut meal' is made by grinding peanut hulls, immature peanuts, and those of an inferior grade.

PEANUTS AS FOOD. Of the 4,000,000 bushels of peanuts raised yearly in the United States, 3,000,000 bushels are used as roasted peanuts. Many nuts are used in the manufacture of confectionery and peanut butter. The latter is prepared by grinding the nut and generally mixing it with a little water. Peanut oil is made in large quantities in Europe from African-raised nuts. The shelled nuts contain 30 to 50 per cent. of oil, which, if carefully made, is of good flavor, and is used for various culinary purposes and in the arts. The peanut is at present used more as a luxury or for eating at odd times than as a staple article of diet. It is, however, wholesome, nutritious, and cheap. Little is definitely known concerning its digestibility. It is apparently more easily digested if eaten with other foods than if eaten alone. Attempts to introduce peanut soups,

cakes, etc., into the diet have not proved very successful. See Plate of USEFUL LEGUMES.

PEA ORE. A form of compact brown or red hematite, consisting of round smooth grains, from the size of mustard-seed to that of small pease. Sometimes the grains are still smaller and flattened. The Clinton iron ore, found in the Silurian of the Eastern United States, is often of this nature.

PEAR (AS. *peru*, *perc*, from Lat. *pirum*, pear, *pirus*, pear-tree; connected with Gk. *ἄριος*, *apios*, pear). A deciduous orchard fruit (*Pyrus communis*) of temperate climates, belonging to the rose family, a native of Europe, early introduced into America. This species is the parent of thousands of cultivated varieties. The small apple-shaped, gritty sand or Chinese pear (*Pyrus Sinensis*) is seldom grown except for ornament and as a stock, the fruit being inedible unless baked or preserved. Some hybrids between these two species have arisen, two of which, Le Conte and Kieffer, are among the most important commercial varieties grown in America. Pear or-

chards resemble apple orchards in appearance except that the trees naturally grow much more pyramidal. When left to themselves they frequently grow to a height of 60 feet or more. Pear flowers are usually white and borne on spurs that continue to bear fruit and to branch for years. The fruit is a pome, more juicy and melting or buttery than the apple, and less tart. It is one of the best dessert fruits, and is extensively used for canning, preserving, etc., and in some parts of Europe large quantities are used in the production of cider or perry.

While pears are grown over a wide territory in the temperate zones, the countries of largest production are France and the United States. In America they stand fourth in importance among the orchard fruits. The best American pear districts are found in the Northeastern States, from New England west to the Great Lakes, and in California and parts of Oregon and Washington. Blight seriously interferes with pear-growing in the South, while in the Northwest only the inferior Russian sorts are hardy enough to thrive. The pear is grown in orchards, either as a standard or dwarf. Standard trees are produced by grafting or budding the variety which it is wished to grow upon a seedling pear; the best stock for the purpose is obtained by growing the seed of the wild pear of Europe. Dwarf trees are produced by grafting or budding on quince stock. Pears thus treated seldom grow more than 12 to 15 feet high. They come into bearing earlier than standard trees, usually within four years from planting in the orchard, and are especially valuable where land is expensive or for planting between other trees. Frequently dwarfing increases the size of the fruit and improves its quality.

The best soil for standard pears is a well-

drained heavy clay loam. Dwarf pears will do well on lighter soils. Rapid growth is not sought for in pear culture, since it is believed to favor the attacks of blight. For this reason, also, stable or other nitrogenous manures are not advocated for the pear orchard except on very poor soils. Trees are set in the orchard when two or three years from the bud, standard trees from 18 to 25 feet apart each way, and dwarfs 10 to 16 feet. Dwarf trees are set deep, 4 to 6 inches below the union, to prevent growth of the stock and to lessen the danger from breaking off in storms. Cultivation is practiced only during the spring and early summer in order to prevent a late, sappy wood growth. Recent investigations have clearly shown that many varieties of pears are self-sterile and must be planted with other varieties to cross-pollinize them in order to produce fruit. Such varieties should therefore never be planted in orchards alone. It is probable that almost any variety blossoming at the same time as these self-sterile sorts may be used as pollinizers. In the orchard one or two rows of one variety should be alternated with one or two rows of another variety blossoming at the same time.

Pears are harvested before they are fully ripe and while they are still hard. Thus handled they acquire a better color and flavor, develop less grit in the flesh, and are less likely to decay at the core than when allowed to ripen on the tree. After picking they are stored in shallow boxes or racks in a cool room away from all draughts of air, which tend to shrivel up the fruit. Late winter pears may be left on the trees as long as practicable before frost. Pears grown for market are gathered and placed in barrels or boxes at once. European and California fancy pears are wrapped in paper like oranges before marketing.

PEAR DISEASES. The pear and its fruit are subject to the same diseases as the apple, for the description and prevention of which see **APPLE**, paragraph *Diseases*. In addition there are two diseases which, although occurring upon the apple and quince, are so much more frequent upon the pear as to be generally associated with it. The first is the leaf-spot, due to the fungus *Entomospodium maculatum*, which occurs upon the leaves, fruits, and young twigs; upon the leaves as reddish brown spots which coalesce more or less, and destroy the leaf, sometimes defoliating the tree; upon the stems black, as dead spots; upon the fruit reddish spots beneath which the tissues become hard and cork-like, the fruit often cracking and rotting as a result of the attack. This disease may be easily controlled by the application of Bordeaux mixture or other fungicide (q.v.). The second is pear-blight or fire-blight (q.v.).

Consult: Quinn, *Pear Culture for Profit* (New York, 1889); Waite, *Pollination of Pear Flowers*, United States Department, Agricultural Division Vegetable Pathology, Bulletin No. 5 (1895); Field, *Pear Culture* (ib., 1863); Bailey, article "Pear," in *Cyclopedia of American Horticulture* (New York, 1900-02); Jordan, *Pear Growing in New Jersey* (New Jersey Experimental Station, Bulletin 142). See **PEAR INSECTS**; Plate of **FLOWERS**.

PEAR, PRICKLY. A species of cactus. See **PRICKLY PEAR**.

PEARCE, pērs, CHARLES SPRAGUE (1851—). An American figure painter, born in Boston,

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Mass. He studied under Bonnat in Paris, and was a frequent exhibitor at the Salon. Afterwards he lived many years in France. He was one of the first members of the Society of American artists. In 1891 he was awarded the Grand Diploma at the Berlin Exhibition, and in 1894 was made an officer of the Legion of Honor. His work is in the realistic French manner, quiet in tone, with notable technical qualities and skill in composition. Among his best known pictures are: "Death of the First Born" (1877); "The Shepherdess" (1866); "Fantaisie" (in the Pennsylvania Academy of Fine Arts); and "Meditation" (in the Metropolitan Museum, New York City). He did some mural painting in the north hall of the Congressional Library in Washington.

PEA RIDGE, BATTLE OF. A battle of the Civil War in America, fought at Pea Ridge, in northwest Arkansas, near the Missouri boundary, March 7 and 8, 1862. In January, 1862, Gen. S. R. Curtis with 10,500 Federal troops, composing the Army of the Southwest, moved against Gen. Sterling Price, commanding Missouri State troops at Springfield. General Price retired into Arkansas, where he was joined by Gen. Benjamin McCulloch with his division, and General Van Dorn took chief command. General Curtis followed and took a strong position at Pea Ridge, on an eminence in the Ozark Mountains, and awaited an attack. General Van Dorn advanced with 14,000 men and was joined by Gen. Albert Pike with a brigade of Indians, which had been recruited in Indian Territory. His plan was to strike the rear of the Federal army and cut off the communications. General Curtis had changed front, but the Federal right was driven back two miles on March 7th. The attack by the Confederates on the Federal left was repulsed with great slaughter, Generals McCulloch and McIntosh being among the killed. The Indians were entirely useless, and scattered at the beginning of the artillery fire. The next morning General Van Dorn retreated under cover of his artillery, but General Curtis drew his men into an arc of a circle and poured in a destructive cross fire. The Federal loss was 1384 killed, wounded, and prisoners; the Confederate was given at 800 exclusive of Indians, but was undoubtedly larger. The result of this first victory west of the Mississippi saved Missouri to the Union cause.

PEAR INSECTS. The insects attacking the pear are identical in many instances with those which attack the apples, the apple-borers, the



PEAR PSYLLA.

Psylla pyricola: adult; an egg (a); and larva (b) from beneath. Greatly enlarged.

San José scale, the oyster-shell bark-louse, and the codling moth all being found to attack the pear. The pear-tree psylla (*Psylla pyri*) is con-

fined to the pear, and is common and rather destructive in the Northern United States, extending westward as far as Michigan and southward to Maryland and Virginia. It was probably imported about 1832 from Europe, where it occurs abundantly, especially in Austria. The orange-yellow eggs are laid by the adult insect upon the leaves of the trees, and the young insects, yellow in color, with crimson eyes, begin immediately to suck the sap from the leaf. It grows rather rapidly and has several generations (four or five) in the course of summer. It hibernates in the adult condition. It is preyed upon by a large number of natural enemies, principally by the golden-eyed lace-wing flies and the larvæ of coccinellid beetles. The best remedy is a spring application of kerosene emulsion spray when the leaves are first unfolded. A combination of kerosene emulsion and Bordeaux mixture is recommended where pear-blight occurs in the same orchard.

A bark-boring beetle, known as the pear-blight beetle (*Xyleborus pyri*), frequently causes the death of many twigs of the pear tree by making small perforations at the bases of the buds. The adult beetle deposits its egg on the bud and the young larva bores down, following the course of the eye of the bud, toward the pith, around which it passes, consuming the tissues in its course, thus interfering with the circulation, and causing the twig to wither. The adult insect issues in June or July and deposits its eggs during August. The only remedy which has been suggested is to cut off the blighted limbs below the injured part and burn them before the beetle has escaped. Another borer, the sinuate pear-borer (*Agrilus sinuatus*), has been introduced into the United States from Europe within recent years. This borer in the larval condition feeds between the bark and wood in pear trees, especially in the trunk and larger branches, making long zigzag galleries, finally girdling the tree and killing it. It lives two years in the larval condition.

Among the numerous insects which attack the leaves of the pear is the so-called 'pear slug,' which is the larva of a sawfly (*Eriocompoides limacina*). The adult is a small insect, smaller

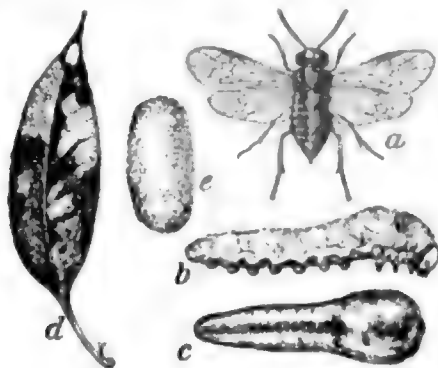
than the house-fly, and glossy-black in color. It was probably introduced into the United States from Europe toward the close of the eighteenth century. The eggs are laid under the surface of the leaf, and the young larvæ hatch and grow rapidly, covering themselves with a slimy secre-

tion. There are two generations each year, and the larvæ when abundant skeletonize nearly all the leaves on large trees. The best remedy is to spray with an arsenical wash or with a soap solution, or hellebore may be used either as a dry powder or as a wet spray. Heavy rains will often destroy them, and a forcible water spray will wash them from the leaves. Among caterpillars which feed upon the pear are the white-marked tussock-moth (*Orgyia leucostigma*), the red-humped apple-tree caterpillar (*Notodonta concinna*), the fall webworm (*Hyphantria cunea*), the cecropia moth (*Attacus cecropia*), the eye-spotted bud-moth (*Tmetocera ocellana*), and others. The plum curculio and the quince curculio (qq.v.) injure pears, as well as plums and quinces, although not so extensively. Consult: Saunders, *Insects Injurious to Fruits* (Philadelphia, 1889); Smith, *Manual of Economic Entomology* (Philadelphia, 1896).

PEARL (from ML. *perula*, *perulus*, *perla*, pearl, probably variants of *pirula*, diminutive of Lat. *pirum*, pear). A morbid product formed from the pearly nacre of the interior of the pearl mussel (*Meleagrina margaritifera*) and other bivalves. It is often due to the irritation caused by the presence of a grain of sand or some other foreign body lodged between the mantle of the animal and the shell; an extra amount of pearly matter is thus secreted and forms roughnesses or projections on the inside of the shell, which, if becoming free and regularly spherical, form one or more pearls. Recent authorities state that pearls are also due to the presence of distomæ. It has been noticed that when the pearl oyster (*Meleagrina*) is large, well formed, and with ample space for individual development, pearls scarcely occur at all, but when the shells are crowded together, and become humped and distorted, as well as affording cover for all kinds of marine worms and parasitic creatures, then pearls are sure to be found (Cooke). The pearl-oyster fishery is carried on in the Aru Islands, the Sulu Archipelago, the Philippine Islands, Burma, the Persian Gulf, the Red Sea, at Ceylon, along the coasts of North Queensland, North-eastern Australia, and of West Australia, at New Guinea, and at the Pearl Islands on the Bay of Panama. This species also occurs along the coast of Lower California, and in the South Pacific in the Paumotu, Gambier, and Navigator Islands, and also at Madagascar. The shell is very large, about eight to ten and even fifteen inches in diameter, while the valves are very thick and heavy, and in young individuals the outer surface is very rough and corrugated. The largest pearl known is said to measure two inches long, four inches round, and to weigh 1800 grains.

The 'mother-of-pearl' is the internal nacre or nacreous laminæ of this oyster. It is utilized in the manufacture of buttons, studs, knife-handles, fans, card-cases, brooches, boxes, and all kinds of inlaid work.

Pearls may be formed in almost any bivalve, and some of the most valuable are taken from the shells of fresh-water mussels, but these are usually small and called 'seed-pearls;' they also occur in tolerable abundance in the common mussel of our coast (*Mytilus edulis*), very fair specimens at times being found; also in oysters, in *Placusa placenta* of the Pacific, in many species of *Pinna*,



PEAR SLUG.

a, adult saw-fly, female; b, larva with slime removed; c, larva in normal state (the 'slug'); d, an affected leaf; e, cocoon.

than the house-fly, and glossy-black in color. It was probably introduced into the United States from Europe toward the close of the eighteenth century. The eggs are laid under the surface of the leaf, and the young larvæ hatch and grow rapidly, covering themselves with a slimy secre-

and in the giant clam (*Tridacna*). Pearls are sometimes formed in univalve shells; thus pink pearls have been taken from the giant conch-shell (*Strombus gigas*) of the West Indies, as well as from certain species of *Turbinella*.

PEARL FISHERIES. The average annual value of the pearl fishery of Northern Australia is \$296,000, the industry having been founded at Thursday Island. It appears that the profits of the fishery are made out of the pearl shell only, because so many pearls, and often very valuable ones, are stolen by divers. Saville Kent distinguishes two species of pearl shells; viz. the large white shell (*Meleagrina margaritifera*) and a smaller black-edged form which he names *Meleagrina nigro-marginata*. Kent has proved that it is possible to transplant living pearl oysters. Under favorable conditions the shell is supposed to attain in three years the marketable size of eight or nine inches in diameter, while in five years a pair of shells may weigh five or six pounds, the extreme weight being ten pounds. The centre for labor and supplies of the Queensland fishery is Singapore, this port being an excellent market for the shells, while more pearls probably change hands here than in any other place in the world, large quantities being purchased for the Chinese market, where there is an extensive demand for second-class pearls.

The pearl oysters live at depths of from eight to twenty or more fathoms. For collecting the oysters small vessels of from 12 to 15 tons are most convenient. Two or more such boats are usually accompanied by a larger vessel as a storeship. The best divers are Japanese; Filipinos are also good, and Malays are employed. The diver takes with him a netted bag made of rope. When the depth is from eight to fifteen fathoms the diver can work at the bottom for two or more hours, but at a greater depth he cannot remain on the bottom more than fifteen minutes. The shells usually live in strong currents and in narrow channels between groups of islands, where they lie on a hard bottom.

The pearl fishery of the Mississippi and its tributaries is of much greater importance than is generally known. During recent years a thousand persons have been engaged in this industry on the Mississippi River alone. In 1901 a single firm is stated to have bought from these fishermen \$100,000 worth of pearls, besides the clam or mussel shells from which pearl buttons are made. It is said that the supply of pearls is not being exhausted, but that the demand has increased so rapidly in the last fifteen years as to treble prices. The centre of the industry is Muscatine, Iowa.

In the United States the fresh-water pearl industry dates back to 1857, when the 'Queen Pearl' was found in New Jersey. It was sold to the Empress Eugenie for \$2500 and is said to be worth now four times that sum. Tennessee, Kentucky, and Wisconsin are the leading States in the pearl industry, and in the ten years succeeding 1889 it is said that more than \$25,000 worth of pearls were collected in Wisconsin alone. So great has been the destruction of the mussels there that in many places they are nearly if not quite exterminated.

PEARL. A beautiful English poem belonging to the second half of the fourteenth century. It is a lament of a father for a lost child, sym-

bolized by a pearl. The poet possessed a spotless pearl. One day as he was in an arbor it slipped from his hand down through the grass and the flowers into the earth. Wandering afterwards into the arbor in search of the lost gem, he fell asleep amid the flowers, and in vision saw his lost child by the shimmering cliffs of the new Jerusalem. The poem consists of 101 twelve-line stanzas. The dialect is West-Midland. That the poet lived in the West of England near the Welsh borders is all that is known of him. Consult *Pearl*, edited, with a modern English version, by Israel Gollancz (London, 1891).

PEARL ASH (so called on account of the color), or **POTASHES**. Crude potassium carbonate obtained from wood ashes. The commercial product is made in Canada, as follows: Wood is burned in pits and the resulting ash spread on a stone floor, sprinkled with water, and worked till it is damp, frequently with the addition of a little lime. The damp ash is then placed in casks containing false bottoms, covered with straw and hot water poured over them. The liquid, which is drawn off from a plug hole at the bottom, is boiled down, and finds some use in this condition as a manure owing to the soluble potash that it contains. The crude pearl ash thus obtained may be purified by heating and then cooled, during which the sulphate and chloride, together with the insoluble matter, are separated out, while the clear supernatant liquid is drawn off and boiled down until it crystallizes. When sufficiently pure this product finds use in the manufacture of flint glass. Ordinary pearl ash is used principally, however, in the manufacture of soap.

PEARL HARBOR. An inlet on the south coast of Oahu, Hawaii, six miles west of Honolulu (Map: Hawaii, C 2). It consists of several land-locked basins with a narrow entrance inside of which there is a depth of 60 feet. Outside, however, a coral reef prevents the entrance of large vessels. In 1884 the United States obtained the right from the Hawaiian Government to establish here a coaling and repair station, and several surveys were made by the United States Government. The harbor, however, was not utilized, and the acquisition of the harbor of Honolulu in 1898 rendered its improvement unnecessary.

PEARLITE (so called on account of the pearly lustre). A glassy or once glassy rock which exhibits a ready separation by cracks into spherical or spheroidal forms. These so-called pearlitic cracks may arise from stresses set up during the cooling of the magma, or from differential expansion and contraction about spherulitic masses of feldspar.

PEARL MILLET. A cereal grain. See **GUINEA CORN**.

PEARL OYSTER. A tropical bivalve (*Meleagrina margaritifera*) noted for producing precious pearls and mother-of-pearl. See **PEARL**.

PEARL RIVER. A river of Mississippi. It rises in Winston County in the east central part of the State, and flows southward, emptying into the Mississippi Sound after having formed for some distance the boundary between Mississippi and Louisiana (Map: Mississippi, F 8). It is about 300 miles long, but its navigation is impeded by shoals and sand bars.

PEARL WEDDING. See WEDDING ANNIVERSARIES.

PEARL WOOD-NYMPH. See WOOD-NYMPH.

PEARSE, pers. MARK GUY (1842—). An English clergyman and author. He was born in Camborne, studied medicine and then theology, and in 1863 entered the Wesleyan ministry. After holding various charges in Leeds, Ipswich, Bristol, Westminster, and elsewhere, on the motion of Hugh Price Hughes in 1889 he was chosen to take charge of the West London Mission, from which he retired after twelve years of service. His writings, numbering more than 25 volumes, include devotional works and semi-religious tales, especially of Cornish life. The best known are: *Daniel Quorm and His Religious Notions* (1874-79), of which hundreds of thousands have been printed in many languages; *Elijah, the Man of God* (1891); *The Gentleness of Jesus* (1898); *The Story of a Roman Soldier* (1899); and *West Country Songs* (1902).

PEARSON, per'son, CHARLES HENRY (1830-94). An English educator and historian, born at Islington. He studied at King's College, London, and at Oxford, receiving a B.A. in 1853 and an M.A. in 1856. He was appointed professor of modern history in King's College; but in 1871 he went to Australia, where he soon resumed teaching and became Minister of Education in Victoria. In 1892 ill health compelled him to return to England. His principal works are: *Russia, by a Recent Traveler* (London, 1859); *History of England During the Early and Middle Ages* (2 vols., London, 1867); *English History in the Fourteenth Century* (London, 1876); *Historical Maps of England During the First Thirteen Centuries, With Explanatory Essays, etc.* (London, 1869); *National Life and Character: A Forecast* (London, 1893); *Report on the State of Public Education in Victoria* (Melbourne, 1878); *Reviews and Critical Essays*, ed. by Strong (London, 1896). Consult Stebbing, *Charles Henry Pearson* (London, 1900).

PEARSON, JOHN (1613-86). An English prelate of high celebrity. He was born on February 28 at Great Snoring, in Norfolk. He was educated at Eton and King's College, Cambridge, where he took the degree of M.A. in 1639, and in the same year took orders, and was collated to a prebend in Salisbury Cathedral. In 1640 he was appointed chaplain to Sir John Finch, Lord Keeper of the Great Seal, and on the outbreak of the Civil War became chaplain to Lord Goring, and afterwards to Sir Robert Coke, in London. In 1654 he was appointed minister of Saint Clement's, Eastcheap, London; and in 1659 published the great work by which he is now remembered, *An Exposition of the Creed* (new ed., 2 vols., 1890-91). During the same year Pearson published *The Golden Remains of the Ever Memorable Mr. John Hales of Eton*. At the Restoration honors and emoluments were lavishly showered upon him. Before the close of 1660 he received the rectory of Saint Christopher's, in London; was created D.D. at Cambridge; installed Prebendary of Ely and Archdeacon of Surrey; and made master of Jesus College, Cambridge. In 1661 he obtained the Margaret professorship of divinity, and was one of the most prominent commissioners in the Savoy Conference; in 1662 he was made master of Trinity,

Cambridge, and in 1673 was consecrated Bishop of Chester. In 1672 he published his *Vindicia Epistolarum S. Ignatii*, in answer to Daille, who had denied the genuineness of the Epistles. In 1684 appeared his *Annales Cyprianici*. He died at Chester, July 16, 1686. Pearson's *Opera Posthuma Chronologica* were published by Dodwell (London, 1688, 3 parts), and his *Orationes, Concioniones et Determinationes Theologicae* contain much valuable matter. Consult Churton's memoir prefixed to Pearson's *Minor Theological Works* (2 vols., Oxford, 1844).

PEARSON, JOHN LOUGHBOROUGH (1817-97). An English architect, born in Brussels. He studied under Bonomi in Durham, and in London with Salvin and Hardwick; entered practice for himself in 1843; and built churches in Yorkshire (1843-46). A second period, following the construction of Trinity for Bentinck (1850), was largely devoted to restorations and especially to regrounding old churches. In 1870 Pearson was employed in extensive repairs to the cathedral at Lincoln, and in 1879, having received a gold medal and the cross of the Legion of Honor at Paris in the previous year, he was intrusted with the plans for the new cathedral at Truro, which, completed in 1887, may be reckoned his greatest opportunity, and his best work. His most widely-known work of restoration was that of the north transept of Westminster Abbey. Besides, he made important repairs at Canterbury, Rochester, Peterborough, Chichester, Bristol, and Exeter. For the most part his architectural type was ecclesiastical and Gothic, but he essayed some country houses and office buildings and at times used the Tudor, Jacobean, or Free Renaissance.

PEARSON, KARL (1857—). An English mathematician and author. He was educated at King's College, Cambridge, studied at Heidelberg and Berlin, and was called to the bar in 1882. After two years (1882-84) as professor of geometry, in 1885 he was appointed to a chair of applied mathematics and mechanics in University College, London. Pearson received the Darwin medal from the Royal Society in 1898. He wrote: *History of the Theory of Elasticity and Strength of Materials* (1886-93); *The Ethic of Freethought* (1888; revised 1901); *The Grammar of Science* (1892 and 1899); and *The Chances of Death, and Other Studies in Evolution* (1897).

PEARY, ROBERT EDWIN (1856—). An American Arctic explorer and civil engineer in the United States Navy, born at Cresson, Pa., May 6, 1856. He was graduated from Bowdoin College, Maine, in 1877, became a civil engineer in the navy in 1881, and in 1884-85, under Government orders, he was assistant engineer on the route of the proposed Nicaragua Ship Canal. In 1887-88 he was engineer-in-chief of the Nicaragua Canal survey. He had made a reconnaissance in 1886 of the Greenland inland ice-cap east of Disco Bay, in latitude 70° N. From this time until he sailed in 1891 on his first expedition to Northwest Greenland all his leisure was given to the most minute studies and preparations for his participation in Arctic research. During his first expedition (June, 1891-September, 1892) he made a brilliant record of achievements, not the least of which were the results of his studies and minute experimentation in the field cover-

ing every phase of the equipment for Arctic work. His journey over the inland ice, from 5000 to 8000 feet above the sea, from McCormick Bay to the northeast angle of Greenland (Independence Bay, latitude $81^{\circ} 37' N.$), a round trip of 1300 miles including land travel on the northeast coast, was one of the most brilliant feats of polar sledge work ever accomplished. He proved that the northern extension of the great interior ice-cap ends below latitude $82^{\circ} N.$ He also established the insularity of Greenland and ascertained the existence of detached ice-free land masses north of the mainland and the fact that the east and west coasts rapidly converge north of the seventy-eighth parallel. His ethnological work among the Eskimos known as the Arctic Highlanders (from Cape York to Smith Sound) was the most thorough and noteworthy that has been done in that region. The auxiliary expeditions in which well-known men of science participated gave opportunity for fruitful researches as to glacial and other Arctic phenomena. In 1893-95 he made another voyage to the same region, completed his study of the Arctic Highlanders, made another journey across the ice-cap to Independence Bay, and discovered the famous meteorites of the Eskimos near the coast of Melville Bay. They were later removed to New York, and one of them, weighing 90 tons, is the largest known to exist. After summer voyages to the Melville Bay regions in 1896 and 1897, he started north again in 1898 for the purpose of outlining the northern extension of the land masses above Greenland and of reaching the North Pole, if possible. His work covered four years, during which he made resurveys of a considerable extent of coast line in the neighborhood of Smith Sound, surveyed new coast lines on the west side of Grinnell Land and north of the Greenland mainland, and made a number of notable and very difficult sledge journeys along the northern channels leading to Lincoln Sea. Passing Lockwood's Farthest, he traced the northern limit of the land masses north of Greenland to its highest point, $83^{\circ} 39' N.$, and then followed the southerly trend of the coast for many miles toward Independence Bay on the east coast.

In the spring of 1902 he started over the frozen Arctic Ocean from Cape Hecla, on the north coast of Grant Land, in his attempt to reach the North Pole. Each day's march was very arduous on account of the broken condition of the ice and the vast pressure ridges crossing his path. His general course was deflected to the west by the character of the ice. At his farthest camp in latitude $84^{\circ} 17' N.$ the polar pack became impracticable and further efforts to advance were given up. He had attained the nearest approach to the pole in the American Arctic. Commander Peary was elected president of the American Geographical Society in December, 1902.

PEARY LAND. A name given to the northern coast region of Greenland, which was first explored by Peary in 1892.

PEASANT WAR (OF. *paissant*, Fr. *paysan*, from OF. *pais*, *pays*, Fr. *pays*, country, from Lat. *pagus*, district, province, from *pangere*, to fix, to fasten; connected with *pax*, peace, Gk. *πᾶσι*, *pēgnynai*, to fasten; and perhaps with Goth., OHG. *fahan*, AS. *fon*, Ger. *fangen*, to seize, take). The name given to the insurrection of the peas-

antry in Central and South Germany in the year 1524-25. With the decline of the feudal system the lot of the peasantry throughout Germany had greatly deteriorated. They were still subject to the oppressive exactions of their feudal masters, but the ancient service of protection from master to man had gradually disappeared. The example of Switzerland encouraged the German peasants to hope that the yoke of the nobility might be thrown off, and after 1475 there were risings here and there among the peasants of South Germany. A peasant league, called from its cognizance, a peasant's clog, the *Bundschuh*, rose in the Rhine countries in 1502, and another, called the 'League of Poor Conrad,' was organized in Württemberg in 1514; but both were put down. The great insurrection finally broke out in Swabia in June, 1524. Many of the secular nobility at first regarded the insurrection with some measure of complacency, because it was directed primarily against the ecclesiastical lords. An irregular warfare ensued, attended by the most revolting cruelty on both sides. In spite of the disadvantage under which the ignorant and poorly organized peasants labored, the insurrection spread through Alsace and the Palatinate, Franconia, Bavaria, Tyrol and Carinthia. The rising of the peasants was accompanied by insurrections among the lower classes in many cities. The movement in many parts took on a religious character, and was merged with the agitation of the Anabaptists (q.v.), Thomas Münzer (q.v.) becoming one of the principal leaders of the peasantry. The demands of the peasants were set forth in a manifesto issued about Easter, 1525, by the insurgents of Swabia, known as the Twelve Articles. These embraced the free election of their parish clergy; the appropriation of the tithes of grain, after competent maintenance of the parish clergy, to the support of the poor and to purposes of general utility; the abolition of serfdom, and of the exclusive hunting and fishing rights of the nobles; the restoration to the community of forests, fields, and meadows, which the secular and ecclesiastical lords had appropriated to themselves; release from arbitrary augmentation and multiplication of services, duties, and rents; the equal administration of justice; and the abolition of some of the most odious exactions of the clergy. The conduct of the insurgents was not, however, in accordance with the moderation of their demands. Their many separate bands destroyed convents and castles, murdered, pillaged, and were guilty of the greatest excesses, partly in revenge for the cruelties practiced against them. A number of princes and knights were forced to make common cause with them and even to join their ranks, the most noted of these being Götz von Berlichingen (q.v.). Luther denounced the excesses of the peasants, and called upon the princes of Germany to stamp out the insurrection. The peasant army in Central Germany, under the command of Münzer, was overwhelmed at Frankenhausen, on May 15, 1525, by the Landgrave Philip the Magnanimous of Hesse, at the head of the forces of Hesse, Saxony, and Brunswick. By June disorderly bands in South Germany had been mostly annihilated or dispersed. The peasants, after they had been subjugated, were everywhere treated with terrible cruelty. Multitudes were hanged in the streets, and many were

put to death with the greatest tortures. Weinsberg, Rothenberg, Würzburg, and other towns which had joined them suffered the vengeance of the victors, and torrents of blood were shed. It is supposed that more than 100,000 persons lost their lives in the Peasant War. Flourishing and populous districts were desolated. The lot of the defeated insurgents became harder than ever, and many burdens of the peasantry originated at this period. Consult: Fries, *Geschichte des Bauernkriegs in Ostfranken* (Würzburg, 1884); Cornelius, *Studien zur Geschichte des Bauernkriegs* (Munich, 1862); Schreiber, *Der deutsche Bauernkrieg* (1864); Zimmermann, *Allgemeine Geschichte des grossen Bauernkriegs* (new ed., Stuttgart, 1891); Baumann, *Die zwölf Artikel* (Kempten, 1896); Janssen, *Geschichte des deutschen Volks seit dem Mittelalter* (Freiburg, 1877-94).

PEASE, ERNEST MONDELL (1859—). An American Latinist, born at West Union, Iowa. He graduated from the University of Colorado in 1882, and was fellow at Johns Hopkins University from 1884-86. He was instructor in Latin at Smith College 1885-86, professor of Latin at Bowdoin College, 1886-91, and at Leland Stanford Junior University, 1891-1902. With Prof. H. T. Peck, of Columbia University, he is editor of the *Students' Series of Latin Classics*, published in Boston. He is also the author of various philological papers and reviews.

PEAS'LEE, EDMUND RANDOLPH (1814-78). An American physician, known as an obstetrician and gynecologist. He was born in New Hampshire, and graduated from Dartmouth College in 1836, where he remained for two years as tutor. After taking his medical degree at Yale, he began practice in Hanover, N. H., in 1841. In 1842 he became professor of anatomy and physiology at Dartmouth, and he retained this position for nearly forty years. He was also professor at Bowdoin College. He was made professor of physiology and pathology in the New York Medical College in 1851, and in 1858 he assumed the chair of obstetrics and removed to New York City. This college became extinct in 1864. He published *Human Histology* (1857), and *Ovarian Tumors and Ovariectomy* (1872).

PEAT (possibly a variant of *beat*, sod, from *beet*, AS. *bētan*, to mend, from *bot*, Goth. *bōta*, OLG. *buoza*, Ger. *Busse*, reparation). The product resulting from the partial decay of vegetable matter—mosses and other marsh plants—which grows and dies in boggy places where water stands. The remains of the plants are often so well preserved that the species can be easily distinguished. Reeds, rushes, and other aquatic plants may usually be traced in peat, and stems of heath are often abundant in it; but it chiefly consists, in the northern parts of the world, of various species of *Sphagnum* (q.v.), or bog-moss. The plants are so well preserved in many bogs that attempts have been made with some success to utilize the fibre prepared from peat as a textile. Peat passes by insensible degrees into lignite (q.v.). The less perfectly decomposed peat is generally brown; that which is more perfectly decomposed is often nearly black. Moist peat possesses a decided antiseptic property which may be due to tannin, organic acids, or iron, and other salts present. This property is manifested not only in the perfect preservation of ancient trees

and of leaves, fruits, etc., but sometimes even of animal bodies. For this reason peat is not well suited for use as a fertilizer in the raw state, but should be allowed to weather before being so used. In warm regions the decay of vegetable substances is, as a rule, too rapid to permit the formation of peat. But in the colder parts of the world the deposits are very extensive. In the Southern Hemisphere no moss seems to enter into their composition, and South American peat is said by Darwin to be formed of many plants, but chiefly of *Astelia pumila*, a phanerogamous plant of the rush family. The rate of growth is variously estimated at from two to four inches a year. Many thousands of acres are known in the North German lowlands; in Ireland estimates place the lowland bog area at 1,576,000 acres and the highland at 1,254,000 acres. Russia is said to have 6700 square miles of peat. Several million acres occur in Norway and Sweden, France and Holland. The United States and Canada have also extensive tracts, but only in the latter country have attempts been made to utilize them. For the physical characters, and the mode of reclaiming and converting peat bogs into arable land, see Bog.

Mere peat is not a good soil, even when sufficiently drained, but requires the application of lime, marl, etc., and other soil amendments to convert it into good soil. Peat bogs even when well drained are not at first productive. The peat must undergo a certain amount of decomposition to supply the nitrogen required by plants, and usually certain of the mineral constituents necessary to plant growth are deficient. Barnyard manure is frequently beneficial, probably because it not only furnishes a certain amount of available fertilizing matter, but promotes fermentation of the peat and thus renders its inert nitrogen available. Lime, marl, wood ashes, etc., are also used with benefit on peat bogs for similar reasons and because they correct acidity and promote nitrification. Peat was formerly extensively used as a fertilizer, particularly in the form of compost (q.v.), but its use has declined since the general introduction of the more convenient and efficient commercial fertilizers. (See MANURES AND MANURING.) Dried peat is an excellent absorbent and is used to a considerable extent as a litter in stables. It has also been used in the manufacture of the so-called 'peat molasses,' a cattle food prepared by mixing the crude molasses from sugar factories with dried ground peat.

Peat is extensively used for fuel. The more perfectly it is decomposed, and therefore the more consolidated it is, the better. It is the ordinary fuel of the greater part of Ireland, where it is usually called turf, although the term turf in its ordinary English sense is utterly inapplicable to it. To procure peat for fuel, the portion of bog to be operated upon must first be partially dried by a wide open drain; its surface is then pared off with the spade, to the depth of about six inches, to remove the coarse undecomposed vegetable matter; the peat is afterwards cut out in pieces (peats) like bricks, by means chiefly of a narrow, sharp spade, the blade of which is furnished on one side with a tongue set at a right angle to it. The soft peats are set up on end in little clusters to dry. When sufficiently dry they are piled in out-houses or stacked in the open air. The operation of peat-cutting is al-

ways performed in spring or summer. Where peat for fuel cannot be obtained in the way just described, the black mud of a semi-fluid bog is sometimes worked by the feet of men, women, and children until it acquires such a consistency that it can be molded by the hand. The process is laborious, but the fuel obtained is good.

Peat is a light and bulky kind of fuel, and cannot be conveyed to considerable distances without too great expense. Efforts have, however, been made, both in Scotland and Ireland, to render it more generally useful, and so to promote the reclaiming of bogs by so compressing it until its specific gravity is nearly equal to that of coal. For this purpose it is first reduced to a pulp. The compressing of peat has not been advantageously prosecuted on an extensive scale.

Peat-charcoal, made from uncompressed peat, is very light and inflammable, and therefore unsuitable for many purposes, but is well adapted for others, particularly for use as an antiseptic and deodorizer. Peat-charcoal is highly esteemed for the smelting of iron, and for working and tempering the finer kinds of cutlery. Charcoal made from compressed peat is in density superior to wood-charcoal, and is capable of being used as coke. Various attempts have been made to obtain valuable products from the destructive distillation of peat, but without profitable results. Kane states that 1000 parts of peat yield about 11 of sulphate of ammonia. For further information, consult: Storer, *Agriculture* (New York, 1897); Koller, *Die Torf Industrie* (Leipzig, 1898); Bach, "Peat," *The Mineral Industry*, vol. vii. (New York, 1899); Ries, "Peat," *Mineral Resources, in United States Geological Survey Reports for 1901* (Washington, 1902); Page, "Making Coal of Bog Peat," in *Iron Age*, vol. lxii. (New York, 1898); Johnson, *Peat and Muck* (Hartford, 1859). See COAL. See Plate of MOSSES AND LICHENS for illustration of peat moss.

PEAT BOG. See SWAMP.

PEA TREE. See PEPPER TREE.

PEAUCELLIER'S CELL. See LINKAGES.

PEAU DE CHAGRIN, *pô de shá'grân'* (Fr., Asses' Skin). A tale by Balzac (1831), in which the author incorporates portions of his own experiences and philosophy. The central idea is the conflict between the ideal and the material. The hero, Raphaël, is the possessor of a piece of ass's skin having the magic power of fulfilling material wishes, but diminishing in size each time the power is exercised, and associated with a corresponding shortening of the possessor's life. After a reckless use of its properties, Raphaël tries to refrain from wishing, but is overcome by the material side of his nature and perishes. The work exhibits Balzac's power of giving reality to the fantastic and unnatural.

PE'BA (South American Indian name). A small armadillo (q.v.). In Texas and Mexico the name is given to the nine-banded armadillo (*Tatusia novemcincta*), which is about 30 inches long, and is notable as the only edentate that occurs in the United States. In South America the name is sometimes given to armadillos of the genus *Dasypas*.

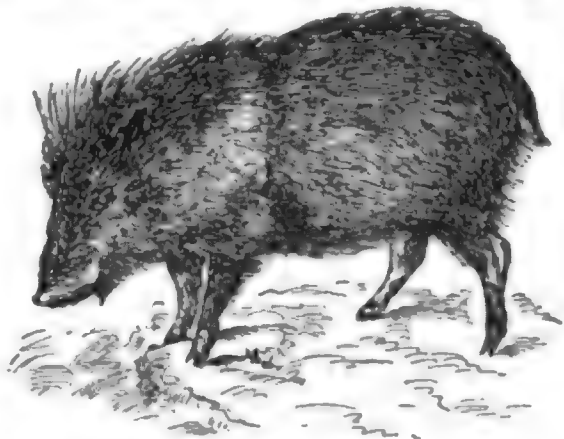
PEBRINE. A disease of silkworms. See SILKWORM.

PECAN (probably from the North American Indian name), *Hicaria pecan*. The common

name of an American forest tree 75 to 170 feet high, and its fruit—a nut. (For the botany of the pecan and its forestry value, see HICKORY.) The tree is native to river bottoms from Iowa and Kentucky southwest into Texas and Mexico, but is now grown commercially in a number of other Southern States and in California. It has not proved commercially successful north of parallel 40°.

The trees grow on nearly all soils, but for nut production a sandy loam soil with a clay subsoil has proved most satisfactory in the Southern States. The trees should be set about 40 feet apart. Clean orchard cultivation should be practiced. Through cultivation and selection a number of varieties have been originated, which, since they do not come true to seed, are budded or grafted upon seedling stocks. Little pruning, except the removal of dead limbs, is required after the head has been formed. The trees come into bearing in five or six years, but paying crops cannot be expected under ten years, and full crops not under twenty. Mature trees sometimes yield as high as twenty bushels of nuts each, but two to three bushels per tree is probably a good average. The nuts have a rounded oblong shape and vary in weight from 25 to 100 to the pound. The varieties called paper shells are considered most desirable, because their shell are very thin and are easily cracked between the fingers. The meats are large and separate easily from the shell. At the present time Texas and Louisiana furnish the bulk of the commercial nuts, mostly from native trees.

PECCARY (probably from the South American Indian name). A small wild hog of the warmer parts of America, two species of which, of the genus *Dicotyles*, represent the swine (*Suidæ*) in the New World, or, in the view of some, constitute a separate family *Dicotylidæ*. They differ from typical swine in having a mere tubercle instead of a tail; no external toe on the hind feet; and the tusks short and not curved outward. A gland opening on the loins near the



THE COLLARED PECCARY.

tail secretes a fetid humor, and must be cut out at once after killing a peccary, or the flesh will be tainted. The common collared peccary or tajaçu (*Dicotyles torquatus*) is found in almost all parts of South America and north through Mexico to Texas and Arkansas; the white-lipped peccary (*Dicotyles labiatus*) lives in Guiana, Brazil, Paraguay, and Peru. Both species are gregarious, the white-lipped peccary often assembling in very large herds, and sometimes doing great mischief to maize and other crops,

which are attacked at night, when the animals do all their feeding. The common peccary chiefly frequents forests, and small companies sometimes take up their abode in the hollow of a great tree. It is about the size of a small hog, grayish, bristly, and maned. A narrow white collar encircles the neck. The white-lipped peccary is considerably larger, of a darker color, with conspicuously white lips. Both species are capable of being tamed, but are of irritable and uncertain temper. In a wild state they defend themselves vigorously against assailants, making good use of their sharp tusks, a whole herd combining for defense. Their most dreaded enemy is the jaguar, or in the north the puma, which seizes one when it can be caught alone, but hurries into a tree to escape the onslaught of a herd. Human hunters have less to fear from them, judging by the Texas examples, than old stories would indicate. They are omnivorous, and, if hurtful to crops, render service by destroying reptiles. Their voice is somewhat like that of the hog, but more sharp. Their flesh is inferior to domestic pork. Consult: Alston, *Biologia Americana Centrali: Mammals* (London, 1879); Audubon and Bachman, *Quadrupeds of North America* (New York, 1841).

PE-CHI-LI, or **PE-CHIH-LI**, p'ā'chē'lē'. An old name for the province of China which is now known as Chi-li, which means 'Direct Rule,' and is so called because it is the one in which is situated the Imperial capital (Map: China, E 3). The name Pe-chi-li is in frequent use by foreigners outside of China and on maps, but is not used by the Chinese themselves.

Chi-li is the most northerly of the six maritime provinces of China proper. It is bounded on the north by inner Mongolia, on the west by Shan-si, on the south by Ho-nan and Shan-tung, on the northeast by a small portion of Liao-tung, and on the east by the Gulf of Pe-chi-li. It now includes within its jurisdiction a portion of inner Mongolia lying north of the Great Wall, where many Chinese have settled. Area, 59,949 square miles, nearly half of which lies beyond the wall.

With the exception of a number of scattered ridges of moderate height in its western and northern parts, the entire province is a plain formed by delta deposits. It is well watered by the Pei-ho (q.v.) with its numerous tributaries and their many feeders, and by the Lan-ho, which rises in Mongolia, and, like the Pei-ho, flows into the Gulf of Pe-chi-li. It is also traversed from southwest to northeast by the Yun-liang-ho or Grand Canal, which terminates at Tien-tsin. There are three lakes in the centre of the province, and several lagoons elsewhere. The province is rich in minerals, especially in coal, which has long been worked by the natives, and is now mined by modern methods at Kai-ping (q.v.). Iron is also plentiful, and silver has been found in several places. In the hills are great quarries of granite, marble, white saccharoid, and blue limestone. Except along the shores, where there are alkaline exudations, the soil is fertile and produces good crops of wheat, barley, millet, maize, cotton, tobacco, indigo, etc. The production of rice is not great; it is grown chiefly in the vicinity of the lakes. The climate is extreme, the temperature ranging from 8° F. below zero in winter to 95°, 100°, and at times 108° F. in summer. The rivers are frozen over from the middle of November to about the end of March. The shores are very low and the coast waters

shallow. The chief outlet for commerce is the Pei-ho, and Tien-tsin was the only treaty port until December 15, 1901, when the port of Chi-wang-tao, near the end of the Great Wall (which had been seized by the foreign admirals operating against the Boxers in 1900, and improved by them), was thrown open to foreign trade. This has a wooden pier 2000 feet long, at which vessels drawing 16 feet can unload. The roads are very poor, but railways have been introduced and under foreign competition are extending rapidly.

For administrative purposes Chi-li is divided into 11 fu or departments, 6 chi-li-chow or sub-departments, each subdivided into a certain number of prefectures, with the rank of *ting*, *chow*, or *hien* (or *hsien*). At the head of the Government is a Governor-General, a Governor, and the usual corps of provincial officials, all of whom reside at the capital, Pao-ting-fu (q.v.). Since the opening of Tien-tsin to foreigners, however, the Governor-General finds it convenient to spend most of his time there. Of the 11 fu, one called Shun-t'ien-fu is detached from the jurisdiction of the provincial Government. Its chief city, Shun-t'ien-fu, is the seat of the National or Imperial capital, and is best known as Peking. The officer who rules the department of Shun-t'ien-fu resides here. The population of the province is estimated at 18,000,000 to 20,000,000.

PECHT, pēkt. FRIEDRICH (1814—). A German painter, illustrator, and art-critic, born at Constance. He was at first occupied for some years as a lithographer in Munich, then went to Paris in 1839 to study painting under Delaroche, and subsequently worked in Munich, Dresden, Leipzig, Frankfurt, and London on portrait and genre pictures. A sojourn in Italy (1851-54) was devoted chiefly to art-historical studies, the results of which he embodied in *Südfrüchte. Skizzenbuch eines Malers* (1854). Settled in Munich, he became favorably known through a series of scenes from the lives of Goethe and Schiller, but more especially through his illustrations for the *Schiller-Galerie* (1855-59), *Goethe-Galerie* (1861-62), *Lessing-Galerie* (1866-68), and *Shakespeare-Galerie* (1870-76). For these publications he also supplied the text. In fresco he executed in a hall of the Maximilaneum at Munich twelve portraits of generals and statesmen (1868-71), and in the council chamber at Constance "Episodes from the History of the City" (1869-77, in collaboration with Fr. Schwörer). His publications include: *Deutsche Künstler des neunzehnten Jahrhunderts* (1877-85); *Geschichte der Münchener Kunst im neunzehnten Jahrhundert* (1886-87); and *Aus meiner Zeit, Lebenserinnerungen* (1894); and edited *Die Kunst für Alle* (Munich, 1885 et seq.).

PECK (perhaps from *peck*, *pick*, AS. *pycan*, Icel. *pikka*, to pick, prick). A measure of capacity for dry goods, such as grain, fruit, etc., used in America, and equivalent to two imperial gallons, or 554.54 + cubic inches. It is thus the fourth part of a bushel (q.v.). See WEIGHTS AND MEASURES.

PECK, GEORGE (1797-1876). A Methodist minister. He was born at Middlefield, N. Y.; joined the Genesee Conference of the Methodist Episcopal Church in 1816; was appointed presiding elder of the Susquehanna District in 1824; was principal of Cazenovia Seminary 1835-40, and in the last year was elected editor of the

Methodist Quarterly Review, which position he filled for eight years. In 1848 he was elected chief editor of the *Christian Advocate and Journal*, in New York, retaining the position for four years. He was pastor at Wilkesbarre, Scranton, Providence, and Dunmore; and his public labors included a period of sixty years. His published works are: *Universalism Examined* (1826); *Scripture Doctrine of Christian Perfection* (1841); *Rule of Faith* (1844); *Reply to Bascom on Slavery* (1845); *Christian Exertion* (1845); *Manly Character* (1852); *History of Wyoming* (1858); *Early Methodism Within the Bounds of the Old Genesee Conference* (1860); and *Our Country* (1865). Consult his autobiography (New York, 1874).

PECK, HARRY THURSTON (1856—). An American classical scholar, editor, and critic, born in Stamford, Conn. In 1881 he graduated at Columbia University, in which institution he was made successively instructor in Latin, and for a while in the Semitic languages, and in 1888 professor of Latin language and literature, after having spent some time in advanced study in Paris, Berlin, and Rome. In the line of his own researches, his publications include *The Semitic Theory of Creation* (1885); *Suetonius* (1889); *Latin Pronunciation* (1890); and he also edited *University Bulletin*; *A Dictionary of Classical Literature and Antiquities* (1895); *Classical Studies* (1895); *Roman Life in Latin Prose and Verse* (1895); *Trimalchio's Dinner* (1899); and a series of Latin classics for college use. In 1890 he became editor-in-chief of *The International Encyclopedia*, continuing as such until 1901, when, with President Gilman and Professor F. M. Colby, he edited *The New International Encyclopedia*. He was also the editor-in-chief of Appleton's *Atlas of Modern Geography* (1892) and of *Masterpieces of Literature* (1899). In 1895 he assumed the editorship of *The Bookman* when that magazine was established, and thereafter published the following works in general literature, besides a large number of special papers, monographs, and reviews: *The Personal Equation* (1897); *The Adventures of Mabel* (1897); *What is Good English* (1899); and a volume of verse, *Gravestone and Porphyry* (1900).

PECK, JESSE TRUESDELL (1811-83). A Methodist Episcopal bishop. He was born at Middlefield, Otsego County, N. Y.; studied at Cazenovia Seminary; joined the Oneida Conference in 1832; was principal of Gouverneur Wesleyan Seminary in 1837-41, and of the Troy Conference Academy at West Poughkeepsie, Vt., in 1841-48; president of Dickinson College in 1848-52; pastor of the Foundry Church in Washington, D. C., two years. In 1854 he was appointed secretary and editor of the Methodist Tract Society; he labored eight years in California as pastor and presiding elder. Returning to the East, he was pastor in Peekskill, Albany, and Syracuse, and in 1872 was elected bishop. He was one of the founders of Syracuse University. He published: *The Central Idea of Christianity* (1855); *The True Woman* (1857); *The History of the Great Republic Considered from a Christian Standpoint* (1868).

PECK, JOHN JAMES (1821-78). An American soldier, born at Manlius, N. Y. He graduated at West Point in 1843, and was assigned to the Second Artillery, with which he served both in the Southern and the Northern campaigns

during the war with Mexico, winning by his gallantry the brevets of captain and major. In 1853 he resigned from the service and became treasurer of a projected railroad from New York to Syracuse and cashier of the Burnet Bank in Syracuse. He was a delegate to the Democratic national convention at Charleston in 1860. At the outbreak of the Civil War he accepted a commission as brigadier-general of volunteers in the Federal service. In 1862 he took part in the Peninsular campaign, and after the battle of Malvern Hill (July 1, 1862) commanded the infantry of the rear guard. On July 4th he was promoted to be major-general, and after the withdrawal of the main army from the Peninsula commanded the troops left to hold the strategic position at Suffolk (September, 1862-May, 1863). There he was attacked by Generals Longstreet and D. H. Hill with a superior force, but managed to hold his own until General Hooker's movements before Fredericksburg caused the Confederate Government to send its forces north. He was mustered out of the service on August 24, 1865, and in 1867 he organized the New York Life Insurance Company at Syracuse, of which he was president until his death.

PECK, SAMUEL MINTURN (1854—). An American poet, born in Tuscaloosa, Ala. He was educated at the University of Alabama and in New York. His poems are collected under the titles: *Cap and Bells* (1886); *Rings and Love-Knots* (1893); *Rhymes and Roses* (1895); and *Fair Women of To-day* (1895). His best known song is "The Grapevine Swing."

PECK, TRACY (1838—). An American Latinist, born at Bristol, Conn. He graduated from Yale in 1861 and continued his studies at the universities of Berlin and Bonn, Germany. From 1871 to 1880 he was professor of Latin at Cornell University. Since the latter date he has held a similar position in Yale College. In 1898-99 he was director of the American School of Classical Studies at Rome. His publications include papers read before the American Philological Association, and an edition with Professor Greenough of *Livy*, books xxi. and xxii. (Boston, 1893). With Prof. C. L. Smith he is editor-in-chief of the *College Series of Latin Authors*.

PECK, WILLIAM GUY (1820-92). An American soldier and mathematician, born at Litchfield, Conn. He graduated at West Point in 1844, and was assigned to the corps of topographical engineers. In 1845 he accompanied Fremont's third exploring expedition through the Rocky Mountains, and during the war with Mexico served under General Kearny in the Army of the West. In 1847 he was appointed assistant professor of mathematics at the Military Academy, but in 1855 he resigned from the army and became professor of physics and engineering at the University of Michigan. In 1857 he accepted the position of adjunct professor of mathematics and astronomy at Columbia, and in 1861 he was promoted to the chair of mathematics, mechanics, and astronomy. He published a number of excellent elementary text-books on mathematics, and was joint editor with Prof. Charles Davis of the *Mathematical Dictionary and Cyclopædia of Mathematical Science* (1855).

PECKHAM, pēk'am. RUFUS WILLIAM (1838—). An American jurist, born in Albany, N. Y.

He was educated at the Albany Academy and in Philadelphia. He was admitted to the bar in 1859, and in the following year succeeded his father, Rufus Wheeler, as law partner to Lyman Tremain. As district attorney of Albany County, Peckham served for three years. He was counsel to the Albany and Susquehanna Railroad in its famous suit against the Erie Railroad; and in 1881 was successful in the national bank tax cases before the Supreme Court. At the same time he had entered politics and was a representative to the Democratic national conventions of 1876 and 1880. He became corporation counsel of the city of Albany in 1881; was justice of the New York State Supreme Court (1883-86); and, during his term as justice of the State Court of Appeals in 1895, was appointed associate justice of the United States Supreme Court.

PECKHAM, WHEELER HAZARD (1833—). An American lawyer, son of Rufus Wheeler Peckham, born in Albany and educated at Union College. He studied law in the office of Peckham and Tremain, practiced in New York City with his father, then in Saint Paul until 1862, and in 1864 again in New York. His growing fame as a constitutional lawyer and his argument on the constitutionality of taxing greenbacks won him the friendship of his opponent in this case, Charles O'Connor, who as Deputy-Attorney-General during the exposure of the Tweed ring made Peckham his assistant. In 1884 he was appointed district attorney of New York City, but soon returned to law practice in the firm of Miller, Peckham & Dixon. In January, 1894, President Cleveland nominated him for the Supreme Court, at a time when he was president of the State Bar Association. But the nomination was not confirmed by the Senate, because of the opposition of the New York Senators to Mr. Peckham's anti-machine Democracy. In 1896 he took a firm stand in favor of sound money.

PECKSNIFF. A character in Dickens's *Martin Chuzzlewit*, a pompous hypocrite and fraud, who pretended to carry on a school for architects, but really plundered and abused his pupils. His daughters were Merry and Cherry, one of whom married Jonas Chuzzlewit, while the other was the victim of unrequited love.

PE'COCK, REGINALD (c.1395-c.1460). A British Bishop of the Roman Catholic Church, born in Wales. He was educated at Oxford, and was ordained a priest in 1421. Ten years afterwards he was master of Whittington College, London, and he was appointed rector of Saint Michael's, in Riola, Bishop of Saint Asaph's (1444), and of Chichester in 1450. He took an aggressive part in the controversy with the Lollards, who were striving to abolish certain rites of the Church of which he approved, and published an introduction to the Christian faith in dialogue form, entitled *Donet* (c.1440), and *Repressor of Over Much Blaming of the Clergy* (c.1455). In his *Book of Faith* (c.1456, partially printed in 1688), he argued against the infallibility of the Church, and in later works went so far as to deny the authenticity of the Apostles' Creed and to place reason above authority. For these and other heresies, forerunners of modern toleration, he was called to account before Henry VI. and his lords at Westminster (1457) and was given the choice between the stake and recantation. He chose the latter, his fourteen books were

burned, and he ended his days in a cell of Thorney Abbey, Cambridgeshire.

PECOS, pá'kós. The principal tributary of the Rio Grande. It rises at the foot of Baldy Peak, near Santa Fe, in north-central New Mexico, and flows first southeast, then southward along the western escarpment of the Llano Estacado, turning again southeast in Texas, and emptying into the Rio Grande 36 miles northwest of Del Rio, Texas, after a course of 800 miles (Map: Texas, C 4). In its upper course it flows through a cañon-like valley, and it receives nearly all its tributaries from the west. Near Carlsbad, N. M., storage reservoirs have been constructed for irrigation purposes.

PECQUET, pe'ká', JEAN (1627-74). A French anatomist, born at Dieppe. He studied medicine at Montpellier, where he soon made the important discovery of the course of the lacteal vessels, including the *receptaculum chyli*, or reservoir of Pecquet, as it is sometimes called, and the termination of the principal lacteal vessel, the thoracic duct, into the left subclavian vein. His principal works are: *Experimenta Nova Anatomica* (Paris, 1651; Amsterdam, 1661; trans. into Eng., London, 1653); *De Circulatione Sanguinis et Chyli Motu*, and *De Thoracis Lacteis* (1654).

PÉCS, pách. The native name of a royal free town of Hungary. See FÜNFKIRCHEN.

PECTASE (from Gk. πηκτός, *pektikos*, congealing, from πηγνύμι, *pegnynai*, to solidify). An enzyme (q.v.), widely distributed in plants, attacking certain of the constituents of the cell wall. The formation of vegetable jellies from ripe fruits is mainly dependent upon the action of this enzyme. The substances it decomposes may be termed in general pectins. Their composition and relationships are not thoroughly understood, though they are undoubtedly allied to the carbohydrates, especially to cellulose. In the presence of minute quantities of pectase and of a calcium salt in solution, the pectins are decomposed and form pectose and calcium pectate, which gelatinize promptly. Pectase, therefore, is to be reckoned as one of the clotting enzymes. When fruits are boiled and the juice expressed and allowed to cool it sets into a jelly, because the pectase and pectins extracted therefrom react, and in the presence of the calcium salts, always found normally in plants, set into a jelly, entangling the other dissolved and suspended materials present.

PECTEN. See SCALLOP.

PECTORAL SANDPIPER (Lat. *pectoralis*, relating to the breast, from *pectus*, breast). A well-known migratory sandpiper (*Tringa maculata*) of North America, called 'grass-snipe,' 'jack-snipe,' and 'meadow-snipe' by gunners. It owes its bookname to an extraordinary ability on the part of the male to puff out its throat (oesophagus) after the manner of a pouter pigeon. (The act is depicted on the Colored Plate of SHORE BIRDS.) It was first noticed by Edward Adams (*Proceedings Zoological Society of London*, 1859), and afterwards confirmed, described, and figured by Nelson, Murdoch, and others in their works on the natural history of Alaska (cited under ALASKA), where it has its summer home. This performance is a part of its courtship, not only as an attention to the female, but

as a menace to rivals. (Compare RUFF.) During its migratory visits to the United States it is a favorite with sportsmen, because of its game-like manner of lying well in the grass before a dog, and its crooked, snipe-like flight. Moreover, its flesh is exceedingly palatable.

PECTORIL'OUQUY (from Lat. *pectus*, breast + *loqui*, to speak). The term applied to a distinct transmission of articulate voice-sounds when the ear or stethoscope of the listener is placed upon the chest wall. This phenomenon was discovered and named by Lænnec (q.v.). In the normal chest the voice sound is transmitted through the lung substance of the patient to the ear of the listener only as a distant, muffled sound, known as *vocal resonance*. Over the bronchi this vocal resonance is increased, the voice sounds become nearer and louder. When there is an approach to articulate speech, this is called *bronchophony*, and occurs also over portions of lung tissue which have become solidified by disease. In pectoriloquy, however, the voice is not only louder and plainer, but words and even syllables are perceived with startling distinctness. The pathological conditions under which this occurs are either a consolidation of the lung substance connecting a large bronchus with the chest wall, which consolidation acts as an unusually perfect conductor of the vocal vibrations; the presence of a cavity in the lung having free communication with a bronchus, in which case the sound is conveyed by air; a pneumothorax having open connection with a bronchus; or, more rarely, compression of the lung by an extensive pleuritic effusion. (See PLEURISY.) As a rule pectoriloquy is interpreted to mean the existence of a cavity in the lung with a thin layer of solidified tissue between it and the chest wall.

Whispering pectoriloquy is produced, under the same conditions mentioned above, when the patient whispers instead of talking. It is a curiously distinct reproduction of the whispered words, and is a test of much delicacy and exactness.

PEDAGOGY, pēd'ā-gō'jī, or **PEDAGOGICS** (from Gk. παιδαγωγία, *paidagōgia*, training of children, from παιδαγωγός, *paidagōgos*, trainer of children, from παῖς, *pais*, child + ἄγωγός, *agōgos*, leader, from ἄγω, *agō*, to lead). The science of education; a body of facts and principles bearing on the aims and methods of effectively equipping the young for life—aiding them in attaining their spiritual majority, and fitting them for their vocation. It is still in its infancy; comparatively few of the problems pertaining to education either in the home or at school are as yet solved by applying established principles in a scientific manner. Numerous and complex, these problems can be worked out only by the help of the sciences of psychology, physiology, ethics, sociology, and anthropology, and in the light of the spirit of the time, the ideals of the nation, and existing local conditions. Any solution of them, indeed, is impossible, except through the coöperation of the various institutions that make up society: the home, the school, the Church, the diverse vocations, and the State in its several functions. That the present time is marked by progress toward more efficient coöperation between these factors is gratifying.

While there are certain fixed factors in education,

and certain principles of universal application, the greater part of the educational field is characterized by adjustment and change. With the growth of cities, home life is revolutionized; inventions and discoveries make possible and necessary the introduction of new subjects, and the changing of old ones; foreign-born children require a somewhat different curriculum from that of native-born children, city children from country children; in a commercial centre, a high school of commerce is a necessity; an industrial community calls for industrial schools; the children of a farming district should have opportunity to study the elements of agriculture; schools of forestry are the natural preventive of the denudation of forest lands; in an age of pressing economic problems, it is an anomalous condition that the study of economics should be postponed till the college course. The study of Latin clearly cannot hold the same place in the twentieth century that it held in the sixteenth or even the nineteenth.

The expansion of modern knowledge and the complexity of modern life are reflected in the modern crowded curriculum, and in the problems to which it gives rise. In a 'three-R' elementary curriculum, or in a college course consisting largely of Greek, Latin, and mathematics, the choice of studies was only an academic question; with a multitude of subjects to choose from, the question of educational values becomes vital. This question has been asked and answered in various ways. With Herbert Spencer it took the form: What knowledge is of most worth? Spencer's answer was, Science, by which he meant the scientific habit of mind in mastering those subjects which bear on man's efficiency in society, including, primarily, the natural sciences and history, with literature and art subsidiary to these. Nicholas Murray Butler, in an essay bearing the same title, assigns the highest place to those subjects that afford in the highest degree nurture and exercise to man's spiritual nature, and in this judgment modern educators generally agree with him. Attacking this same problem at closer quarters, Commissioner William T. Harris asks the question, What groups of subjects are essential to a complete education? and gives this answer: There are six coördinate groups of studies: (1) Mathematics and physics, which give us the command of nature quantitatively; (2) biological science, which gives us the key to the organic phase of nature; (3) literature and art, which reveal human nature in its intrinsic form, and show man in his relation to social institutions; (4) grammar and language, and studies allied with them, such as logic and psychology, which enable the mind to know itself analytically; (5) history, or the study of the development of the State and its relations to the individual; (6) religion, which looks at human experience and knowledge in their relation to God. An education which should not provide at least the elements of each group would be incomplete.

The question still remains. Upon what principles shall studies be chosen within these groups? A favorite way of approaching this question has been to classify all subjects (1) as giving discipline to the faculties of the mind; (2) as giving practical training for life; (3) as giving culture. Thus, bookkeeping and spelling are valued chiefly for their practical value; algebra

and grammar for their disciplinary value; literature and art for their power to give that sympathy, appreciation, and insight into the meaning of life which we call culture. But it is clear that no subject is without some value in each of these departments. And, further, it appears that much depends on the method of teaching, the purpose in view, and individual attributes; the same study may serve now as a bread-and-butter subject, now as a culture subject, according to circumstances. The same study may train memory or reason, according to the method employed; or the same study may be good for one pupil, and not so good for another. Moreover, with the fall of the faculty theory in psychology, the dogma of formal discipline has been discredited. It is held that there is no such thing as training 'the memory,' and that to transfer skill acquired in one department to another department is not in any strict sense possible. It follows that, in any given case, considerations of environment, aptitude, aim in life, and method must have greater weight in determining the choice of studies than values assigned to studies in the abstract. These considerations furnish justification from one point of view for the expansion of the modern curriculum and the concomitant development of the elective system.

At what point shall studies be introduced? This question is to be answered partly in the light of the capacity of the child, and partly in the light of the culture-epoch theory, which assumes that the child in his development passes through a series of stages corresponding closely to the epochs through which the race has passed in its progress from primitive to modern culture. Gen. Francis A. Walker, after investigating the study of arithmetic in the elementary school, protested against 'prying up' the powers of the child by giving him tasks for which he was not yet ready, and which he could in due time perform naturally and easily. On similar grounds, it has been proposed to decrease the amount of reading and writing called for in the first three years of school; but advocates of this plan seem not to give sufficient weight to the fact that children in these very years show a decided tendency to perform these activities, and a marked ability to master them. It is clear that to postpone the study of mythology and of mediæval history until the child has passed the culture epoch to which they appeal involves waste. The application of this latter principle, however, is made difficult by the fact that the youngest child is a member of the modern world as well as of the primitive world—that he can and must learn about the arrangements for heating and lighting his own house as well as about back-logs and tallow candles.

Children in the elementary school sometimes carry as many as fifteen so-called 'subjects' at one time: how shall they be kept from being overwhelmed by the multiplicity of subjects and interests. Certain well-established principles throw light on the solution of this problem. First, the doctrine of apperception, which asserts that the mind acquires knowledge by means of knowledge already possessed—that what we can learn is conditioned absolutely by what we have to learn with. Secondly, the principle of self-activity, which affirms that the child is not primarily a knowing being, but an active being, whose instincts and impulses

start him on the way to knowledge, and whose practical needs teach him to think. Empirical observation attests the truth of these principles; it has been conclusively shown, for example, that under the old régime children learned the little they had to learn with greater difficulty and strain than they accomplish their greatly increased tasks, if only the work be properly organized and conducted.

In order to understand the various attempts at correlation, it is necessary to consider the evolution of the idea. The revolt against the isolation of studies was the outgrowth of Herbartian doctrines. According to Herbart, 'erziehender Unterricht'—instruction that educates, or education through instruction—expresses the aim and the chief means of formal school work. Now, education means moral character-building, and character is produced by the training and culture of volition—the will being reached only through the emotions, these in turn depending on ideas. But not from ideas in any form and relation do emotional warmth ('interest') and volitional energy spring, but only from those ideas that are knit into a living whole. Hence the fundamental significance in the Herbartian pedagogy of the phrase '*circle of thought*,' by which it is meant that instruction should be both many-sided and closely connected; and hence the capital rôle played in the same system by *interest*—interest being that condition of mind of which the cause is knowledge made real and vital through being related, and of which the effect is volition. The early schemes of correlation were produced in Germany and were characteristically formal, treating correlation as chiefly a question of curriculum, and so perhaps better described as schemes for the *coördination* of studies. Usually, however, German plans of coördination took the form of *concentration*, whereby certain studies were made dominant and others were treated as subsidiary to them. There was no agreement as to what studies should be the core, some choosing literature and history, others natural sciences. In America, under the impulse of Herbartian ideas, much fruitful experimenting has been done, at first after the German manner (taking *Robinson Crusoe*, for example, as the central subject of a year's work and 'relating' arithmetic, geography, reading, drawing, manual training, and other studies to this core), and later in ways independently American. For the most part, this latter work may be described as *informal correlation*. For example, a part of the work of a year or a part of the year in a certain grade may cluster around the reading of *Hiawatha* and the making and decorating of various objects illustrative of the story, no attempt, however, being made to confine the work in arithmetic, geography, and nature-study within the limits of *Hiawatha's* life. Even where correlation is not recognized in the curriculum there is an increased tendency to recognize the manifold inter-relations which exist between all subjects and parts of subjects. In support of such partial schemes it is claimed (1) that variety and difference are as essential to wholesale mental development as are identity and relatedness; (2) that the child studies with intense interest and with assimilation so apparently isolated a study as arithmetic; (3) that a correlating teacher can make an apperceptive child even without a correlated curriculum. But there can be no doubt that waste is

often avoided by studying at the same time subjects related both to each other and to the theoretical and practical interests of the child.

The most important single contribution to this subject made by American educators is the monograph *Interest as Related to Will*, by Prof. John Dewey, in which interest is represented as arising when the child does that which makes for self-expression (self-realization). This view not only places interest in its proper subordinate place, but also makes it clear that a curriculum is not to be worked out in the closet, and that character-building does not necessarily result when the child is occupied with apparently inter-related studies. In the practical working out of this principle, the child, with his manifold impulses to act, his interests, his social relationships, his spiritual environment and heritage, becomes the core of correlation, and those creative social activities that have to do with providing food, clothing, shelter, and aesthetic expression become the gateway both to knowledge and to character. The influence of this insight into the dynamic nature of education (whereby 'educative activity' is substituted for 'educative instruction') has been and is destined to be profound and far-reaching.

In an ideal system of education, the pupil would pass without loss of time or energy from the kindergarten into the elementary school, thence into the high school, college, and professional school. Between the kindergarten and the elementary school, on the one hand, and the college and the professional school on the other, the transition is now, indeed, measurably natural and easy. But the transition from elementary school to high school and from high school to college involves considerable waste, which it is being attempted to obviate through conference, discussion, and experiment.

The foundation principles of education may for the present purpose be summarized in the form of an answer to the question, Wherein does the so-called 'new education' differ from that system which it has replaced or is replacing? Ever since the rise of democratic institutions, there has been developing a new conception of the worth of the individual; and during the past fifty years this conception of the individual has been modified and reinforced by a new conception of society. It is now coming to be vividly realized that the ideal of individual development is realized in the highest social efficiency, and that the ideal social or institutional development demands individuals that have attained perfect self-realization. This insight has been reflected in educational aims and methods. In the old education, based on a certain lack of faith in the individual and on contempt for the body and this present world, the characteristic notes were authority, intolerance, and disregard of hygienic laws; the mainstay in teaching was naturally memorizing. The new education is based on respect and even reverence for humanity—on belief in the worth of the present moment, and on the doctrine of evolution. Its dominant features are, therefore, appeal to individual observation, experience, judgment, reason—enrichment of school programmes; and enlightened consciousness of the differences in individuals, and a consequent tolerance and adaptation. Under the impulse of these conceptions school hygiene is recognized as an important ad-

junct to pedagogics; psychology, instead of dealing only with traits supposed to be common to all, is investigating those peculiar to types and even to individuals; child study makes careful studies of actual children at various stages of development in order to determine effective ways of dealing with each type at each stage. As for educating the child to be a social being, the new education proceeds by regarding and treating him as a social being from the start. The most advanced schools of all grades are those which recognize most fully the possibilities of social training latent in the class, the school, the playground. Constructive work, especially the form known as group work (where all the members of the class are engaged on a common project, each contributing his share) is a fine illustration of how a subject can contribute to both individual and social development. Mention has already been made of the recognition of the need of adjusting the child to his social environment through the curriculum. The bearing of these ideas on moral education is obvious. Morality is to be attained in the individual as such only through his own free and responsible choosing to obey law; it is best to be attained in the individual considered as a social unit by living morally in the society of which he is a member—the family, the school, the neighborhood.

The main objection urged against the new education is that it fails to provide for training that power to "endure hardness as a good soldier" which is the bone and sinew of character; that in suiting school work to the grain of a child's disposition it fails to prepare for those demands of life which go against the grain. It is a sufficient answer to this objection to say: (1) that bone and sinew are none the less firm, and they are the more useful, when developed by growth rather than inserted ready-made; and (2) there is no virtue or strength either in school or in life to be gained by overcoming difficulties merely by a dead pull; the secret of power in performing difficult tasks is the ability to raise any task above the level of drudgery into relation with life as a whole. By giving this power, the new education greatly multiplies the ability to overcome obstacles.

EDUCATIONAL METHODS. The word 'method' is used in two senses: (1) to designate those special rules which are applicable to the teaching of a particular subject; and (2) to designate general modes of procedure applicable to all subjects. Examples of the first are the various methods of teaching reading, as the phonetic method, the sentence method, the word method, &c. Each of these methods can be defended on psychological grounds, yet each is incomplete. The most effective method is that which combines the good points of all methods into one. The final test of a method is not, "Can arguments be made in its favor?" but "Will it work?"

Under the head of 'general method' belongs the doctrine of the *formal steps of instruction*. This doctrine is based on the assumption that the mind must follow a certain order of processes in grasping any subject presented to it: there must be *preparation* of the ideas already in the mind, *presentation* of the new facts, *comparison*, *abstraction*, *generalization*, whereby the meaning of the facts is arrived at and stated in terms; and, finally, *application*, whereby the knowledge thus gained is translated into life. The essential value

of this doctrine lies not so much in its assumption of an unchanging time order of processes, as in its emphasis on the fact that there are certain processes which are essential to a complete act of instruction.

Using 'general method' in the sense of a law of teaching applicable to any subject, the following maxims may serve as examples: (1) In all teaching, whether in instruction or in training, let spirit be uppermost, and mechanism subordinate to it. This is the first and great commandment; upon it are based a multitude of specific directions; such as, thought first, form second; interest first, then criticism; praise first, if possible, and let blame be simply the subtracting from a fund of praise; let the teacher's first aim be to lead the pupil to love a subject, and afterwards he may do what he will; seize the moment of excited curiosity that it may not run to waste—an impulse of the human spirit is a power which the teacher cannot produce at will, but which, unfortunately, he can cramp and suppress; on the other hand, the teacher should make mechanism his ally, not his enemy. 'Drive thy habits, let them not drive thee.' (2) A second general principle may be stated thus: We learn most effectively by our own activity under the spur of a practical interest. We learn least effectively when we are least active and least interested. A teacher who applies this principle will multiply opportunities whereby his pupils may learn by experience, by discovery, by executing; by object lessons, laboratory and shop work and the relations of school life; whereby they may apply what they have heard or read or gained in any second-hand way, thus supplying, though in the reverse order, the element reality. (3) A third general principle of teaching may be described as learning by thinking. The teacher who follows this leads his pupils to avoid being swamped by details, because, grasping together many particulars into a convenient bundle duly tagged, he will form in them the habit of foresight and forethought, and he will develop in them the power to search out meanings and to find the essential point of a problem, a situation, or an argument.

In deciding the order to be followed in teaching the topics in a subject, two conflicting systems have held sway. The first arranges the topics of the subjects in logical order, ignoring the fact that what is first in experience is last in thought, that the psychological order is usually the reverse of logical order. The second arranges the topics with reference to the child's supposed needs; either (1) teaching related processes concurrently (as in the Grube method in arithmetic) and carrying a number of topics abreast, returning to each at more or less regular intervals with increased power, as in the *spiral method*, or (2) determining the order of topics rather by the need of the child than by the strict development of the subject; for example, introducing the subject of osmosis at the point when the children are eager to understand how the root of a plant receives nourishment from the earth.

By the *inductive method* of teaching, a pupil is led from facts to generalizations; for example, in natural science where individual forms are first observed, then classified according to essential characteristics; and in the study of syntax, where the rule is formulated after several cases of the construction are observed and compared.

By the *deductive method*, the teacher or the

author first states a principle and then proceeds to elucidate and exemplify it, as when in grammar the definition of noun is given and then examples of nouns. Each of these methods has its own field, every subject having its deductive and its inductive stage, and every study of any subject being partly deductive and partly inductive. In the *Socratic method*, the teacher asks questions designed to lead the pupil to think about what he already knows, to see his mistakes, revise his judgments, and discover the truth. This method is especially applicable in subjects involving moral or æsthetic judgments, where the pupil has experiences and knowledge more or less unorganized. Akin to this is the *method of discovery*, which leads the pupil to experiment, observe, infer, and formulate conclusions. In all the above methods the principle of self-activity and participation is called in. Often combined with this is the *method of discussion*, in which the teacher proposes, or has members of the class propose, theses to be defended. The advantages and dangers of this method are extreme. Great skill and address, together with the power of summarizing the discussion, are required in the leader. All these methods aim to make the pupils ready, resourceful, self-reliant. They need to be supplemented by some form of the *lecture method* or by the *text-book method*, which are strong on the side of exactness and breadth. The *recitation* (which is the name applied in the United States to class exercises in general) varies in efficiency according to the method pursued. The minimum of advantage results if the time be spent in saying lessons learned memoriter from a book, or in reciting facts more or less known to all the class. A class exercise is at its best when the class is engaged upon some problem toward the solution of which each one, including the teacher, from his peculiar point of view, contributes his proper share. It has been proposed that instead of recitations in which the quick and the slow proceed at the same rate, each pupil should be allowed to go at his own pace under the guidance of the teacher. This plan (known as the *Pueblo plan*), though it contains an element of wisdom, is of only limited application. Its vital defect lies in its failure to recognize sufficiently the social value of the recitation.

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PEDAL (Lat. *pedalis*, relating to the foot, from *pes*, foot). Any part of a musical instrument acted on by the feet. The pianoforte, the harp, and the organ are furnished with pedals, which, however, serve an entirely different purpose in each instrument. In the pianoforte their object is to effect a change in the quality or in-

tensity of the sound; the damper pedal prolongs the sound after the finger is lifted from the key, and the shifting or *una corda* pedal softens the tone. The pedals of the harp are the means by which the chromatic changes of intonation are effected. In the organ the pedals are keys put in action by the feet. The division of the organ which is connected with the foot-keys is called the pedal organ, and contains the largest pipes. The introduction of pedals in the organ has been attributed to various men, among them a German of the name of Bernhard, who lived in the fifteenth century. Pedals known as *combination pedals* are also used in the organ by which certain fixed combinations of stops may be utilized. Recent improvements in organ-building have made possible the choice of such combinations by the performer, who before commencing to play arranges the combinations he wishes to use, to act on the swell and on the stops. See ORGAN.

PEDAL-POINT. See ORGAN-POINT.

PEDDLER. A person who travels from place to place selling at retail goods, wares, and merchandise, which he carries about with him. Peddlers are to be distinguished from ordinary traveling salesmen, who sell goods by sample and have a recognized headquarters from which the goods are shipped. Because of the irresponsible character of most peddlers and the difficulty of tracing fraud or other crime to them, statutes have been enacted in almost all of the United States requiring them to take out licenses and to conform to certain other regulations, such as wearing a badge or shield, bearing their license number, where it can be easily seen. See LICENSE.

PEDEE', GREAT. A river in North Carolina. See GREAT PEDEE RIVER.

PEDESTAL (It. *pedestallo*, base of a pillar, from *piede*, from Lat. *pes*, foot + *stallo*, from OHG. *stal*, Ger. *Stall*, stall). A base for columns, statues, vases, etc. The pedestal is much used in classic (especially Roman) architecture. Like the column, it has a base, a body or central block, and a capital or cornice, usually called the surbase. The shaft or plain block is called the dado or die.

PEDICULARIS (Lat., lousy). A genus of more than 100 herbs of the natural order Scrophulariaceæ, some of which have rather large and finely colored flowers. Several species have been called lousewort, the English equivalent of *Pedicularis*, from their supposed influence in producing the lousy disease in sheep. Their acidity seems to make them injurious as sheep food. Many species are found in Continental Europe and Northern Asia, and some in North America. A few species are cultivated chiefly for their finely cut beautiful foliage. *Pedicularis Canadensis*, wood betony, is the most common species in the United States.

PEDICULATI (Neo-Lat. nom. pl., from Lat. *pediculus*, little foot, diminutive of *pes*, foot). An order of marine fishes having the carpal bones elongated into a kind of arm which supports the broad pectoral fin, and the anterior dorsal fin reduced to a few tentacle-like, mostly isolated, spines: the anglers (q.v.), frog-fishes, etc. See Plate of ANGLERS AND BATFISH.

PEDIGREE (of uncertain etymology; perhaps from OF. *pied de grue*, crane's foot, in allusion to the resemblance of the lines of a pedigree to a bird's foot). Family relationship traced back through a number of degrees or generations, sometimes including the record of births, marriages, and deaths. The term is most frequently employed in the law in connection with a rule of evidence which forms one of the exceptions to the so-called 'hearsay rule' of evidence, and may be generally stated to be, that statements as to the pedigree of the party in question made by a blood relative of that party, as a brother, since deceased, may be repeated by a witness who heard them made. See AFFINITY; CONSANGUINITY; EVIDENCE; KIN, NEXT OF.

PEDIMENT (Lat. *pedamentum*, prop for a vine, from *pedare*, to furnish with feet, from *pes*, foot). The triangular space over the colonnade at the ends of the roof of classic buildings. It is inclosed by the horizontal and the raking cornices, the latter following the slopes of the roof and corresponding to the cornice of the entablature. The pediment may be called the gable of classic buildings. In Greek temples the pediment was frequently enriched with sculpture, for which it forms a fine setting. The finest examples are the pedimental sculptures of the temples of Ægina, Olympia, and the Parthenon at Athens. The doors and windows of buildings of the Renaissance are often surmounted by pediments, either straight-sided or curved, and the form was also used in mediæval structures for façades and minor architectural parts. In such cases the terms to use are more properly gable (q.v.) and fronton.

PEDOMETER (from Lat. *pes*, foot + Gk. *μετρον* *metron*, measure). An instrument resembling a watch and used for measuring distances traveled by walking. Such an instrument usually records on a dial plate the number of steps taken by the person carrying it.

PEDRARIAS DÁVILA, pá'drá-ré'ás dá'vé-lá (c.1440-1530). A Spanish administrator in America, born in Segovia, Spain. Pedro Arias de Avila was his proper name, but historians have contracted it. He distinguished himself in the conquest of Granada, and he served in the New World as governor of the Spanish colonies on the Isthmus of Panama in 1514. He found a rival there in Balboa, whom he finally executed (1517). This deed put Pedrarias out of favor with the Spanish Court, but the emissaries sent to dislodge him failed in their mission, and he continued governor, founded Panama (1519), and extended his sovereignty by settling colonies to the north and south. But he was jealous of any one else attempting the same, hindered Pizarro as much as he could, and had Córdoba beheaded for trying to league himself with Hernando Cortés at Honduras. For these and other tyrannical acts Pedrarias was called upon to exchange the governorship of Panama for that of Nicaragua, where he died.

PEDREGAL Y CANEDO, pá'drá-gál' & ká-ná'dó, MANUEL (1832-96). A Spanish politician and author, born at Grado. He studied law, and took a prominent part in politics as an ardent Republican. After the abdication of Amadeus, in 1873, and during the period of the Republic, Pedregal was twice Minister of Justice, and once Minister of Finance. The following year he re-

turned to private life and devoted himself to study, and to the foundation of the Institución Libre de Enseñanza, of which he was made rector in 1883. He reëntered politics in 1882 as Deputy from Oviedo, and with Azcárate, Salmeron, Labra, and others, organized the Republican party called 'centralista,' which has stood for the best element in radical politics. His works include *El poder y la libertad en el mundo antiguo* (1878); *Estudios sobre el engrandecimiento y la decadencia de España* (1878); *Elección presidencial de los Estados Unidos* (1892); *Naciones de hacienda pública* (1881); and *Sociedades cooperativas* (1888).

PEDRELL, pá-drél'y', FELIPE (1841—). A Spanish writer on music. He was born at Tortosa, studied music, and in his earlier period composed considerably. His works include the operas *El último Ahenerrage* (1874), for which he wrote music and book, *Quasimodo* (1875), and *El Tasso en Ferrara* (1881), and the lyric dramas *Cleopatra*, *Mazeppa*, and (1894) *Los Pirineos*, as well as songs and masses. In all these works there is originality and an evident effort to build up a national musical style. Of even more importance is Pedrell's works as a critic and historian of music. The two great works, *Hispania Schola Musica Sacra* (1894 sqq.) and *Teatro lirico español anterior al siglo XIX* (1897 sqq.), are original and able. His lexicographical labors include *Diccionario técnico de la música* (1894) and a biographical dictionary of Spanish and Portuguese musicians (1897 sqq.).

PEDRO I., Port. pron. pá'dró (DOM ANTONIO PEDRO DE ALCANTARA BOURBON) (1798-1834). Emperor of Brazil. He was the second son of John VI., King of Portugal from 1816, and was born at Lisbon, October 12, 1798. In 1807 the royal family fled to Brazil before the invading armies of France. There John VI., on the death of his mother, Maria I., was crowned King of Portugal, and Dom Pedro, heir apparent since the death of his elder brother (1801), attained much influence in politics in spite of his youth and his rather irregular education. In 1821 King John returned to Portugal and Dom Pedro was made Regent of Brazil. He soon threw in his lot with the Brazilian national party, who were disgusted by the systematic preference shown to the Portuguese in the appointment to high offices in Church and State. The separatist movement attained formidable proportions and on October 12, 1822, Dom Pedro was proclaimed Emperor of Brazil. The slight resistance made by Portugal was easily overcome, and in 1825 the mother country acknowledged the independence of Brazil. The popularity of the Emperor, which was at first very great, was gradually weakened by the arbitrary measures taken against the Republican faction, and his acceptance of a new constitution in 1824 did not materially mend matters. In 1828 the Province of Uruguay succeeded in establishing its independence of Brazil. Opposition to the Government increased, and Pedro at length, April 7, 1831, abdicated in favor of his son, Pedro II., and went to Europe. He had been proclaimed King of Portugal upon the death of his father, in 1826, but had resigned the throne in favor of his daughter, Donna Maria da Gloria, who had been set aside by her uncle, Dom Pedro's younger brother, Miguel (q.v.). The ex-Emperor invaded Portugal in the early part of 1832 with

an army largely made up of English and French volunteers, to make good his daughter's title to the throne. He occupied Oporto in July, and a year later made his entry into Lisbon after his admiral, Sir Charles Napier had vanquished the fleet of Dom Miguel off Cape Saint Vincent. The usurper was forced to abandon all claims to the throne in 1834. In August, 1834, Dom Pedro was chosen Regent of the Kingdom, but he died on September 24th of the same year, two days after the coronation of the young Queen, Donna Maria.

Armitage, *History of Brazil* (London, 1836), gives an excellent account of events during the residence of the Braganza family in Brazil.

PEDRO II. (?-1213). King of Aragon. A brave soldier and a gifted troubador. He succeeded his father, Alfonso II., in Aragon and Catalonia in 1196, and in France he secured the lordship of Montpellier. He was crowned at Rome in 1204, and promised to send a yearly tribute to the Papal chair. His efforts to impose a new tax on his people aroused opposition on the part of the nobility and the towns, and these formed a league against him. In 1212 he entered into an alliance with the kings of Castile and Navarre against the Almohades (q.v.), which resulted in the great victory of Las Navas de Tolosa on July 16. The next year he crossed into France to aid the Albigenses against Simon de Montfort (q.v.), and was killed at the battle of Muret, September 2, 1213.

PEDRO II. (DOM PEDRO DE ALCANTARA) (1825-91). Emperor of Brazil. He was the son of Emperor Pedro I. and was born at Rio de Janeiro, December 2, 1825. He was but five years old when his father abdicated in his favor, April 7, 1831. During his minority the country was governed by a regency. He was declared of age in 1840, was crowned in 1841, and married in 1843 Theresa Christina, sister of Ferdinand II. of the Two Sicilies. His sons died in childhood, and his daughter Isabella became heiress to the crown. The early years of the reign of Pedro II. were marked by revolutionary disturbances within the country and complications with the neighboring South American States. Revolts in the provinces of Sao Paulo and Minas Geraes were suppressed in 1842, as were similar insurrections in Rio Grande do Sul in 1845, and Pernambuco in 1849. In 1851 Brazil assisted General José de Urquiza, Governor of Entre-Rios, in his struggle against Rosas, the dictator of Buenos Ayres, and was instrumental in bringing about the fall of the dictator. A five years' struggle in conjunction with Uruguay and the Argentine Republic against Lopez, the dictator of Paraguay (1865-70), ended in the triumph of the allies. In 1867 Dom Pedro opened the Amazon to the commerce of all nations. In 1871 a law was passed for the gradual abolition of slavery, which was hurried to its completion by popular demonstrations in 1888. Dom Pedro's administration was conducted with tact and good judgment. On November 15, 1889, however, as a result of a revolution instigated by the officers of the Brazilian army, Dom Pedro was forced to abdicate and a republic was proclaimed. A pension was conferred on the ex-Emperor and he was sent to Europe on a Government vessel. Dom Pedro spent the remaining years of his life in France, and died in Paris, December 5, 1891. He was a man of wide culture, and Brazil made

great progress under his guidance. He traveled extensively, both in America and in Europe, and devoted much time to studying systems of government and education.

PEDRO THE CRUEL (1334-69). King of Castile and Leon from 1350 to 1369. He was the son of Alfonso XI and Maria of Portugal, and was born at Burgos, August 30, 1334. On his father's death Pedro succeeded to the throne without opposition. He was greatly influenced by his mother, and Albuquerque, his favorite. His bastard brother, Henry of Trastamare (qv.), plotted against him constantly. But the great opposition which he encountered was due to his marriage, in 1353, to Blanche of Bourbon, whom he abandoned after three days, and a second marriage in 1354 to Juana de Castro, whom he abandoned after two days. The friends of both joined his brothers. He was taken prisoner in 1354, but soon escaped and took cruel revenge. From 1357 to 1361 he was engaged in a war with Pedro IV. of Aragon. Henry of Trastamare, who had fled to France, returned (1366) at the head of a body of exiles, reinforced by Bertrand du Guesclin (qv.) with an army of mercenaries, and aided by Aragon, France, and the Pope. Pedro prevailed upon Edward, the Black Prince, to espouse his cause. Edward invaded Castile in the spring of 1367, defeated Henry and Du Guesclin at Najera, and restored Pedro to the throne. But the King disgusted his chivalrous ally by his cruelty to the vanquished, and paid no heed to his remonstrances; Edward accordingly repassed the Pyrenees, and left the treacherous monarch to his fate. The whole kingdom groaned under his cruelties; rebellions broke out everywhere; and in August, 1369, Henry returned. Pedro's forces were routed at Montiel, and he himself was compelled to retire for safety within the town, whence he was treacherously decoyed and captured by Du Guesclin. He was carried to a tent, where a quarrel took place between him and Henry, in which the latter killed Pedro. Consult: Garcia, *Castilla y Leon durante los reinados de Pedro I., Enrique II., Juan II., Enrique III.*, vol. i. (Madrid, 1891); Burke, *A History of Spain*, vol. i. (London, 1895).

PEEBLESSHIRE, pē'b'l-shēr, or TWEEDDALE. A southeastern county of Scotland, bounded by Edinburgh on the north, Selkirk on the east, Dumfries and Selkirk on the south, and Lanarkshire on the west (Map: Scotland, E 4). Area, 355 square miles. The surface generally is mountainous, 450 feet above the level of the sea at the lowest point and attaining a maximum altitude of 2754 feet in Broadlaw. The principal river is the Tweed (whence Tweeddale) and its affluents. The arable lands are in the valleys, the highlands being chiefly pastoral. Cereals are largely grown and green crops. Coal is mined and there are deposits of ironstone and limestone. Woolens are manufactured. Capital, Peebles. Population of county, in 1891, 14,750; in 1901, 15,066. Consult Chambers, *A History of Peeblesshire* (Edinburgh, 1864).

PEEKSKILL. A village in Westchester County, N. Y., forty-one miles north of New York City; on the east bank of the Hudson River, just below the Highlands, and on the New York Central and Hudson River Railroad (Map: New York, G 4). It has several private secondary schools and the Field Library, with over 6800

volumes; Helping Hand Hospital, St. Joseph's Home, a House of the Good Shepherd, and the State Military Camp. There are extensive manufactures of stoves, fire brick, hats, underwear, foundry products, blank books, etc. The water works are owned and operated by the municipality. Peekskill was settled in 1764, and derives its name from Jans Peek, an early Dutch navigator. It was incorporated as a village in 1816 and was reincorporated in 1827. Near it is the famous Robinson House, the headquarters of Generals Putnam and Parsons in 1778-79, and of Arnold in the summer of 1780. It was here that Arnold first learned of the capture of André. Population, in 1890, 9676; in 1900, 10,358.

PEEL. A seaport town and a favorite watering resort on the west coast of the Isle of Man, England (Map: England, B 2). It was formerly called "Holm." Its fisheries are productive, and the building of vessels of small tonnage and the manufacture of nets are carried on extensively. At the northern extremity of the bay on which it stands are several grotesque and romantic caverns. The southern extremity is formed by Peel Island, which contains the grand old ruins of Peel Castle, described in Scott's *Peveril of the Peak*. The castle was formerly the frequent residence of the earls of Derby, then lords of the Isle of Man, and is expressly named in the original grant of Henry IV. to the Stanley family. It incloses a 'round tower' and the ruins of a cathedral, beneath which is a strong subterranean dungeon, where many notable persons were imprisoned. Population, 3600.

PEEL, PAUL (1860-92). A Canadian artist, born in London, Ontario. At the age of sixteen he went to the Pennsylvania Academy of Fine Arts in Philadelphia, and in 1880 to the Royal Academy, London, thence to Paris, where he studied with Gérôme, Boulange, and others. He was a pupil of Benjamin Constant for nearly five years and achieved great skill as a colorist, especially in flesh tints as shown in nude children. In 1889 he obtained an honorable mention at the Paris Salon for his painting "How Bitter Life Is," and the following year was awarded a gold medal for "After the Bath," which was acquired by the National Gallery at Budapest, Hungary. Queen Alexandra bought his "Two Friends" for Buckingham Palace, and "Fording the Stream" hangs in the City Hall, Toronto. His other pictures include "The Unwilling Model," "In Punishment," "The Unexpected Meeting," and "The Twins."

PEEL, Sir ROBERT (1788-1850). An eminent British statesman. He was born on February 5, 1788, the eldest son of Robert Peel (created a baronet in 1800), a wealthy cotton-spinner. Peel was educated at Harrow and Christ Church, Oxford, graduating from the latter in 1808. In 1809 he entered the House of Commons, where he began his career in supporting the Tory Ministry of the Duke of Portland. In 1810 he was appointed Under-Secretary for War and the Colonies. In 1812, Lord Liverpool having meanwhile become Prime Minister, Peel became Chief Secretary for Ireland. In this capacity he had to consider three great questions: patronage, the preservation of order, and the maintenance of the Protestant ascendancy. In order to carry out these affairs successfully, Peel ignored all personal ends, and appointed Catholics and Protestants alike,

thus strengthening his party. He created the Irish constabulary, dubbed 'Peelers,' and became involved in such a bitter contest with Daniel O'Connell (q.v.) that he was driven in 1815 to send the agitator a challenge. The police, however, prevented the duel from taking place. Peel remained Irish Secretary until 1818, when he resigned. He had been chosen in 1817 the representative of Oxford in Parliament, an unusual honor for so young a man. He also began about this time to acquire a reputation as a financier and economist; and in 1819 he was appointed chairman of a special committee to consider the state of the Bank of England. As a result the so-called 'Peel's Act' was adopted, according to which specie payments were resumed on May 1, 1823.

Peel had been a vigorous opponent of all acts intended to emancipate the Catholics, but about this time his views gradually began to change, though the process was so slow that after he had reëntered the Ministry in 1822 as Home Secretary he continued to oppose the measures of Canning, the most powerful advocate of the Catholics, and in 1827, after Canning had become Prime Minister, Peel resigned. In 1828 he again became Home Secretary in the Cabinet of the Duke of Wellington. By this time Peel decided to support Catholic emancipation, and on March 5, 1829, himself introduced a bill to effect this change, which soon became a law. As a result of this reversal of his views, Peel no longer remained the representative of Oxford. He also brought about at this time numerous reforms in the laws, and in 1829 established the London police force.

In November, 1830, the Cabinet was defeated, on the question of Parliamentary reform, and Peel for the first time belonged to the Opposition. He vigorously attacked the Reform Bills, and played an important part in the various dramatic episodes of that time. On December 9, 1834, he became Prime Minister, and tried to carry on the Government in the face of an overwhelming hostile majority, but on April 8, 1835, he was compelled to give up the contest. He began slowly, but surely, to build up the great Conservative Party, so called since 1831, and gathered together under his leadership young men like Disraeli and Gladstone. In 1839 the Conservative leader was summoned on one occasion to form a Cabinet, but Queen Victoria refused to submit to changes in the personnel of her household, and so the Whigs remained in power. They were, however, pressed on the one side by the new Radical Party and the Anti-Corn League, and on the other by O'Connell. They lost ground, and in 1841 were compelled to dissolve Parliament. The general election that ensued was virtually a contest between free trade and protection, and the latter won. When the new Parliament met, the Conservative Party, headed by Peel, came into office. The Whigs desired a fixed and moderate duty on foreign corn; the Anti-Corn League wished free corn; while Peel was in favor of a modification of the sliding scale of duty which had existed since 1828. He introduced and carried in 1842, in spite of strong opposition, a measure based upon this principle. The deficit in the revenue, which had become quite alarming under the Melbourne Administration, next engaged his attention, and led him to bring in a bill (1842) for the imposition of an 'income tax' of 7d. in the pound, to

be levied for three years. To equalize still further the burdens of taxation, Peel commenced a revision of the general tariff, and either abolished or lowered the duties on several very important articles of commerce. The great Bank Charter Act of 1844 was the measure to which Peel himself felt most attached, and which he considered the most important and far-reaching of his Administration. He also showed himself resolute in the repression of the malcontents of Ireland. O'Connell (q.v.) was tried for conspiracy, and though the judgment against him was set aside on appeal to the House of Lords, the influence of the 'agitator' was broken. The first half of 1845 was marked by the increase of the allowance to Maynooth and its change into a permanent endowment instead of an annual grant, and by the foundation of the Irish nonsectarian colleges and other important measures. The potato-rot in Ireland during the autumn, followed by a frightful famine, rendered 'cheap corn' a necessity, if millions were not to starve. Cobden and the League redoubled their exertions. Lord John Russell announced the views of the Liberal Party on the crisis, and Peel finally yielded. He told his Ministerial colleagues that the corn-laws were doomed, and their repeal was inevitable. Some of them refusing to go along with him, he resigned; but after a few days he was recalled, and the repeal was carried. He was, however, immediately afterwards defeated on a protection of life bill for Ireland. Not so much upon this account, as because he felt that the course which he had pursued had produced a dissolution of the old ties of party, and that he could not expect for some time to find himself at the head of a strong Government, Peel retired from office in June, 1846, giving place to a Liberal Administration under Lord John Russell, to which he gave an independent but general support as the leader of a middle party rather than Liberal or Conservative. In the critical times of 1847-48 he was one of the most important props of the Government, whose free-trade principles he had now completely accepted. His ecclesiastical policy had also undergone a remarkable change, and he now frankly supported the Liberals in their efforts to carry an act for the repeal of the Jewish disabilities. On June 28, 1850, he spoke with great eloquence in the debate on Lord Palmerston's Greek policy. On the following day he was thrown from his horse in Hyde Park, and was so much injured that he died on the evening of July 2, 1850.

The best authorities for a study of Peel are: *Collection of Speeches Delivered in Parliament* (4 vols., London, 1853); Stanhope and Cardwell, *Memoirs by Peel* (ib., 1857); Hardinge and Peel, *Sir Robert Peel: His Life and His Private Correspondence* (ib., 1891). A great number of biographies of Peel exist. Among the best may be named: Taylor and Mackay, *Life and Times of Sir Robert Peel* (London, 1846-50); Doubleday, *The Political Life of Sir Robert Peel* (ib., 1856); Sir Lawrence Peel, *Life and Character of Sir Robert Peel* (ib., 1860); Guizot, *Sir Robert Peel: Etude d'histoire contemporaine* (ib., 1856). Consult also "Peel," in *Tweeler English Statesmen Series*, in *Prime Minister of Queen Victoria Series*, and in *Statesmen Series*.

PEELE, GEORGE (c.1558-c.1597). An English dramatist. He was educated at Christ's Hospital

School, where his father was a clerk, and at Christ Church, Oxford, graduating B.A. in 1577, and M.A. in 1579. On returning to London he was driven from the precincts of Christ's Hospital owing to his dissipated conduct. He seems to have been a skillful player as well as a playwright. His chief plays are the *Arraignment of Paris*, performed before the Queen probably in 1581; *Edward I.* (printed 1593), one of the earliest historical plays in English; *The Battle of Alcazar* (printed 1594); *The Old Wives' Tale* (printed 1595); and the richly Oriental *David and Bethsabe* (printed 1599). Though Peele's dramatic work has less importance than Greene's and Marlowe's, it yet helped prepare the way for Shakespeare. Peele wrote a couple of pageants, also, and among his miscellaneous writings are "An Eclogue Gratulatory," addressed to the "Renowned Shepherd of Albion's Arcadia, Robert, Earl of Essex," and "The Beginnings, Accidents, and End of the Fall of Troy," important because Shakespeare may have got from it the idea of treating fully the theme of *Troilus and Cressida*. Peele's style is often highly poetical. His verses are sweet, but his rhyme seems faulty. Many of the lyrics and pastorals scattered through his plays have great charm. Consult his *Works*, ed. by Bullen (London, 1888).

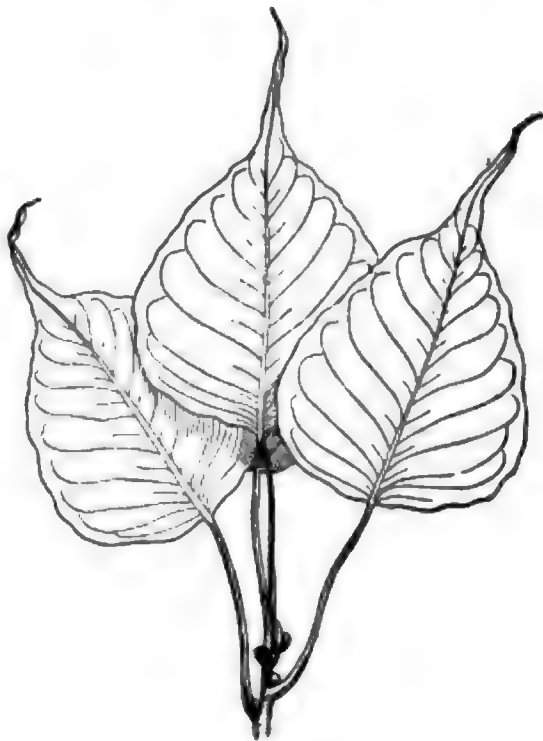
PEELE, JOHN THOMAS (1822—). An English-American genre painter, born in Peterborough, England. He came to the United States at an early age, and was self-taught. He began by painting portraits, but after 1846 took up genre painting, especially of juvenile subjects. He settled in England about 1851. His works include "The Children of Robert Thornton," and "Children of the Wood," bought by Prince Albert of England.

PEENE, pā'ne, HIPPOLIET JAN VAN (1811-64). A Flemish dramatist. He was born at Caprycke, in East Flanders, studied medicine at Louvain, and practiced in Ghent from 1837 to his death. Besides a popular song, *De Vlaamsche Leeuw*, for which the music was written by Karel Miry, Peene's work was for the stage. As early as 1835 he had written a French vaudeville, *La vicillesse de Stanislas*. His *Keizer Karel* (1847) is the first example in Flemish of the same genre. Of his later plays the more important are: *Brigitta* (1847), an opera; *Jan de Vierde* (1848), an historical drama; *Vader Cats* (1855); and *Jellen en Mictje* (1858), as well as texts for French opera. His collected works in thirty-eight volumes appeared at Ghent (1880-82).

PEEPER. One of the small tree-frogs which in early spring are heard peeping all over the country as the sexes gather in the ponds and puddles for breeding purposes. The first voice heard in this chorus of early March in the Northern States is that of Pickering's or the little yellow tree-toad (*Hyla Pickeringii*). In the Southern States a small greenish peeper, very common, is *Hyla squirella*.

PEEPING TOM OF COVENTRY. The only person in Coventry who disobeyed the injunction not to look out on the street while Lady Godiva (q.v.) rode by. The name has become a conventional term for an inquisitive person.

PEEPUL, PIPUL, or PIPPUL (Hind. *pipal*, from Skt. *pippala*, long pepper, sacred fig-tree), *Ficus religiosa*. A species of fig (q.v.) known in Ceylon as the bo tree. It somewhat resembles the banyan, but the branches do not root like those of that tree, and the leaves, rounded at the base, have long attenuated points which are considered special devices for carrying off the water from leaves, a necessary device in wet tropical



PEEPUL.

forests. The tree, which often attains a height of 100 feet or more, is held sacred by the Hindus, who maintain that Vishnu was born under it, hence its name sacred fig. It is frequently planted near temples, and religious devotees spend their lives under its shade. The Buddhists also held it sacred. It is often planted for shade near houses, and by the side of walls. The juice contains caoutchouc, and is used by women as bandoline. Lac insects feed upon the tree, and much lac is obtained from it. The fruit is not much larger than a grape, and, although edible, is not valued.

PEER (OF. *per*, *pair*, Fr. *pair*, peer, equal, from Lat. *par*, equal). A general name applied to the various members of the titled nobility of England. The peerage comprises the ranks of duke, marquis, earl, viscount, and baron. The dignity of the peerage, still hereditary, was in early times also territorial. Life peerages seem to have been not unknown at one time in England; but in 1856, in the case of the law lord Baron Wensleydale, the House of Lords ruled that his creation "for and during the term of his natural life" did not convey the privilege of a seat and a vote in their House. Women may be peeresses in their own right, either by creation or by inheritance. In France the great vassals of the Crown were very early known as peers, while the legal fiction of a semi-equality with the King was still maintained; the title occurs under Robert I. and Louis VII., though the earliest letters patent creating a peerage which are known are those issued by Philip IV. in favor of Robert II., Count

of Artois. Under Philip Augustus there were six lay peers and six ecclesiastical. When three of the lay peerages were extinguished by union with the Crown, the King created new ones, at first of the blood royal, to counterbalance the ecclesiastical peerages. The policy of Richelieu and Louis XIV. reduced the prerogatives of the peerage to a simple question of precedence, the debates over which occupy such a large part of Saint-Simon's memoirs. Their only privilege was that of sitting in the parliaments and being judged only by these high courts. At the Revolution there were forty-nine peerages, including five princes of the blood, six spiritual peers (the same archbishops as in the Middle Ages), and thirty-eight lay peers, ranging in seniority from Uzès, 1572, to Aubigny, Choiseul, and Coigny, 1787. The peerage was then suppressed. From 1814 to 1848 a House of Peers was in existence, modeled on the English Upper House. Hereditary succession was abolished in 1830.

PEER GYNT, pâr gunt. A dramatic poem by Henrik Ibsen (1867). It has been called the Scandinavian *Faust*, and is a satire on certain Norwegian traits exemplified in the hero. It has, however, a broader application as the story of a human soul. Peer Gynt, as the drama begins, is a peasant, dreamy, selfish, sordid, superstitious, and a liar, leading a life of smatterings. Later the scene changes to foreign lands where Gynt apparently has prospered, but his character remains unchanged. At last, in old age, he returns to his early home, and realizes the worthlessness of his miserable existence, but is saved from utter despair by the devotion of the woman who has loved him from his youth. In spite of its dismal theme, the poem is varied and witty, full of allusions to Northern folk-lore, the name and nature of Peer Gynt being taken from a folk-tale of that title. The composer Grieg has a suite named from the poem and suggested by its theme.

PEERLKAMP, pâr'kâmp, HOFMAN PETER (1786-1865). A prominent Dutch Latinist and critic. He was born at Groningen, studied there and at Leyden, where, after teaching in Haarlem and Dockum, he became professor of classics and ancient history (1822). This chair he resigned in 1848 because of ill health. As a classical scholar, he had a remarkably brilliant style and a purely subjective standard of criticism which led him to judge as interpolations much of Latin poetry. Peerlkamp edited Horace's *Odes* (1834; 2d ed. 1862), his most famous work: Vergil's *Æneid* (1843); Horace's *Ars Poetica* (1845) and *Satires* (1863); as well as Tacitus's *Agri-cola* (1827; 2d ed. 1864) and the works of Xenophon of Ephesus (1818); and he wrote much on the history of Dutch literature and classical scholarship. He founded (1825) the *Bibliotheca Critica Nova*. Consult Leopold, *Studia Peerlkampiana* (Groningen, 1892).

PEERS, RICHARD (1645-90). An English author and translator. He was the son of a tanner and was born in Lisburn, in the County of Antrim, Ireland. Disliking his father's trade, to which he was apprenticed, he ran away to England, where he was sent to school by an uncle. He graduated B.A. from Christ Church, Oxford, in 1668, and M.A. in 1671. In recognition of his scholarship, he was elected esquire bedell in the faculty of arts (1675) and afterwards in the

faculty of physic. Under the supervision of Dr. John Fell (q.v.), he translated into Latin Anthony à Wood's *History and Antiquities of Oxford* (1674); and unaided made the first catalogue of Oxford graduates under the title of *A Catalogue of Graduates in Divinity, Law, and Physic*, etc. (1689), and contributed to the famous *English Atlas* (vol. iv.) of Moses Pitt, *The Description of the Seventeen Provinces of the Low Countries or Netherlands* (1682). He also published *Verses on Sundry Occasions* (1667). His life was passed in and near Oxford.

PEERYBINGLE, Mrs. In Dickens's *Cricket on the Hearth*, the devoted and cheery little wife of the Carrier John Peerybingle. Her husband called her *Dot*, under which name Dion Boucicault's dramatization of the story was presented in 1862.

PEET, HARVEY PRINDLE (1794-1873). An American educator, born at Bethlehem, Conn. He graduated at Yale in 1822, and two years later became superintendent of the American Asylum for the Education of the Deaf and Dumb, the first institution of the kind in this country. In 1831 he became president of the New York institute for the deaf and dumb. He was the author of *A Course of Instruction for the Deaf and Dumb* (1844-46), and of several other works on deafness and on insanity.

PEET, STEPHEN DENISON (1830-). An American archaeologist, born at Euclid, Ohio. He graduated at Beloit College in 1851, studied theology at Andover, Mass., and after 1854 was pastor of Congregational churches in Racine and Clinton, Wis., Ashtabula, Ohio, and Mendon, Ill. He became editor of the *American Antiquarian* and published *History of Early Missions in Wisconsin* (1886), *Religious Beliefs of the Aborigines of North America* (1888), *The Clan Centres and the Clan Habitat of the Effigy Builders* (1891), *The History of the Explorations in the Mississippi Valley* (1896), and *Prehistoric America* (3 vols., 1890-99).

PEFFER, WILLIAM ALFRED (1831-). An American lawyer and legislator, born in Cumberland County, Pa. He was entirely self-educated. In 1853 he settled in Indiana, in 1859 in Missouri, and later in Illinois. He enlisted in the Eighty-third Illinois regiment in 1862, was mustered out as lieutenant in 1865, and, removing to Kansas, established the *Fredonia Journal* and the *Coffeyville Journal*. In 1874 he was elected to the State Senate, in 1880 was a Republican Presidential elector, and in 1881 assumed the editorship of the *Kansas Farmer*. From 1891 to 1897 he represented the People's Party in the United States Senate, and in 1898 was nominated by the Prohibitionists for Governor of Kansas. Among his publications are: *Peffer's Tariff Manual* (1888); *The Way Out* (1890); *The Farmer's Side* (1891); *Americanism in the Philippines* (1900); *Rise and Fall of Populism in the United States* (1900).

PEGASUS (Lat., from Gk. Πήγασος; connected with πηγῆς, *pēgōs*, strong, πηγύς, *pēgynai*, to fasten; popularly derived from πῆγῃ, *pēgē*, spring). In Greek legend, a winged horse, begotten by Poseidon on the Gorgon Medusa, and with Chrysaor springing from her neck when she was beheaded by Perseus. Later by the aid of Athena he was caught at the spring Peirene in

Corinth by Bellerophon, who used him in his conflict with the Chimæra, and his later wars. Afterwards he was said to have flown to heaven, and later writers told how he had been placed among the stars. The Alexandrian poets seem to have been the first to attribute the spring Hippocrene on Mount Helicon to a blow of Pegasus's hoof, and the same story is found in connection with Aganippe and several other fountains in Greece. This story brought Pegasus into connection with the Muses of Mount Helicon, and as the spring-inspired poets we find them honoring Pegasus for his gift. As the poet's horse on which he is carried from the earth into the realms of poetic fancy, Pegasus is unknown to antiquity. That conception seems to appear first in Boiardo's *Orlando Innamorato*. Consult Hannig, *De Pegaso* (Breslau, 1901).

PEG'GOTTY. The name of a family in Dickens's *David Copperfield*, consisting of Clara Peggotty, David's devoted nurse, who married Barkis, the carrier, her brother Dan, and nephew Ham, Yarmouth boatmen, who live in a remodeled barge with Little Emily and Mrs. Gummidge.

PEGMATITE (from Gk. *πέγμα*, *pēgma*, anything fastened together, from *πηγνύναι*, *pēgnynai*, to fasten). A coarse-grained rock of siliceous composition occurring in dikes or veins and generally in association with a parent mass of granite rock. Most pegmatites have the composition of a siliceous granite. They are made up chiefly of feldspar (orthoclase, microcline, plagioclase), quartz, and muscovite; but they are also the home of many of the minerals containing rarer chemical elements, such, for example, as boron, beryllium, uranium, cerium, etc. Pegmatites supply the feldspar for porcelain and the mica for isinglass. They are in part of igneous and in part of aqueous or aqueo-igneous origin.

PE'GRAM, JOHN (1832-05). An American soldier, born at Petersburg, Va. He graduated at West Point in 1854, and was assigned to frontier duty with the First Dragoons. On February 28, 1857, he was appointed first lieutenant. He served as assistant instructor of cavalry, and took part in the Utah Expedition of 1857-58. From 1858 to 1860 he was on leave, traveling and studying in Europe, and on his return served against the Indians in New Mexico. He resigned on May 10, 1861, and became a captain of cavalry in the Confederate army. In June and July he was lieutenant-colonel in General Garnett's operations around Beverly in western Virginia, and was captured at Rich Mountain (July 11). When exchanged, he was sent in July, 1862, to General Bragg in Mississippi as chief of engineers, and afterwards was chief of staff for Gen. E. Kirby Smith in Tennessee. He was made brigadier-general of cavalry in November, 1862, was engaged at Murfreesboro, and commanded a division at Chickamauga. He was transferred to the Army of Northern Virginia, Early's division, Second Corps, and repulsed at attempt to turn the right Confederate flank at the Wilderness. He served in the campaign against Sheridan in the Shenandoah in the fall of 1864, and was promoted major-general. While on service around Richmond he was mortally wounded in the skirmish at Hatcher's Run in February, 1865.

PEGU, *pè-goo'*. A division of Lower Burma (q.v.), British India (Map: Burma, C 3). Area, 13,106 square miles. Population, in 1891, 1,522,500; in 1901, 1,819,000. It comprises the districts of Pegu, Rangoon, Hanthawaddy, Tharrawaddy, and Prome. It is watered by the Irrawaddy, the Rangoon, the Pegu, and the Sittang. The surface is uneven, attaining in the Aracan Yoma Mountains, on the west boundary, a maximum altitude of about 6000 feet. The climate is warm and humid, but not unhealthful. The soil is fertile; the river valleys are well cultivated and highly productive; and there are extensive forests of valuable trees. Rice is the principal crop, and teak timber is largely exported. The Peguans belong by race to the Mons (q.v.), one of the great groups of primitive peoples of Indo-China. Pegu was an independent Talaing kingdom until 1752; its subsequent history is merged with that of Burma (q.v.). It became British in 1852.

PEGU. The capital of a division of Southern Burma, on the Pegu River, at its confluence with the Irrawaddy, 40 miles northeast of Rangoon (Map: Burma, C 3). Before its destruction by Alompsa in 1757 it was a large and fine city, said to have had over 100,000 inhabitants. Its population is now about 12,000. It contains a number of interesting pagodas, a colossal recumbent figure of Buddha, and many ancient relics.

PEHLEVI, *pā'la-vē*, more correctly *pāk'la-vē*. See PAHLAVI LANGUAGE AND LITERATURE.

PEI-HO, *pā'hō'* or *pī'hō'* (Chin., white river). The most important river of North China (Map: China, E 4). It rises near the Great Wall north of Peking, flows southward, receiving several tributaries, past T'ung-chow fu, 12 miles east of Peking, to Tien-tsin, where it takes a southeastern course and falls into the Gulf of Pe-chi-li at Taku (q.v.), its course being wholly within the Province of Chi-li. At Tien-tsin it receives from the northwest the Hun-ho, swollen by the accession near its confluence with the Pei-ho of the waters of many rivers, with numerous feeders, from the west and southwest. Here, also, it connects with the Grand Canal. Its course is very tortuous, especially below Tien-tsin, the distance from that point to Taku by water being 80 miles, but only 35 by land. Its waters are thick with silt, but are navigable by coast and river steamers as far as Tien-tsin and by native vessels above that point to T'ung-chow. There is a bar of stiff clay at its mouth which greatly impairs its value as a waterway, and the water along the coast is so shallow that heavily laden vessels cannot approach nearer than eight miles. The total length of the river is estimated at 350 miles.

PEILE, *pāl*, JOHN (1838—). An English philologist, born at Whitehaven, Cumberland. He studied at Christ's College, Cambridge, where he was fellow and lecturer in 1860, and in 1887 master. Peile took much interest in university extension. He published: *Introduction to Greek and Latin Etymology* (1869) and *Primer of Philology* (1877), both popular works; *Notes to the Tale of Nala* (1881); and a *History of Christ's College* (1900).

PEINE, *pī'ne*. A town in the Province of Hanover, Prussia, on the Fusa, 20 miles south-east of Hanover (Map: Prussia, D 2). It has cattle markets, breweries, and manufactures of iron, sugar, furniture, jute goods, malt, artificial

guano, etc. Population, in 1890, 10,100; in 1900, 15,400. Peine was founded in the ninth century.

PEINE FORTE ET DURE, pân fôrt & dÿr (OF., strong and hard punishment). A punishment formerly imposed by the laws of England upon persons who, on being arraigned for felony (q.v.), refused to plead, stood mute or peremptorily challenged more than twenty jurors, which was considered a contumacy equivalent to standing mute. By the early English law, an accused person must plead 'guilty' or 'not guilty' before he could be tried, and the form of coercion hereinafter described was devised to force an accused person to plead in case of his obstinate refusal.

In the beginning of the thirteenth century the penalty consisted merely of a long imprisonment and a low diet, persisted in until the prisoner submitted. However, by the reign of Henry IV. it had become the practice to lay the accused on his back on a bare floor, place on his body as great a weight of iron "as he could bear, and more," and give him only the 'worst' bread and water from the nearest stagnant pool until he consented to plead or died. During the fifteenth, sixteenth, seventeenth, and even the eighteenth centuries, a number of cases are recorded of the infliction of the above punishment for 'standing mute' on an arraignment for felony.

This form of coercion of a plea was finally abolished in 1772, by the statute of 12 Geo. III., chap. 20, which provided that 'standing mute' on an arraignment for felony should be considered as equivalent to conviction. This harsh rule was altered by the statute of 728 Geo. IV., chap. 28, by the humane provision that a plea of 'not guilty' should be entered in case of the refusal of a prisoner to plead, and this rule prevails everywhere to-day.

American records are stained by only one well-authenticated instance of the infliction of this torture. One Giles Cory, accused of being a witch, refused to plead on his arraignment, and was pressed to death at Salem, Mass., in 1692. Consult Stephens, *History of the Criminal Law of England* (London, 1883).

PEIPUS, пі́пусъ (Russ. *Tekudskoye Ozero*). A large lake in the Baltic Provinces of North-western Russia. It lies 30 miles south of the Gulf of Finland, into which it is drained through the Narova River (Map: Russia, C 3). It is 45 miles long and 20 miles broad, and connects southward through a narrow channel with Lake Pskov. Its banks are low and sandy, and for the greater part wooded, and it is rich in fish, which supply the markets of Saint Petersburg. The lake is deep enough for large vessels, and is navigated by steamers. It was formerly the chief waterway between the Hanse towns of the Baltic and the interior of Russia.

PEIRCE, pîrs or pîre, BENJAMIN (1809-80). An American mathematician and astronomer, born at Salem, Mass. He graduated at Harvard College in 1829. He became tutor there in 1831; professor of mathematics and physics in 1833, and Perkins professor of mathematics and astronomy in 1842, which position he held till his death. In 1849 he became consulting astronomer to the *American Ephemeris and Nautical Almanac*, and in 1855 one of the council to organize

the Dudley Observatory, Albany. In 1867 he succeeded Professor A. D. Bache as superintendent of the Coast Survey, in which service he continued till 1874. In his early life he was a contributor to the *Mathematical Miscellany*, and also published the *Cambridge Miscellany of Mathematics, Physics, and Astronomy*, in which appeared his celebrated investigation of the motion of a top spinning on a plane surface. He also prepared a series of mathematical text books for the use of the university, and it was chiefly by his exertions that the Harvard Observatory was established and perfected. In 1851 he published in the *Astronomical Journal* remarkable papers on the constitution of Saturn's rings, in which he considered the conditions of statical equilibrium of a transverse section of the ring, and came to the conclusion that if there are separate rings, they must be more numerous than Laplace had even supposed. (See SATURN.) In 1857 he published the *System of Analytical Mechanics*. Among his important contributions to mechanics may be mentioned his investigation of the forms of an elastic sac containing a fluid, a subject which led to the theory of analytic morphology. His contributions to mathematics are of the broadest and profoundest character. They are principally embraced in certain communications on *Linear Associative Algebra*, to the National Academy of Sciences, which had been suggested by the publication by Hamilton in 1852 of his quaternions. These communications were collected in 1870, and 100 lithograph copies were published. It was reprinted in the *American Journal of Mathematics* (1882). Peirce was a member of various learned societies in Europe and America.

PEIRCE, BENJAMIN OSGOOD (1854-). An American mathematician and physicist, born in Beverly, Mass. He graduated at Harvard in 1876; studied in Leipzig and Berlin after acting as assistant in physics at Harvard for a year; taught in the Boston Latin School; was instructor in mathematics at Harvard from 1881 to 1884, and was promoted from an assistant professorship to the Hollis chair of mathematics and natural philosophy. He contributed to the *Proceedings of the American Academy of Sciences* many papers on magnetism, electricity, and heat, and published a *Table of Integrals* (1899).

PEIRCE, BRADFORD KINNEY (1819-89). A minister of the Methodist Episcopal Church. He was born at Royalton, Vt., graduated at Wesleyan University, Middletown, Conn., 1841, and joined the New England Conference 1846. He was editor of the *Sunday-school Messenger and Sunday-school Teacher*, 1844-45; agent of the American Sunday School Union 1854-56; State Senator 1855-56; superintendent and chaplain of the State Industrial School, Lancaster, Mass. 1856-62; chaplain of the house of refuge on Randall's Island, New York, 1862-72; editor of *Zion's Herald*, 1872-1888; financial agent for Boston University, 1889. He wrote *The Bible Scholar's Manual* (1847); *Notes on the Acts* (1848); *The Eminent Dead* (1851); a series of question books for Sunday-school scholars (1849-52); *Trials of an Inventor* (1866); *The Word of God Opened* (1868); *A Half Century With Juvenile Delinquents* (1869).

PEIRCE, CHARLES SANDERS (1839-). An American physicist, born in Cambridge, Mass. He graduated at Harvard in 1859, and at the

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the ship-worm (q.v.), are injurious. The mollusks of this class vary in size from a small fraction of an inch up to the giant clam (q.v.) of the East Indies, which reaches three feet in length. In many species the shells are very beautiful, the interior being lined with nacre, or mother-of-pearl. Pearls (q.v.) are formed in many, especially in the pearl oyster and fresh-water mussels. Bivalves inhabit all parts of the world in both salt and fresh water, and form a highly important part of the food of many valuable fishes, especially those of the cod family, as well as of other marine animals. About 14,000 species are known, 8000 or 9000 of which are fossils; and they are generally grouped in five orders, distinguished by the character of the gills.

See MOLLUSCA and authorities cited thereunder; Colored Plate of CLAMS AND EDIBLE MUSSELS and Plate of ABALONE, ETC.

PELÉE, pā-lā', MONT (or more properly, MONTAGNE PELÉE). An active volcano of the island of Martinique, situated in its northwestern part, in about latitude 14° 48' N. The elevation of the Morne de La Croix (the culminating point at the time) previous to May, 1902, was about 4300 feet; of the newly formed cone, with its extended 'plug' or obelisk, in May, 1903, 5200 feet. The mountain has exceedingly gradual slopes, which rise with gradients of from five to twenty-five degrees, and is constructed of alternating lava-masses (andesite) and fragmental agglomerates. Its surface is scarred by deep ravines and waterways, the latter numbering about twenty-five, the majority of the streams taking individual courses to the sea. Among the most noted of these are the Rivière Blanche (lying in the course of the devastated region), the Rivières Précheur, Grande, Basse-Pointe, Falaïse, and Roxelane, the last-named flowing through the town of Saint Pierre. Prior to the eruption of May 8, 1902, a small tarn, the Lac des Palmistes—often, but probably erroneously, referred to as a crater-lake—occupied the flattened summit of the volcano, and was surrounded by beautiful and rank vegetation. The only historically recorded eruptions of Mont Pelée are those of 1762, August, 1851, and 1902-03 (those of May 8, 20, 26, June 6, July 9, and August 30, 1902, being especially accentuated), all having taken place from craters or *soufrières* located on the western and southwestern slopes of the mountain, and at elevations of from 2400 to 3000 feet. The great eruptions of 1902 were from the basin of the Etang Sec, or 'Dry Lake,' near the head of the Rivière Blanche, this being the true crater, a wild basin, about a half mile in greatest diameter, surrounded in greater part by rugged walls of rock 1600 feet or more in height. The seaward face of the Morne de La Croix plunged at an angle of 75° into this crater-basin. The active opening of this crater, the general character of which had been recognized fifty years before, was on April 25, 1902: from it, on May 5th, descended the 'avalanche' of boiling black mud that destroyed the sugar estate (*usine*) of Guérin, and buried beneath its mass thirty or more of the workmen (and proprietors), and on May 8th the black cloud of explosive and exploded superheated steam, charged with glowing incandescent particles, which (at 8.2 A.M.) destroyed Saint Pierre, and with it hardly less than 30,000 people. The phenomena of this remarkable eruption are not

yet known in their full detail, but they are among the most extraordinary recorded in the intensity of the associated electric manifestations, the vast disturbance in the magnetic field, and the violence of the destroying blow. The magnetic disturbance was transmitted to the antipodal region of the earth in about two minutes' time, while the noise of the eruption manifested itself forcibly at Maracaibo, Venezuela, and beyond, at a direct distance of 850 miles, or considerably more.

The second death-dealing eruption of Mont Pelée took place on August 30th at about 9 P.M., and destroyed in less or greater part Morne Rouge and Ajoupa-Bouillon, besides inflicting considerable damage, with loss of life, upon Morne Balai, Morne Capot, and Bourdon (Basse-Pointe). The loss of life in this later explosion, whose characteristics appear to have been almost exactly those of the May cataclysm, has been estimated at from 2000 to 2500. Since that date, as well as in the period preceding the early days of May, the volcano has been continuously active, discharging vast quantities of lapilli and ashes. There has been at no time during the recent period of activity any lava flow, although the large ejected blocks or bombs, together with the massive extended obelisk, clearly shows the presence of a molten magma within the throat or neck of the volcano. The column of ejected steam, laden with dust and lava bombs, shot forth from the crater on August 30th, just before the second great eruption, was estimated to have a diameter of 1500 feet as it rose over the crest of the crater, and its initial velocity was roughly computed to be in the neighborhood of 100 miles an hour. The steam ascended miles into the air, spreading out into a broad, mushroom-like canopy. The most extraordinary feature that is associated with the activity of Pelée is the giant mass of rock, a veritable obelisk, which has been slowly pushed out through the summit opening of the new cone, and rises (June, 1903) to upward of 800 feet, with a basal thickness of 300-350 feet. The molten lava rises into some portions of this, and may be followed at night-time along the passages, which are made brilliantly red.

It is a remarkable circumstance that, despite the accentuated warnings which for a period of two weeks and more Mont Pelée threw out pre-aging disaster, only a few hundred of the inhabitants of Saint Pierre took the precaution to leave the city; and this loss to the population was counterbalanced by numbers of refugees who from minor villages and hamlets had flocked to the larger city for protection. The annihilating blow came with appalling swiftness, and there is reason to believe that for the greater part of the 30,000 victims death was well-nigh instantaneous, or, at least, brought about in two to three minutes. Only two of the inhabitants from the city proper appear to have survived their wounds, although a dozen or more lingered on in the hospital of Fort-de-France and elsewhere for a few days. The attitudes and conditions of many of the corpses found among the ruins were largely suggestive of the remains (casts) recovered from Pompeii, and there is reason to believe that the destruction of the two cities may have been brought about in very nearly the same way. In both places many of the bodies were found wholly destitute of clothing or giving indication of having had the clothing swept from the body

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PELHAM-HOLLES, hólē, THOMAS, First Duke of Newcastle. See NEWCASTLE, THOMAS
PELHAM-HOLLES, FIRST DUKE OF.

PELHAM, OR THE ADVENTURES OF A GENTLEMAN. A novel by Bulwer-Lytton (1828). The hero, though a dandy, is a young man of serious ambition, who devotes himself to politics. His love for Ellen Glanville induces him to take steps to prove the innocence of her brother, who was accused of murder, though at first convinced of his guilt.

PELIAS (Lat., from Gk. Πηλιάς). In Greek legend, a son of Poseidon and of Tyro, daughter of Salmoneus, and twin brother of Neleus, father of Nestor. With his brother he was exposed by Tyro, but the children were found and reared by a herdsman, who named him Pelias (compare *πέλος*, *pelos*, dark-colored) because his face was livid from a kick by a mare. In the meantime Tyro had become the wife of Cretheus, King of Iolcos in Thessaly, and mother of Æson, Pheres, and Amythaon. The twins later found their mother, and after Cretheus's death Pelias succeeded in seizing the throne from Æson, who fled into exile. By his wife, Anaxibia, daughter of Bias, he became father of Acastus and four daughters. One of these was Alcestis, who was won by Admetus, who met the test imposed by her father, by harnessing a lion and a boar to a chariot. Jealous of Jason, his nephew, Pelias dispatched him to secure the Golden Fleece at Colchis. On the return of the *Argo*, Medea persuaded the daughters of Pelias that she could rejuvenate their father, by boiling his flesh with magic herbs. They accordingly killed and cut up the old man, but were then mocked by Medea, who thus revenged the wrongs of her husband, Jason. His funeral was celebrated with great splendor by Acastus, and the games were a favorite theme with ancient poets. See ABONAUTS; JASON; MEDEA.

PELICAN (AS. *pellican*, from Lat. *pelicanus*, *pelicanus*, from Gk. πηλικός, *pelekan*, pelican, connected with *πέλεκας*, *pelekas*, woodpecker, from *pelkan*, to hew with an axe, from *πέλεκυς*, *pelekys*, Skt. *parasa*, axe). A large web-footed, fish-eating water-bird of the family Pelecanidae, having a very large, long, flattened bill. The upper mandible, which is terminated by a strong hook, curves over the tip of the lower one; and beneath the lower mandible, which is composed of two flexible bony branches meeting at the tip, a large distensible pouch of naked skin is appended. The tongue is very short and almost rudimentary; the face and throat generally are naked; the wings of moderate length, the tail rounded. About 12 species are known, widely distributed in warm regions, frequenting the shores of the sea, lakes, and rivers, and feeding chiefly on fish. They take their prey by plunging upon it into the water, and store it in their pouch, for their own eating at leisure or to feed their young. Three species of pelican occur in the United States. The white pelican (*Pelecanus erythrorhynchos*) was formerly found throughout North America, but is now rare east of the Mississippi, except along the Gulf coast, where it winters. It resembles the common pelican of the Old World, but differs in having a curious horny prominence on the bill during the breeding season. The plumage is pure white, excepting the primaries. It is the largest American species,

being five feet long and eight or nine feet across the wings. It breeds in colonies generally; the eggs, from one to four in number, are creamy or bluish white, $3\frac{1}{2}$ inches long by $2\frac{1}{4}$ broad. The brown pelican (*Pelecanus fusces*) is somewhat smaller than the white pelican, and gray and brown. It is found throughout the West Indies, occurs as far north as South Carolina, and breeds throughout its range. The brown pelican of the California coast (*Pelecanus Californicus*) is a trifle larger and shows more difference in color.

The common pelican of the Old World (*Pelecanus oncorhynchus*) is as large as a swan. Its plumage is white, tinged with flesh color. It is a native of Eastern Europe, and of many parts of Asia and Africa, and frequents both the sea-coast and rivers and lakes. It makes a nest of grass on the ground near the water, and lays two or three white eggs. The parents are said to carry water to their young, as well as food, in their pouches. The nail or hook which terminates the bill is red, and it has been suggested that the ancient fable of the pelican feeding its young with blood from its own breast originated from its habit of pressing the bill upon the breast, when the red tip might be mistaken for blood.

In heraldry, the pelican is drawn with her wings indorsed, and wounding her breast with her beak. When represented in her nest feeding her young with her blood, she is called 'a pelican in her piety.' This is connected with the fable above mentioned, and with the symbolism of the pelican in mediæval religious art as significant of self-sacrifice. Consult Twining, *Symbols and Emblems of Christian Art* (London, 1886). See PLATE OF FISHING BIRDS.

PELICAN'S-FOOT, or SPOUT-SHELL. A shell of a gastropod of the family Aporrhaidæ, of which



FOSSIL APORRHAIDE.

1. *Alaria myurus* (Lower Oolite); 2. *Aschurn carinata*; 3. *Spirigera semicarinata* (Jurassic); 4. *Aporrhais carinata* (upper Greensand).

but four living species remain, but a great number of quaintly shaped fossil species are known from the Jura onward. The most common specimens are of *Aporrhais pes-pellicani*, numerous on the Western European coast. Its widely distended and prolonged outer lips account for its popular name. A heavier, less forked species (*Aporrhais occidentalis*) is occasionally seen off New England. These mollusks inhabit rather deep water, and their habits are little known.



PELICAN'S-FOOT SHELL.

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clopédique des Sciences Médicales, vol. xxii. (Paris, 1886); also the official report, *La pellagra in Italia* (Rome, 1880).

PELLAT, pâ'lâ', JOSEPH SOLANGE HENRI (1850—). A French physicist, born at Grenoble. He studied in Paris at the Ecole Normale Supérieure, was assistant in physics at the Paris Observatory (1874), and taught in various lycées until 1893, when he was named adjunct in the scientific faculty of the University of Paris. In 1899 he was promoted to a full professorship. Pellat's especial field of research is electricity. On thermodynamics also he wrote for the *Journal de Physique* and the *Comptes Rendus*. He invented an electro-dynamometer balance, and other apparatus for the measure of specific inductivity; and wrote: *Cours de physique* (1883-86); *Electricité atmosphérique* (1890); and *Cours de physique générale* (1896-97).

PELLEGRINO, pêl'lâ-grê'nô, TIBALDI. See TIBALDI, PELLEGRINO.

PELLETAN, pêl'tân', CHARLES CAMILLE (1846—). A French politician, son of the following. He was born in Paris, studied at the Ecole des Chartes, and entered the political press with boldly republican attacks on the Empire. He became editor-in-chief of *La Justice* in 1880 and in the following year was elected to the Chamber of Deputies, where he voted with the Radical Left. He was an active opponent of Boulanger. In 1902 he received in the Combes Cabinet the portfolio of the navy and came near causing international complications because of his ill-advised speeches in which he foreshadowed a great war of conquest for France. His publications include: *Le théâtre de Versailles* (1876), a collection of his reports on the meetings of the National Assembly; *Question d'histoire: Le comité central et la Commune* (1879); *Georges Clémenceau* (1883); *Les guerres de la Révolution* (new ed., 1894); and *De 1815 à nos jours* (1892).

PELLETAN, PIERRE CLÉMENT EUGÈNE (1813-84). A French politician and publicist, born at Royan. He was educated at Poitiers and Paris, was engaged in journalistic work in the latter city from 1837, and incurred the displeasure of the Government by the freedom with which he voiced his political convictions. In 1868 he became chief editor of the *Tribune*, of which he had been a founder, and in 1863 he was elected to the Chamber of Deputies, where he sided with the opposition. During the Franco-Prussian War he was a member of the Government for National Defense; in 1871 he was elected to the National Assembly and in 1876 to the Senate. Three years afterwards he became vice-president of the Senate. He was the author of *La Lampe éteinte* (1840); *L'histoire du brahmannisme* (1846); *La loi de progrès* (1857); *Décadence de la monarchie française* (1860); *La nouvelle Babylone* (1863); *Elisée: voyage d'un homme à la recherche de lui-même* (1877); and *Dieu est-il mort?* (1883). The friendship between Lamartine and himself was dissolved by the publication of Pelletan's *Profession de foi du XVIème siècle* and *Lettres à un homme tombé* (1857).

PELLETIER, pêl'tyâ', Sir CHARLES ALPHONSE PANTALÉON (1837—). A Canadian statesman, born at Rivière Ouelle, Quebec Province. He was educated in the Sainte Anne de la Pocatière College and Laval University, called

to the bar in 1860, and became Queen's Counsel in 1879. He commanded the Ninth Battalion of the Voltigeurs de Quebec in the Fenian Raid of 1866, represented Kamouraska in the Dominion Parliament in 1869-77, and Quebec East in the Provincial House in 1873-74. He was made a Senator in 1877, served as Minister of Agriculture in 1877-78, and president of the Canadian commission at the Paris Exposition in 1878. He was made Speaker of the Senate in 1896, and was knighted in 1898.

PELLEW, pêl'w, EDWARD. See EXMOUTH, VISCOUNT.

PELLICANUS (Neo-Lat., skinner, furrier, from Lat. *pellis*, skin; a translation of his German name, *Kürschner*). CONRAD (1478-1556). A Swiss linguist and reformer. He was born at Ruffach in Alsace, studied for a short time at Heidelberg, entered a Franciscan monastery in his native town, and was later transferred to Tübingen. Subsequently he became professor at Basel. He gradually shifted toward Protestantism, and in 1526 threw aside his cowl and in the following year became professor of Hebrew at Zurich. He published the first Hebrew grammar written in a European language (1504; reprinted in phototype, 1877); his other works are an autobiography (published in Latin at Basel, 1877, and in German, Strassburg, 1891); and a biblical commentary in seven volumes (1532-39). Consult Reuss, *Konrad Pellicanus* (Strassburg, 1893).

PELLICO, pêl'la-kô, SILVIO (1788-1854). An Italian poet, celebrated for his long and cruel imprisonment by the Austrians. He was born June 24, 1788, at Saluzzo, in Piedmont. In his sixteenth year he went to Lyons, where he stayed, giving his time mostly to French literature, until Foscolo's *Carme de' sepolcri* awakened in him a strong patriotic feeling, and an irresistible longing to return to Italy. About 1810 he went with his family to Milan, where he was professor of French in the Collegio degli Orfani Militari, and he also served as tutor in the family of Count Porro, in whose house the most distinguished men in Milan were wont to meet. His tragedy *Francesca da Rimini* (1818) shows how a mediæval theme may be classically handled. This play is full of lyric passages and of declamation. Pellico took an active part in a liberal periodical called *Il Conciliatore*, which was suppressed. For belonging to the Carbonari (q.v.) Pellico was arrested in 1820, and sent to the Prison of Santa Margherita, at Milan, where his friend the poet Maroncelli was also confined. In the beginning of the following year he was taken to Venice, and in January, 1822, to the prison on the isle of San Michele, near Venice. Maroncelli and he were at last condemned to death; but the Emperor commuted the sentence to twenty years' imprisonment for Maroncelli, and fifteen years for Pellico. In March, 1822, they were both conveyed to the subterranean dungeons of the Spielberg, near Brünn, in Moravia. In August, 1830, however, they were set at liberty. Pellico published an account of his sufferings during his ten years' imprisonment, under the title *Le mie prigioni* (1832). Pellico's health, however, was permanently injured. The Marchioness of Barolo received him into her house at Turin as her secretary. He died at Turin, January 31, 1854. Pellico wrote some twelve tragedies, only

eight of which he published, and nearly all of which deal with mediæval subjects. *Francesca da Rimini* is the last of them and is still a popular play. The verse novels and lyrics (*Poesie inedite di Silvio Pellico*, Turin, 1837) and the *Poesie* (Florence, 1869) belong chiefly to the period between 1834 and 1837. Pellico is shallow and sentimental, but his piety is sincere. His correspondence (*Epistolario*, Florence, 1856, and later editions, 1858, 1861, 1874, 1877) reveals his tendency to mystical contemplation. His fame rests on his account of his imprisonment. *Le mie prigioni* has been translated into many languages. Consult: Bourbon, *Silvio Pellico, sa vie et sa mort* (Paris, 1879); Rinieri, *Della vita e delle opere di Silvio Pellico* (Turin, 1899-1901).

PELLISOV, pěl'le-zóf, EMIL. The pseudonym of the German physicist Karl Franz Emil Schafhäütl (q.v.).

PELMATAZOA. A class of echinoderms characterized by the fact that (with a few exceptions) they are fixed in their dwelling-place by stalks. It includes the crinoids, ceptoids, and blastoids (q.v.).

PELLITORY OF SPAIN, *Anacyclus Pyrethrum*. A plant of the natural order Compositæ. Its small spindle-shaped, fleshy, acrid root has been used medicinally in parts of Europe and still is in Northern Africa, where the plant is native.

PELOPIDAS (Lat., from Gk. Πελοπίδας) (?-B.C. 364). A Theban general and patriot, the associate of Epaminondas. He belonged to a good family and was in affluent circumstances. In B.C. 382 he was driven from Thebes by the oligarchic party, supported by the Spartans, and took refuge at Athens, but returned with a few associates in B.C. 379, recovered possession of the Cadmeia, or citadel, slew the Spartan leader, Leontiades, with his own hand, and established a democratic form of government. From this time until his death he was actively engaged in fighting for his country's cause, and was successful in several conflicts with the Lacedæmonians. His Sacred Band of Theban youth largely contributed to the victory of Epaminondas at Leuctra (B.C. 371), but failed in a subsequent attack on Sparta itself. In the expedition of the Thebans against the cruel tyrant Alexander of Phæræ (B.C. 368) he was, after several important successes, treacherously taken prisoner, when in the character of an ambassador, but was rescued by Epaminondas in the expedition of the following year. He was then sent to Susa as ambassador from Thebes, and successfully counteracted the Spartan and Athenian intrigues at the Court of Persia. In B.C. 364 he defeated Alexander of Phæræ at Cynoscephalæ, but was himself killed while rushing in pursuit of the enemy. Consult Plutarch's *Life of Pelopidas*, and the standard histories of Greece.

PELOPONNESIAN WAR. See GREECE.

PELOPONNESUS (Lat., from Gk. Πελοπόννησος, island of Pelops, from Πίλος, Pelops, Pelops + νῆσος, nêsos, island). The ancient name of the peninsula forming the southern part of ancient Greece; now called the Morea (q.v.). It is separated from the mainland by the Co-

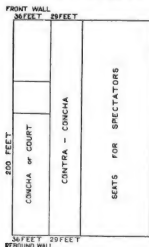
rinthian and Saronic gulfs, and united with it only by the narrow Isthmus of Corinth. It was divided into six districts: Argolis, on the northeast; Laconia, on the southeast; Messenia, on the southwest; Elis, on the west; Achæa, on the north; and Arcadia, in the centre. The most famous cities were Mycenæ, Sicyon, Tiryns, Corinth, Argos, Træzen, and Epidaurus in Argolis, Sparta in Laconia, Messene, Pylos, and Methone in Messenia, Elis in Elis, Patræ and Ægium in Achæa, and Tegea, Mantinea, and Megalopolis in Arcadia. After the conquest by the Dorians a long period of war resulted in the establishment of the supremacy of Sparta, which was maintained until the battle of Leuctra (B.C. 371), which was followed by the Theban invasion under Epaminondas, the restoration of the Messenians, and the founding of Megalopolis. From this time the Peloponnesus was the scene of internal strife until the Roman conquest (B.C. 146), when it became part of the Province of Achæia. Consult: Leake, *Travels in the Morea* (London, 1830); id., *Peloponnesiaca* (ib., 1846); Blouet, *Expédition scientifique du Morée* (and Atlas, Paris, 1831-38); Curtius, *Peloponnesos* (Gotha, 1851-52), still a standard work; Philippson, *Der Peloponnes* (Berlin, 1892), treats chiefly of the physical geography and geology. See GREECE, section on History; MOREA.

PELOPS (Lat., from Gk. Πέλοψ). In Greek legend, the son of Tantalus, King of Phrygia. His father was especially loved of the gods, but at a feast at which they were present he slew and served to them his son. The gods, recognizing the nature of the food, refused it, with the exception of Demeter, who, absorbed in grief at the loss of her daughter, devoured a shoulder. At the command of Zeus, Hermes threw the members into a caldron from which Clotho drew the boy restored to life, while Demeter replaced the lost shoulder by one of ivory. Later legend told of the love of Poseidon for the beautiful youth, and his gift of winged horses of matchless speed, by whose aid and the treachery of Myrtilus he was enabled to win the hand of Hippodamia, daughter of Cænomaus, King of Elis. Each suitor was required to take Hippodamia in his chariot and start from Olympia for Corinth, while Cænomaus offered a sacrifice to Zeus and then pursued. As his horses were a gift of the gods, he had hitherto overtaken and slain thirteen luckless lovers. Pelops bribed Myrtilus, Cænomaus's charioteer, to draw the lynch-pin, and thus secured the victory and the death of Cænomaus. He, however, refused to pay Myrtilus his reward, and even cast him into the sea, wherefore Myrtilus cursed the whole race of Pelops. It may be observed that the Homeric poems know nothing of this curse and the subsequent horrors, which furnished so much material to the Attic dramatists. While the ordinary versions localized this story at Olympia, and associated the Olympic games with Pelops, there are many indications that the race was in some versions considered as crossing the water to or from Lesbos. Of the later fortunes of Pelops many versions were current. He was the father by Hippodamia of Atreus, Thyestes, and other children, and by Axioche of Chrysippus, who was carried off by Laius of Thebes, or murdered by his jealous brothers and stepmother, thus beginning the woes of the family. At Olympia Pelops was especially honored in a sacred inclosure, the

Pelopon, where a black wether was yearly offered.

PELO'RIA (Neo-Lat., from Gk. *πέλος*, *pelór*, monster). A malformation occurring in flowers which are normally irregular, by which regularity is again attained. It was first described by Linnaeus, who found the spurred flowers of the butter-and-eggs or toadflax (*Linaria vulgaris*) with five spurred petals instead of the normal one. The cause of such malformations has not been fully determined, though peloria has been produced by a change in the relation of the plant to light, one-sided illumination appearing favorable to its development.

PELOTA, pá-ló'tá, or 'JAI-ALAI' (Sp., from *pilota*, *pelota*, little ball, from Lat. *pila*, ball). A Basque game introduced into the South American republics, and to Cuba, from the northern provinces of Spain, and imported thence to the United States. It can be played either in or out of doors. Its necessities are a *concha* or court, with level concrete floor 200 feet long and 65 feet wide, with a wall 36 feet square, called the *frontis* or front wall at one end, and at the opposite another similar wall, called *la pared de rebote*, or rebounding wall. On the front wall iron strips painted red mark the boundaries within which the ball must strike. On the floor of the court, occupying the whole space between the two ends, are also boundary lines within which



the ball must, on its rebound, strike, to be counted. A narrow strip 29 feet parallel with the *concha* is the *contra-concha*, within which the ball must remain to avoid being counted as a fault. The instrument with which the game is played is a light wickerwork basket arrangement fastened to the hand by means of a glove attachment. It is called a 'cesta.' The ball is about the size of a lawn-tennis ball. It has a core of india-rubber bound round with yarn, and is covered with sheepskin.

The game is played by four, six, or eight players, mostly by four, two on each side, one of

whom on each team is the *delantaro*, or forward, and the other the *zagüero*, or back. Play is on when the forward of the side first entitled to do so runs to a certain mark on the court and throws the ball to the floor, catching it on the bound in the basket attached to his hand, and striking it against the front wall within the red-lined boundaries, whence it should rebound so as to touch the floor between the lines thereon defined. The forward of the opposing side must then strike it with his basketed hand either while it is in the air as it rebounds, or on its first bound from the floor, and throw it against the front wall again; and so on by each team in turn, until one side loses the point. If the ball falls or strikes outside the boundaries, it is a fault to the credit of the opponent. No player may hold the ball in his hand or in the basket; it must always be kept in motion. The first team to gain fifty points wins the game.

PELOTAS, pá-ló'tás. A town in the State of Rio Grande do Sul, Brazil, 26 miles northwest of the city of that name, on the São Gonçalo, which joins the Lagoa dos Patos and the Lagoa Miri, and on the Rio Grande-Cacuy Railway (Map: Brazil, G 10). It is a well-built, handsome city and the centre of an extensive interior and coast-wise trade. The principal industry is the curing and preserving of meats, and in addition there are extensive exports of hides, horns, and tallow. The population, in 1894, was about 25,000.

PELOUBET, pél'ô-bét, FRANCIS NATHAN (1831-). An American biblical scholar, born in New York City. He graduated at Williams in 1853 and at Bangor Theological Seminary in 1857, and for twenty-five years held charges in Congregational churches in Massachusetts. In 1884 he revised Smith's *Bible Dictionary*. Peloubet's *Select Notes on the International Sunday-School Lessons* (1875 sqq.) and his *Sunday-School Quarterlies* (1880 sqq., in four grades) became widely known.

PELOUZE, pé-lô-zé, THÉOPHILE JULES (1807-67). A French chemist. He was assistant to Gay-Lussac and later professor of chemistry at the Ecole Polytechnique and the Collège de France. In 1836 he was associated in research work with Liebig, and in 1837 became a member of the Institute. Pelouze carried out a number of important investigations in chemistry and published several works; jointly with Frémy he wrote a *Traité de chimie générale*, which passed through several editions.

PELS, pels, ANDRIËS (?-1681). A Dutch poet and critic. He was born in Amsterdam, it seems, and probably studied law there. About 1670 he either founded or revived a literary circle called from its motto *Nil Volentibus Ardum*, with the purpose of purifying the Dutch language and creating poetic canons. This school was vigorously opposed by Joannes Antonides, but it exerted a great and baneful influence on Dutch literature. Pels wrote: *Didoos dood* (1668), a tragedy in the French classical manner; *Horatius Dichtkussel* (1677), a translation and adaptation in verse of the *Ars Poetica*; *Gebruiken Misgebruik des tooneels* (1681), also didactic; and a posthumous volume of poems, *Minneliederen en Menzelzangen* (1684).

PELTIER, pélt'yá, JEAN CHARLES ATHANASE (1785-1845). A French physicist and me-

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lum, and in front and behind by the anterior and posterior borders. It presents various curved lines and rough surfaces for the attachment of the *glutei* and other powerful muscles connecting the pelvis and the lower extremities. The internal surface, which is smooth and concave, has the same boundaries as the external, except inferiorly, where it terminates in a prominent line, termed the *linea ilio-pectinea*. The

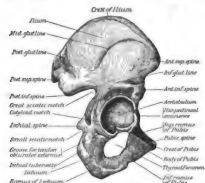


FIG. 1. OS INNOMINATUM OF THE RIGHT SIDE (outer surface).

surface of the crest is convex, roughened, and sufficiently broad to admit of the attachment of three planes of muscles. The borders will be sufficiently understood by a reference to Fig. 1. The ischium is the inferior and strongest portion of the bone. It consists of a thick and solid portion, the body (whose inferior border is termed the *tuberosity*), and a thin ascending portion, the ramus. In the ordinary sitting position the whole weight of the body rests on the ischium; and by sitting on the hands we can usually feel the part (the *tuberosity*, see Fig. 1) through which the weight is transmitted. The pubes is that portion which runs horizontally inward from the inner side of the acetabulum for about two inches, and then descends obliquely outward for about the same length, thus making an acute angle with its original direction. The former part is called the *body*, and the latter the *ramus*, of the pubes. The ramus is continuous with the ramus of the ischium. Between the ischium and the pubes is a large aperture, known as the *thyroid or obturator foramen*, which in the living body is closed by a membrane termed the *obturator membrane*. The object of this large foramen is probably to give lightness to the parts, without materially diminishing their strength.

The development of the os innominatum affords an excellent example of the general principles laid down in the article *OSSEIFICATION*. There are no less than eight centres of ossification for this bone: three primary—one for the ilium, one for the ischium, and one for the pubes—and five secondary ones for various processes, etc. The first centre appears in the lower part of the ilium, at about the same period that the development of the vertebrae commences, viz. at about the close of the second month of fetal life; the second in the body of the ischium, just below the acetabulum, at about the third month, and the third in the body of the pubes, near the acetabulum,

during the fourth or fifth month. At birth the crest of the ilium, the bottom of the acetabulum, and the ramus of the ischium and pubes are still cartilaginous. At about the sixth or seventh year these rami become completely ossified; next, the ilium is united to the ischium; and lastly, the pubes is joined to the other two in the acetabulum. The complete ossification of the bone, from the secondary centres in the crest of the ilium, the tuberosity of the ischium, etc., is not completed till about the twenty-fifth year.

Each os innominatum articulates with its fellow of the opposite side through the intervention of the *interosseous fibro-cartilage*, which unites the two surfaces of the pubic bones, with the sacrum, and with the femur (at the acetabulum). No less than thirty-five muscles are attached to this bone, some proceeding to the region of the back, others forming the walls of the abdomen, others forming the floor of the pelvis, others passing downward to the lower extremities, etc. As the other bones entering into the formation of the pelvis (the sacrum and the coccyx) belong essentially to the vertebral column, and will be described in the article on that subject, it is sufficient here to remark that, collectively, they form a triangular bony mass (with the base upward, and with a concave anterior surface), which constitutes the posterior part of the pelvic ring. See Fig. 2.

The pelvis, considered as a whole, is divisible into a false and true pelvis. The *false pelvis* is all that expanded portion which is bounded laterally by the iliac bones, and lies above the prominent line termed the *linea ilio-pectinea* (see Fig. 2); while the *true pelvis* is all that part of the general pelvic cavity which is situated below that line. The broad, shallow cavity of the false



FIG. 2. PELVIS (FEMALE ADULT) SEEN FROM THE FRONT.

pelvis serves to support the weight of the intestines; while the rectum, bladder, and part of the generative organs lie in the cavity of the true pelvis. The upper aperture of the true pelvis is termed the *inlet*. It is somewhat heart-shaped in form, and has three principal diameters—an *antero-posterior* (or *sacro-pubic*), which extends from the angle formed by the sacrum with the last lumbar vertebra to the symphysis pubis, or point of union of the two pubic bones; the *transverse*, at right angles to the former, and extending across the greatest width of the pelvis; and the *oblique*, extending from the sacro-iliac symphysis (or union), on one side, to the margin of the brim corresponding with the acetabulum on the other. The diameters of the outlet are two—an *antero-posterior*, extending from the tip of the coccyx to the lower part of the symphysis pubis, and a *transverse*, from the posterior part of one ischial tuberosity to the same point on the opposite side. As the precise knowledge of the diameter and depth of the pelvis is of the greatest

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Johnston, to unite with him near Jackson, next to strike General Grant's rear at Clinton, and finally to evacuate Vicksburg. His correspondence with General Johnston was betrayed to General Grant, and he was sharply defeated at Baker's Creek or Champion's Hill, May 16, 1863, and at Big Black Bridge the next day. When he retired into Vicksburg he conducted the defense with skill until July 4th, when he surrendered 31,600 men and 172 cannon. His course met with so much criticism that he resigned his commission after his exchange, but in May, 1864, was placed in charge of the artillery defenses of Richmond, with the rank of lieutenant-colonel, and served here until the end of the war. He then engaged in farming in Virginia until 1876, in which year he removed to Pennsylvania. Consult for Vicksburg, Johnson and Buel (ed.), *Battles and Leaders of the Civil War* (New York, 1887).

PEMBERTON, Max (1863—). An English romancer, born in Birmingham, June 19, 1863. After graduating from Caius College, Cambridge, he joined the staff of *Vanity Fair* (1885). He also began writing stories and miscellaneous articles for several London periodicals, became the editor of *Chums* (1892-93), and in 1896 he became editor of *Cassell's Magazine*. Among his romances are: *The Iron Pirate* (1893); *The Sea Wolves* (1894); *The Impregnable City* (1895); *A Gentleman's Gentleman* (1896); *Queen of the Jesters* (1897); *The Garden of Swords* (1899); *P'eo* (1900); and *House Under the Sea* (1902).

PEMBROKE, pēm'brūk. A seaport town and the capital of Pembrokeshire, Wales, 42 miles west of Swansea (Map: Wales, B 5). Pater, otherwise called Pembroke Dock, an important fortified Government dockyard, two miles from the town, embraces an area of 80 acres and provides the chief industry of the neighborhood. On the extremity of the ridge on which the town is built are the remains of its extensive castle, founded in 1094, and the birthplace of Henry VII. Beneath the ruins is a remarkable natural cavern, which had communications both with the castle and the harbor. In 1648 the castle was beleaguered by Cromwell and taken after a siege of six weeks. The town dates from the early years of British history. It owns its water supply, slaughter houses, and markets. Population, municipal borough, in 1891, 14,978; in 1901, 15,853.

PEMBROKE. A municipality of Leinster, Ireland, constituting a southeast suburb of Dublin. Population, in 1891, 23,992; in 1901, 25,799.

PEMBROKE, pēm'brūk. A town and the county-seat of Renfrew County, Ontario, Canada, on the Ottawa River, 86 miles from Ottawa (Map: Ontario, F 21). It has saw mills, factories, and a large business in lumber. Population, in 1891, 4401; in 1901, 5156.

PEMBROKE, pēm'brūk. Earl of. A title of the British family of Herbert (q.v.).

PEMBROKE COLLEGE. A college at Cambridge, England. It was founded by Mary de Saint Paul, wife of Aymer de Valence, in 1347. It has always occupied an honorable place among Cambridge colleges, and has had among its members some of the most distinguished men in England. Of these, the greatest are Pitt, the poets Spenser and Gray, Archbishops Whitgift, Grindal, and Rotherham, the martyrs Ridley, Rogers, and

Bradford. The college library, of some 20,000 volumes, is one of the most interesting and valuable college collections in Cambridge. There are thirteen fellowships and twenty-nine scholarships.

PEMBROKE COLLEGE. A college at Oxford, England. It was founded by James I. in 1624, and endowed by Thomas Tesdale, of Glympton, Oxfordshire, and Richard Wightwick, B.D., rector of Ilsey, Berks. It took its name from William, Earl of Pembroke, then chancellor of the university. Its buildings, though not large, and quite modern, are very attractive. The college has a master, ten fellowships, several honorary fellows and lecturers, and twenty-eight scholars, some seventy-five undergraduates in all. Never a large college, a number of distinguished men have been connected with it, especially in the seventeenth and eighteenth centuries. Among these may be mentioned Camden the antiquary, John Pym, Beaumont the dramatist, George Whitefield, Sir William Blackstone, Shenstone, Sir Thomas Browne, and Samuel Johnson.

PEMBROKESHIRE. The westernmost county of Wales, Great Britain, bounded north and west by Saint George's Channel, east by Cardigan and Carmarthen, south by the Bristol Channel (Map: Wales, B 5). Area, 628 square miles. The surface is undulating; the principal elevations are the Prescelly Hills, which traverse the north of the county from east to west, and attain a maximum altitude of 1754 feet. The rivers are unimportant; the Eastern and Western Cleddau, which unite and form a navigable portion of Milford Haven, are the principal streams. The northern and western shores are indented with fine bays and dotted with islands; the estuary of Milford Haven forms one of the best harbors on the coast of Great Britain; the south shores are wild and rugged, fronted with precipitous cliffs. The climate is mild but damp. There are excellent and productive soils in the south, and along the northwest coast the barley districts are famous. Oats, barley, and potatoes are the principal crops. Coal, iron, and lead are mined, and slate is quarried. There are important fisheries. The chief towns are Pembroke (the capital), Saint Davids, Tenby, and Haverfordwest. Population, in 1891, 89,000; in 1901, 88,000.

PEMICAN (Cree Indian name). An Indian food preparation much used among all the tribes from about the Canada border to the Eskimo country, and consisting of lean dried meat of buffalo, deer, or, in modern days, beef, pounded to a powder, and liberally mixed with boiling fat, which is poured over it. It is then pressed into cakes and packed into paraffine cases until needed. Berries are frequently pounded up and mixed with the meat. Pemican contains a great amount of nutriment in compact form, and when thus prepared will continue sweet and good for an indefinite time so long as it is kept dry. It is extensively manufactured by the Cree and Red River half-breeds and is the staple commissary article of hunters, traders, and other travelers throughout the great Northwest.

PEMPHIGUS (Neo-Lat., from Gk. *pēphigē*, *pēphix*, bubble), or **POMPHOLYX**. A disease of the skin in which appear on its surface blebs or bullæ filled with serum, pus, or blood, with itching, fever, and great impairment of the general health. Similar blebs appear on the mucous membrane. The blebs burst after a time, leav-

ing a rough, reddened surface, and scaling occurs in the variety termed *pemphigus foliaceus*. This variety is always chronic, and an attack lasts from several months to several years, successive crops of bullæ appearing and rupturing. In *pemphigus vulgaris*, which may be acute or chronic, the vesicles contain clear serum at first. This variety may last but two or three weeks. In the treatment of this disease arsenic, strychnine, iron, and quinine are given internally, local applications of a sedative nature are made, and warm baths are given for months, the patients being suspended under water upon a hammock night and day.

PEN (OF., Fr. *penne*, from Lat. *penna*, pen, feather, OLat. *pesna*, feather; probably connected with Gk. *πτερόν*, *pteron*, OHG. *fedara*, Ger. *Feder*, AS. *feþar*, Eng. *feather*, Skt. *patatra*, feather, from *pat*, to fly). An instrument for writing with a fluid ink. For many centuries the quill pen was the only kind used. Isidore of Seville, who died A.D. 636, mentions reeds and pens among the instruments employed in writing. A century and a half later Alcuin writes of the use of pens. Probably their general use began with the introduction of modern paper.

STEEL PENS. Toward the close of the eighteenth century various experiments were being made in France, England, and America toward the manufacture of steel pens. At first they were barrel-shaped and were made as much like a quill pen as possible. They were made by bending a flat piece of steel into a tube and then filing it into shape, the joint of the two edges forming the slit. These pens were expensive and unsatisfactory, for they were hard and inflexible. In 1820 Joseph Gillott, of England, began the manufacture of steel pens and greatly improved their form. He also cheapened their price by introducing machinery for their manufacture. Presses were contrived for cutting, bending, and marking, and other machinery for cleaning and polishing. The manufacture of steel pens was not introduced into the United States until about 1860. By that time the art had been perfected and a knowledge of the varieties of steel best qualified for pens had been acquired. Most of the steel used in American factories is imported from Sweden. The steel, which is received by the manufacturer in sheets of varying thickness, are prepared for conversion into pens by a preliminary process of annealing, polishing, and rolling. The last named operation requires considerable care and skill, for the steel must be passed between successive rollers until reduced to a required thickness, which is usually 1-160th of an inch. The slightest variation in the thickness of the sheet affects the flexibility of the finished pen. The blanks are next stamped or pressed into the desired shape, and then the small hole which terminates the slit in the finished pen and prevents it from spreading is punched. After another annealing, the blanks are placed between a pair of dies which give them their curved form. Hardening by plunging into hot oil, cleaning in sand and sawdust, and tempering are the next processes. The polishing is performed by placing the pens in revolving barrels of sand or sawdust and then grinding against a revolving emery wheel. The tempering is done by placing the pens in an iron cylinder which is kept revolving over a charcoal fire until they are of the proper temper. This is a delicate process, regulated

by the color shown by the pens, which indicates the temperature of the metal. The last and perhaps most important mechanical operation is slitting the pen point. This is done by a specially constructed pair of cutters of great delicacy of construction. The pens are now subjected to a final burnishing, and possibly lacquering to prevent rust, and are ready for the market.

GOLD PENS. Though steel pens are used in greater quantities than any other kind, there is an increasing demand for gold pens on account of their greater flexibility and durability. Gold pens were first made in 1825 in England. In the United States their manufacture was first attempted by a watch-maker of Detroit in 1835. In 1840 the business was moved to New York, various improvements were introduced, and the manufacture grew in importance. At first the points of gold pens were protected by diamonds or rubies. The discovery that the native alloy of iridium and osmium could be used much more cheaply as well as satisfactorily was made by John Isaacs Hawkins, an American, residing in England. The American right to this discovery was purchased by a New York establishment. About 1850 it was discovered that by imbedding the iridium points in the gold instead of soldering them on a stronger pen was produced. Gold pens are made in a manner similar to steel pens, by rolling the metal into thin sheets and stamping out the blanks and shaping them with dies. The under side of the point is notched with a circular saw to receive the iridium tip, which is secured by a flux of borax and a blowpipe. The slit is cut through the solid iridium by means of a thin copper wheel, after which it is extended up the pen itself, to the notch, with a saw. The pen is now finished by polishing it and by hammering till the desired degree of elasticity is secured.

FOUNTAIN PENS. A fountain pen is one having an ink barrel in the holder which supplies ink as required by means of an automatic feed. Fountain pens were manufactured in England as early as 1835, but they did not attain any great degree of success. In the Schaeffer pen the ink was admitted to the pen from a reservoir in the holder, by pressing a projecting button with the thumb. In the Parker pen the flow of ink was regulated by a piston controlled by a rotating nut. Other early attempts sought to control the flow from the barrel by means of tubes, springs, valves, or other mechanical contrivances. In all these early attempts the flow of ink was found to be irregular. All modern fountain pens are based on a different principle. The flow of ink is regulated by a feed, and air is admitted to the barrel to take the place of the ink as it is used. A typical fountain pen consists of four pieces of hard rubber and a gold pen. The handle containing the ink reservoir is in two pieces, connected with a screw joint, so that it may readily be taken apart for filling. The gold pen is held in the point section of the barrel by means of a third piece of rubber, the feed-bar, which also conveys the ink from the reservoir to the pen. Air is admitted to the barrel, to replace the ink as it is used, by means of a cavity in the feed connecting with the hole at the end of the slit in the back of the pen proper. During the act of writing the ink is drawn from the reservoir by capillary attraction, through the feed to the pen point and the flow ceases with the writing. The fourth

piece of rubber is the cap, which covers the pen to protect it from injury and keep the ink from drying when not in use. A fountain pen usually holds ink enough for ten hours or more of continuous writing, or from 15,000 words up.

STYLOGRAPHIC PENS, like fountain pens, have a reservoir to hold the ink, but instead of an ordinary pen point it has a pencil-shaped point; the point is tubular and in it plays a needle which releases the ink when pressed on the paper.

STATISTICS. According to the Twelfth United States Census there were in the United States, in 1900, 48 establishments devoted to the manufacture of pens, of which 23 made fountain and stylographic pens, 22 made gold pens, and 3 made steel pens. The combined capital invested in these different establishments is given as \$1,444,065, and the value of the annual product \$1,855,658. In this amount 8028 gross of fountain pens, valued at \$902,734, 1803 gross of stylographic pens, at \$82,676, 6735 gross of gold pens, at \$458,376, and 1,764,079 gross of steel pens, at \$411,872, are included.

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PENAL CODE. A collection or declaration of the laws of a State or country in relation to crimes and their punishment, in a single legislative act. By this means the various acts and omissions which constitute crimes, the degrees of crime, and the penalty imposed for each are all defined and clearly set forth in an orderly manner. Nearly all of the nations of Europe and several of the United States have thus embodied their criminal laws in the convenient and comparatively simple form of a penal code. Some States, including New York, have also adopted a code of criminal procedure which, as its name indicates, provides the mode of enforcing the law as set forth in the penal code. See *CODE*, and the authorities there referred to.

PENAL LAW. See *LAW, CRIMINAL*.

PENALTY (Fr. *pénalité*, from ML. *penalitas*, punishment, from Lat. *penalis*, relating to punishment, from *poena*, punishment, from Gk. *ποινή*, *poine*, fine, punishment; connected with *τίσις*, *ticsis*, Skt. *ci*, to avenge). In the broadest sense, punishment of any kind for violations of law or legal duty, as the 'death penalty.' Usually, however, a 'penalty' is a sum of money the payment of which is required by law as a punishment for an offense, or omission to comply with some statutory provision. In this sense, a penalty is usually imposed for a violation of the law less serious in its nature than a crime, which is *malum in se* (q.v.). For example, a neglect to conform to sanitary regulations generally subjects the offender to payment of a sum of money imposed as a penalty, which is considered as commensurate with the gravity of the offense. Except in aggravated cases, imprisonment would be too severe for omissions of the above nature. A penalty differs but little from a fine in its nature and purposes. As penalties are commonly imposed for the least serious violations of the law, which are, for that reason, not so likely to come to the attention of the proper authorities, the statutes creating them often provide, as an inducement to persons to inform on offenders,

that the whole or a part of the penalty shall go to the informer. In some jurisdictions the informer may recover the amount of the penalty by civil action, and in others payment to the public officials is enforced by the alternative of imprisonment, and the amount collected is then paid to the informer.

In the law of contracts the term penalty is applied to an arbitrary sum fixed by the parties to an agreement, to be paid by the one guilty of a breach thereof. This practice is no longer sanctioned, and a sum fixed as a penalty cannot be recovered. Where, however, a sum is based on a calculation as to the probable amount of damages in case of a breach, it will be considered as 'liquidated damages' (q.v.), and payment enforced.

PENANCE (OF. *penance*, *penance*, *penance*, from Lat. *penitentia*, repentance, from *penitere*, to repent, frequentative of *penire*, *punire*, to punish, from *poena*, punishment). The voluntary or accepted punishment by which a repentant sinner manifests his sorrow for sin, and seeks to atone for the sin, and to avert the punishment which, even after the guilt has been remitted, may still remain due to the offense. Roman Catholics number penance among the seven sacraments (q.v.), and believe it to be of direct divine institution (Matt. xvi. 19; xviii. 18; John xx. 21). The matter of this sacrament consists, in their view, of the three acts of the penitent—contrition, or heartfelt sorrow for sin, as being an offense against God; confession, or detailed accusation of one's self to a priest approved for the purpose; and satisfaction, or the acceptance and accomplishment of certain penitential works, in atonement of the sin confessed; and the form of the sacrament is the sentence of absolution from sin pronounced by the priest who has received the confession, and has been satisfied of the penitential disposition of the self-accusing sinner. Even in the Apostolic times the practice prevailed of excluding persons of scandalous life from the spiritual fellowship of the Christian community (see *EXCOMMUNICATION*); and without attempting to fix the date, it may be stated as certain, from the authority of Tertullian and other writers, that from a very early time the persons so excluded were subjected to certain penitential regulations. The class of offenders so treated were those who had been notoriously guilty of the grievous crimes of idolatry or apostasy, murder, adultery, and other scandalous offenses. The period of penitential probation differed in different times and places, but in general was graduated according to the enormity of the sin, some going so far in their rigor (see *NOVATIAN*) as, contrary to the clearly expressed sense of the Church, to carry it even beyond the grave. The penitent, in ordinary cases, could only be restored to communion by the bishop who had excluded him, and this only at the expiration of the appointed time, unless the bishop himself had shortened it; but in case of dangerous illness he might be restored, with the condition, however, that if he recovered from the illness the whole course of penance should be completed. The reconciliation of penitents took place commonly in Holy Week, and was publicly performed by the bishop in the church, with prayer and imposition of hands. It was followed by the administration of communion. This public discipline continued in force with greater or less ex-

actness in the fifth, sixth, and seventh centuries, gradually, however, being replaced by semi-public, and ultimately by private penance. In the eleventh and twelfth centuries the public penance had entirely disappeared. The nature and origin of private penance is a subject of controversy between Catholics and Protestants; the former contending that it had existed from the first, and that it held the same place even in the ages of public penance for secret sins which the public penance did for public offenses. At all events, from the date of the cessation of the public discipline it has existed universally in the Roman Catholic Church. The priest, in absolving the penitent, imposes upon him the obligation of reciting certain prayers, undergoing certain works of mortification, or performing certain devotional exercises. These acts of the penitent are held to form an integral part of the sacrament of penance.

Outside of what is explained above as sacramental penance, devout Roman Catholics have always believed in the infliction of voluntary mortifications as being pleasing to God, since they are based on an intense detestation of sin and realization of its enormity; and many of the saints have gone to almost incredible lengths in seeking suffering as a means of purifying the soul and uniting it more closely with God.

Luther fought stoutly against the doctrine of penance current in his day as being contrary to some of what he considered the most essential principles of Scriptural Christianity, particularly to the doctrine of justification by faith in Jesus Christ alone, on the ground of His complete or 'finished' work; penance being founded on a doctrine of at least supplementary atonement by the works or sufferings of man—the sinner—himself. His teaching has been generally followed by Protestants. The outward expressions of humiliation, sorrow, and repentance common under the Jewish dispensation are regarded as very consistent with the character of that dispensation, in which so many symbols were employed. It is also held that the self-inflicted austerities, as fasting, sackcloth and ashes, etc., of Jewish and earliest Christian times, had for their sole purpose the *mortification* of unholy lusts and sinful passions in the people of God; or the expression of sorrow for sin, so that others beholding might be warned of its evil and restrained from it. Accordingly, in the discipline of the Protestant churches penance is now unknown. The nearest approach to the Roman Catholic polity on the subject was that in use among the English Puritans of the seventeenth century, and more particularly in the Church of Scotland during that and the succeeding century, when it was common "to make satisfaction publicly on the stool of repentance." See ABSOLUTION; CONFESSION; INDULGENCE.

PENANG' ('Betel-nut Island'). The most northerly of the British Straits Settlements (q.v.). It consists of the island of Penang, formerly officially called Prince of Wales Island, and the coast districts known as Province Wellesly and the Dindings. The island of Penang, with an area of 107 square miles, is situated off the west coast of the Malay Peninsula at the northern entrance to the Malacca Strait (Map: Burma, D 6). The island is still largely covered with jungle, and is of great commercial impor-

tance, Georgetown, the capital, situated at the northeastern extremity, being the chief port of the Straits Settlements next to Singapore. The town is defended by forts, and has a capacious harbor and a large shipping and commerce. In 1898 there entered and cleared at the port 5114 vessels, of 3,761,094 tons. In 1899 the imports amounted to \$69,078,371, and the exports to \$61,424,108. The principal exports are tin, spices, rice, and sugar, nearly all of which are produced on the mainland. The total population of the Settlement was, in 1891, 235,618, and in 1901, 248,207, mostly Malays and Chinese, there being only 1160 Europeans, most of whom were in the city of Georgetown. The population of Penang Island in 1901 was 128,830, and of Georgetown municipality 94,086. Penang Island was ceded to England in 1785 by the Rajah of Kedah, and organized in the following year under the East India Company, who later purchased Province Wellesley. In 1806 Penang was made a presidency of equal rank with Madras and Bombay, and it remained the chief seat of government of the Straits Settlements, including Malacca and Singapore, until 1832, when the latter city superseded it.

PENARTH'. A seaport of Glamorganshire, Wales, at the mouth of the Taff, opposite Cardiff (Map: Wales, C 5). It is a favorite seaside residence and bathing resort of the Cardiffians. It was an unimportant village until 1856, when its port was made a tidal harbor. It has extensive docks, and is an important shipping port for the minerals of South Wales, especially coal, iron, and alabaster. The docks have 6125 feet of quayage and the tidal harbor 15,000 feet. The town maintains public baths, parks, and pleasure grounds, and an isolation hospital. Population, in 1891, 12,400; in 1901, 14,200.

PENATES, pē-nā'tēz (Lat. nom. pl., gods of the store-room). The Roman gods of the store-room, worshiped, with Vesta, at every hearth. The proper title is *di penates*, which indicates that a group of gods is here united under a comprehensive title, which is not really a proper name. It thus follows that the individual deities comprised in the title might vary in different families, and this seems proved by the variety of gods who appeared grouped with Lares and Genius as penates in the Pompeian paintings near the hearth. Vesta seems usually, if not always, included in these groups. Each family worshiped its own penates, though under the Empire the penates of the Imperial family were publicly honored. As the family had its private hearth, so the State had its temple of Vesta also, and with her were naturally worshiped the *public* penates, probably a collective title for the gods who cared for the prosperity of the State. Later (before B.C. 167, and probably some time before) a little temple of the penates was built on the Velia, and now images after the type of the Greek Dioscuri were set up. Varro, it is true, denied that these were the true penates, whose sacred symbols were rather kept secretly in the *ædes Vestæ*, but other antiquaries did not follow him, and much ingenuity was displayed in attempted explanation of these mysterious gods. They were identified with the 'great gods' of Samothrace, and after the time of Augustus it was the orthodox belief that they had been brought from Troy to Italy by Æneas. See LARES; MANES.

PENCIL (OF. *pincel*, Fr. *pinceau*, from Lat. *penicillum*, *penicillus*, painter's brush, diminutive of *penis*, Gk. *πτεος*, *ptos*, tail, penis). An instrument for writing or drawing, employing some coloring material of which it is composed, as lead, graphite, or slate. Probably the pencil was the first instrument used by artists, and in its earliest form consisted simply of a lump of colored earth or chalk, cut into a form convenient to hold in the hand. With such pencils were executed the line-drawings of Aridices, the Corinthian, and Telephanes, the Sicyonian, and also the early one-colored pictures or *monochromata* of the Greeks and Egyptians. The use of metallic lead for marking is of very ancient origin. Pliny refers to the use of lead for making lines on papyrus, and Cortés in 1520 found the Aztecs using lead crayons. Black lead pencils are made of graphite or plumbago, which contains no lead whatever in its composition, but is in reality almost pure carbon. (See GRAPHITE.) The misnomer is probably owing to the fact that, previous to the employment of graphite for making pencils, common lead was used, a material which, indeed, continued to be employed until well into the nineteenth century. Consequently, as the plumbago with its black streak offered a contrast to the pale mark of the lead, it was called, in contradistinction, *black lead*.

DEVELOPMENT OF THE INDUSTRY. The manufacture of graphite pencils in England began in 1564, when a valuable graphite mine was discovered at Barrowdale, Cumberland. The mine was so highly prized that Parliament kept it guarded with an armed force, and, to keep up the value of the product, it was worked only six weeks in the year. The early graphite pencils were made by pulverizing the graphite and compressing it into solid blocks by means of a hydraulic press, and then cutting bars from the blocks. In 1850 the Barrowdale mine became exhausted. Graphite is now mined at Passau, Bavaria; Schwarzbach, Bohemia; in Norway, in New Zealand, in Mexico, and in various parts of the United States. The mine containing the purest graphite yet discovered is located at Ticonderoga, in New York State. It yields a product which is 99.9 per cent. pure carbon. The manufacture of lead pencils is extensively carried on in Germany, England, and America. In Nuremberg, Bavaria, are no less than 23 pencil factories, employing 10,000 workmen and turning out 4,400,000 pencils per week.

PENCIL MANUFACTURE IN THE UNITED STATES. The two raw materials essential for pencil manufacture—pure graphite and excellent cedar for the cases—exist in such generous quantities in the United States as to favor exceptionally the growth of this industry. The first manufacturer of black lead pencils in this country was William Monroe, of Concord, Mass., who in 1812 invented a process by which he pulverized and mixed the material and incased it in cedar holders. He was very successful in selling his product and continued the business for about eighty-four months, when he was obliged to give it up on account of the difficulty of obtaining the raw materials. Later he resumed the manufacture of pencils and carried it on, on a small scale, for many years. Another pioneer in the industry was Joseph Dixon, and in 1860 the Fabers established a branch factory in the United States.

METHOD OF MANUFACTURE. The familiar lead pencil of every-day use consists of a round or polygonal stick of graphite mixed with clay, surrounded by a cedar case. The graphite is first reduced to an impalpable powder by grinding. Water is then added and the substance is run through mixers in a fluid state, the proper amount of finely powdered clay being put into the mixture and thoroughly blended with it. A little lampblack is sometimes added to the composition to increase the blackness. The more clay used, the harder will be the pencil. The mixing is performed by specially constructed machinery. After thorough mixing the mass is placed in filter presses to exclude the water and reduce the mixture to a doughy consistency. The material is next passed through dies, consisting of successive plates with holes of varying diameter. Great pressure is used, causing the mixture to ooze forth in doughy strings. This process is repeated several times. The final dies are of the same diameter as the finished lead. The graphite in this form is straightened, cut into three-foot lengths, and allowed to dry. It is next cut into pieces of the required length, usually about seven inches. These pieces are packed in crucibles and burned for several hours, to extract the moisture. The graphite is now ready to be inserted in its wooden case. Sometimes the plumbago is calcined before being mixed with clay. For some varieties of drawing pencils the leads are immersed for a minute in very hot melted wax or suet, before being mounted.

The leads are usually incased in the wood before it is shaped into a pencil. Little slabs of cedar, two, four, or six pencils wide, are passed through a machine which cuts out semicircular grooves, the diameter of the pencil. Into the grooves in one of these slabs the leads are laid and another grooved slab is glued to it, thus completely incasing the graphite. The slabs are now passed through machines which divide them into pencils, with their sides shaped in hexagonal or curved form. After the processes of polishing, varnishing, and stamping, all of which are performed by machinery, the pencils are ready for shipment.

COLORLED PENCILS are made of chalk, clay, or wax, mixed with coloring pigments, the nature of which does not permit their being calcined like black pencils. They may be incased in wood like ordinary pencils, or simply wrapped in paper. Toward the close of the last century a process was invented by which both black and colored pencils were incased in paper instead of wood. A sheet of paper cut for a part of its width into strips about one-fourth of an inch wide is wrapped around the lead to form a case of the usual thickness. The surface is painted. When the pencil point wears down to the paper it is sharpened, that is more lead is exposed, by simply unwinding one of the narrow strips of paper.

SLATE PENCILS are sometimes inclosed in wood, but are more often little unprotected rods of slate. Partly from sanitary reasons, they are not nearly so much used as formerly, paper and lead pencil having taken the place of slate and pencil for most purposes.

STATISTICS. According to the Twelfth Census of the United States, there were in 1900 seven pencil factories, having a total capital of \$2,227,000.

406, and producing an annual output of 1,383,822 gross of pencils, valued at \$1,705,065. The number of factories reported has increased only one since the census of 1860, but the capital invested was then only \$6,600, and the value of the product about \$20,400. The value of the pencils imported into the United States for the closing decade of the nineteenth century is as follows: 1891, \$116,687; 1892, \$99,902; 1893, \$105,720; 1894, \$74,585; 1895, \$142,817; 1896, \$171,575; 1897, \$182,687; 1898, \$169,051; 1899, \$197,406; 1900, \$289,008.

BIBLIOGRAPHY. *The Twelfth United States Census*, vol. x., part iv., "Manufactures," contains historical, descriptive, and statistical matter regarding the pencil industry in this country. The Dixon Crucible Company, of Jersey City, N. J., and L. C. Hardtmuth Company, of New York, both publish pamphlets containing interesting descriptions of methods of pencil manufacture.

PENCIL (in mathematics). See **PERSPECTIVE**.

PENCK, pēpk, ALBRECHT (1858—). A German geologist and physical geographer, born and educated at Leipzig. He made special studies of the mountains of Bavaria and Tyrol (1880), and traveled in Scotland and the Pyrenees. After serving as docent at Munich he was in 1885 appointed professor of physical geography at Vienna. He was editor of *Geographische Abhandlungen* (1886 et seq.) and has been one of the contributors to the *Geological Journal* of Chicago. In 1892 he was appointed president of the central commission for the study of the geography of Germany. He wrote: *Die Vergletscherung der deutschen Alpen* (1882); *Die Eiszeit in den Pyrenäen* (1885); *Niederlande und Belgien* (1889); *Donau* (1891); *Morphologie der Erdoberfläche* (1894); and *Untersuchungen über Verdunstung und Abfluss* (1896).

PENCZ, pēnts, GEORG (c.1500-50). A German painter and engraver. He was born at Nuremberg and was probably a pupil of Dürer, or, at least, stood immediately under his influence. He was received into the Painters' Guild in 1523; but in the year following, together with Sebald and Barthel Beham, he was tried for infidelity and banished from the city. In 1525 he was allowed to settle in the neighborhood, and about 1532 he returned to Nuremberg, where he was frequently employed by the city council. In Rome, which he visited before 1530, and again in 1539, he diligently studied Raphael and other great masters, especially the Venetians, and perfected himself in the art of engraving under Marc Antonio. Of the few existing specimens of his historical, allegorical, and mythological paintings, his "Saint Jerome" (1544; in the Germanic Museum, Nuremberg) is the most remarkable. His fame as a painter rests chiefly on his masterly portraits, which for animated conception, excellent modeling, and warm, transparent coloring rank among the finest productions of the Nuremberg school. Especially characteristic are a "Young Man" (1534), "The Painter Erhard Schwetzer" (1544), and his "Wife" (1545), all in the Berlin Museum; a "Young Man" (1543), in the Vienna Museum; and "Fieldmarshal Sebaldus Schirmer" (1545), in the Germanic Museum, Nuremberg. All others in the various galleries of Europe are surpassed by the exquisite portrait of a "Scholar" in the Karlsruhe

Gallery. Pencz is most prominent as an engraver, ranking next to the Behams among the 'Little Masters.' In some of his plates he equals his master, Marc Antonio. Besides his largest plate, "The Taking of Carthage" (1539), after Giulio Romano, may be mentioned the "Six Triumphs of Petrarch," "Life of Christ" (26 plates), "Medea," "Paris," "Vergil and the Courtesan," and the portrait of John Frederick, Elector of Saxony. Consult: Scott, *The Little Masters* (London, 1880); and Kurzweily, *Forschungen zu Georg Pencz* (Leipzig, 1895).

PENDA. A king of the Anglo-Saxon kingdom of Mercia (q.v.).

PENDANT (Lat. *pendens*, hanging, pres. part. of *pendere*, to hang). A hanging ornament, used in ceilings, vaults, staircases, timber roofs, as the end of keystones, posts, corbels, etc. It is sometimes a simple ball, and sometimes elaborately ornamented, and is chiefly used in the later Gothic and Renaissance styles.

PEND D'OREILLE, pān dō'ra'y'. See **KALISPEL**.

PENDENNIS, THE HISTORY OF. A novel by W. M. Thackeray (1850). Arthur Pendennis, the hero, a weak, commonplace, but thoroughly life-like young man, spoiled by an indulgent mother, and his own worst enemy, nearly wrecks himself in imprudent love affairs. From one such affair with an actress he is saved by his uncle, Major Pendennis, a shrewd man of the world. When he is jilted by Blanche Amory, he realizes the devotion of his cousin Laura and marries her. After a struggle, he becomes a successful writer in London, and as such tells the story of *The Newcomes*.

PENDENTIVE. A section of masonry forming the transition between a domical vault and the walls or piers supporting it. It occupies the angle where two walls meet and is usually roughly triangular in shape, with the apex below. The development of the pendentive by Byzantine architects of the sixth century made it possible to erect domes (q.v.) above rectangular or polygonal interiors, and this made it one of the greatest acquisitions in the history of architecture. Such pendentives are, strictly speaking, formed of a curved surface, but any device for passing from a vault to a wall of different plan may, by extension, be called a pendentive, as in the case of corner slabs or lintels, receding corbels, cones, and especially the Mohammedan stalactite pendentive.

PENDER, WILLIAM DORSEY (1834-63). An American soldier, born in Edgecombe County, N. C. He was graduated from West Point in 1854 and assigned to the artillery. He served against the Seminole Indians in New Mexico, and in the Apache campaign in 1856. He resigned in 1861 and was made captain of artillery in the Confederate Army, and May 16th was promoted to be colonel of the Third North Carolina Infantry. He was engaged at Bull Run, and at Seven Pines was made temporary brigadier-general. The appointment was made permanent after Gaines's Mill and Frazier's Farm. At the second battle of Bull Run he fought on foot, leading his men again and again against the impregnable Federal position. He was engaged at Winchester, Harper's Ferry, and Fredericksburg, winning the special favor of "Stonewall" Jackson. Pender was made major

image

not

available

time of oscillation, and consequently a pendulum with a vibration period of one-half second has but one-quarter the length of a seconds pendulum. It is also apparent that pendulums of different kinds of matter—but in other respects identical—should have the same periods of vibration if g is the same for the different kinds of matter. This idea was tested by Newton and later by Bessel, who found that within experimental limits g is the same for all forms and kinds of matter. If g is different at different places on the earth, the fact will be shown by measuring the period of the same pendulum at these places. This was shown to be the case by Huygens.

The problem of deducting the length of a simple pendulum which should have the same period as a given compound pendulum was first solved by Huygens. See CENTRE OF OSCILLATION and MECHANICS.

If the same pendulum is swung at various positions on the earth's surface, its time of vibration will vary depending on the value of g . Accordingly one of the best methods of determining this quantity is to cause a pendulum to swing at different stations and carefully and exactly measure its time of oscillation. In the United States this work is done by the United States Coast and Geodetic Survey, and from their observations the value of the absolute force of gravity in the pendulum room of the Coast and Geodetic Survey at Washington has been found to be 980.165 on the C. G. S. system. The relative measure between Paris and Washington gave $g = 980.169$, and accordingly, the mean of these two values, 980.167, was adopted.

The pendulums used in the United States Coast and Geodetic Survey for gravity determinations swing with a period of one-half second in a case from which the air has been exhausted. The stem is flat and carries a lenticular bob, the pendulum being supported on agate bearings. A beam of light is thrown into the pendulum receiver every second, and when the pendulum is vertical it is reflected into a telescope through the coincidence of two slits. A carefully rated chronometer forms a part of the apparatus and enables the observer to determine with great accuracy the time of vibration of the pendulum. The instruments of the



HALF-SECOND PENDULUM.
Front and side views of United States Coast and Geodetic Survey standard form. A, handle for lifting pendulum from the knife edges on which it is suspended.

Survey are extremely portable, and the observers travel from station to station making observations.

This variation in time of oscillation is shown below in figures from three stations in North America, with considerable difference in their latitude. A pendulum whose period of vibration

in Washington was .5008383 second had a period at Key West, Fla., of .5011320 second and at Umanak, Greenland, of .5002032 second.

Another application of the pendulum due to Foucault is to show the rotation of the earth. Using a long pendulum with a heavy weight, he found that the plane of oscillation would shift in the same direction as the motion of the sun, or opposite to the rotation of the earth. Were the pendulum to vibrate at the pole, it would continue in the same plane while the earth rotated, the path of the pendulum appearing to make one complete revolution in twenty-four hours. At the equator, on the other hand, there will be no rotation of the plane of vibration.

In order to determine the length of a seconds pendulum at any particular place, the method devised by Captain Kater of using a reversible pendulum is employed. Here the centre of oscillation and the centre of suspension are interchangeable and the apparatus will be equivalent to a simple pendulum, whose length is the distance between them. In practice these two points are formed by knife edges, which can be moved with respect to each other along a rod so that the vibrations of the pendulum will be synchronous irrespective of the knife edge by which it is supported.

COMPENSATION PENDULUM. As the length of a rod or bar of any material depends on its temperature (see HEAT), a clock with an ordinary pendulum goes faster in cold and slower in hot weather. In the method of correction usually employed, and called compensation, advantage is taken of the fact that different substances have different coefficients of linear expansion; so that if the bob of the pendulum is so suspended as to

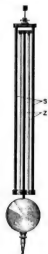
be raised by the expansion of one substance, and depressed by the expansion of another, the lengths of the effective portions of these substances may be so adjusted that the raising and depression, taking place simultaneously, may leave the position of the bob unaffected. There are two common methods of effecting this, differing a little in construction, but ultimately depending on the same principle. Of these, the mercurial pendulum is the more easily described. The rod AC and the framework CB are of steel. Inside the framework is placed a cylindrical glass jar, nearly full of mercury, which can be raised or depressed by turning a screw. With an increase of temperature, the steel portion AC is lengthened by an amount proportional to its length, its coefficient of linear dilatation, and the change of temperature, conjointly—and thus the jar of mercury is removed from the axis of suspension. But neglecting the expansion of the glass, which is very small, the mercury rises in the jar by an amount proportional to its bulk, its coefficient of cubic expansion, and the change of temperature jointly. Now, by increasing or diminishing



MERCURIAL COMPENSATING PENDULUM.

quantity of mercury, it is obvious that we may so adjust the instrument that the length of the equivalent simple pendulum shall be unaltered by the change of temperature, whatever be its amount, so long as it is not great enough to change sensibly the coefficients of dilatation of the two metals.

The construction of the *gridiron* pendulum will be easily understood from the cut. The shaded bars are steel; the second and fourth ones are zinc, or some substance whose coefficient of linear expansion is considerably greater than that of steel. It is obvious from the figure that



GRIDIRON COMPENSATING PENDULUM.

the horizontal bars are merely connectors, and that their expansion has nothing to do with the vibration of the pendulum, so they may be made of any substance. It is easily seen that an increase of temperature lowers the bob by expanding the steel rods, whose effective length consists of the sum of the lengths of one of the outer rods and the steel bar to which the bob is attached; while it raises the bob by expanding the zinc bars, whose effective length is that of one of them only, the other, as well as one of the outside steel rods, being added to the instrument for the sake of symmetry, strength, and stiffness only. If the effective lengths of steel and brass be inversely as their respective expansion coefficients, the position of the bob is unaltered by temperature; and therefore the pendulum will always vibrate in the same period. This is on the supposition that the weight of the framework may be neglected in comparison with that of the bob; if this weight must be taken into account, the requisite adjustments, though possible, are greatly more complex, and can only be alluded to here.

Practically, it is found that a strip of dry fir-wood, carefully varnished to prevent the absorption of moisture, and consequent hygrometric alterations of its length, is very little affected by change of temperature; and in many excellent clocks this is used as a very effective substitute for the more elaborate forms just described. In astronomical clocks, though they are kept at a temperature as nearly constant as possible, the compensation of the pendulum is a matter of delicacy.

PENEL' OPE (Lat., from Gk. Πηνελόπεια, *Pēnelopē* Πηνελόπεια, *Penelopeia*). In Greek legend, a daughter of Icarios of Sparta and Periboea, and wife of Odysseus. According to the Homeric story, Odysseus was soon called to the Trojan War, leaving his wife with their infant son Telemachus at Ithaca. When Troy had fallen and years passed without his return, numerous suitors gathered at his palace, whom the youthful Telemachus could not dispossess, though they devoured and wasted his father's goods, while importuning Penelope to choose a husband. For some time she put them off under the plea that she must first finish the shroud she was weaving for old Laertes, father of Odysseus. To protract the time, she unraveled at night what she wove

by day. Betrayed by a maid, she was compelled to finish the work, and the suitors were preparing to force a decision, when Odysseus returned, and slew them. Later epics told how Odysseus was subsequently slain in ignorance by Telegonus, his son by Circe, and how after his death Telemachus, Telegonus, and Penelope journeyed to Circe's island, where Telemachus wedded Circe, and Telegonus Penelope. There is considerable evidence connecting both Odysseus and Penelope with Arcadia, as local divinities. At Mantinea the grave of Penelope was shown, and in Arcadian legends she is a nymph, who became by Hermes (or in another version by all the suitors) the mother of Pan. The later writers endeavored to account for her grave by saying that when Odysseus learned of her infidelity, he dismissed her, whereupon she wandered to Lacedæmon, and then to Mantinea, where she died.

PENEPLAIN. See **PLAIN**.

PENETRATION OF A PROJECTILE. See **BALLISTICS**.

PEN'FIELD, EDWARD (1866—). An American artist, born in New York City. He studied at the Art Students' League in New York City, and afterwards in Holland and England. He was associated with the Harpers Publishing Company from 1891 until 1901, and designed several posters, magazine covers, and calendars for them. He was one of the first in America to make poster designs in color, and showed himself to be an artist of originality and unusual force, especially in drawings of small size. His other works include decorations in Randolph Hall, Cambridge, Mass.

PENFIELD, SAMUEL LEWIS (1856—). An American mineralogist, born at Catskill, N. Y. He graduated in 1877 at the Sheffield Scientific School of Yale, and was appointed professor of mineralogy there. Penfield was elected to the National Academy of Sciences. His publications include: *Determinative Mineralogy and Blow-Pipe Analysis* (1898), and contributions to the *American Journal of Science and Art* on crystallography and mineralogy.

PENFIELD, SMITH NEWELL (1837—). An American organist and composer. He was born in Oberlin, Ohio, and graduated from Oberlin College. After teaching music for several years in Rochester, N. Y., he studied in Leipzig under Moscheles, Reinecke, and Plaidy, and on his return to America lived for some time in Savannah, Ga., then in Brooklyn, N. Y., where he was for two years organist of the Church of the Pilgrims, and in New York, where he held like positions in Saint George's, Saint Mark's, the Broadway Tabernacle, and the Scotch Presbyterian Church. In Savannah he founded the Mozart Club and a Conservatory of Music, and in Brooklyn the Arion Conservatory. Among Penfield's many compositions are services of the Episcopal canticles, a cantata entitled *The Eighteenth Psalm*, as well as marches, choruses, glees, and solos.

PENGE. A municipality of Surrey, England, and a residential suburb of London, seven miles southeast of Saint Paul's. Population, 1891, 20,400; 1901, 22,460.

PENGUIN (possibly from Welsh *pen gwen*, white head, applied to the auk and later transferred to the penguin, or perhaps from a native

South American name). One of the Antarctic sea-birds of the family Spheniscidæ, representing the larger group Sphenisci. They have short wings, quite unfit for flight, but covered with short rigid scale-like feathers, and much like the flippers of turtles. The legs are very short, and are placed very far back, so that on land penguins rest on the tarsus, which is widened like the sole of the foot of a quadruped, and they thus maintain a perfectly erect posture. Their bones, unlike those of birds in general, are hard, compact, and heavy, and have no air-cavities; those of the extremities contain an oily marrow. The body is of an elliptical form; the neck of moderate length; the head small; the bill moderately long, straight, more or less compressed; the tail very short. They are among the most aquatic birds, and spend little more time on shore than is necessary for sleeping and reproduction. Their food consists of all the small life of the sea, which they catch by swimming and diving often to very great depths. The wings are modified internally as well as externally to make them effective aids in this work, and are used not together like oars, as other birds swim under water, but alternately and with a twisting motion, so that no part of the result of the effort is neutralized and continuous and very rapid progress is made without the aid of the feet, which merely serve as rudders. Underneath their skin is a layer of blubber-like fat, which assists them to withstand the icy air and water of their habitat. They go about in swimming 'schools,' and gather at their breeding grounds in enormous flocks.

About fifteen species are known, mainly in high southern latitudes, although some species straggle as far north as Peru and Brazil, New Zealand, and the Cape of Good Hope. It is upon the islands about Cape Horn and in the Antarctic Sea that they abound and breed in the greatest numbers. Some gather stones, bits of stick, grass, etc., into a sort of a nest; others make no nest whatever; while the king penguin, and perhaps some others, incubate the egg as do their Arctic analogues, the auks, by holding it between their thighs, resting upon the top of their feet, the male and female relieving each other at intervals. A single egg only is laid, but it is tended and guarded with great care; and the mother penguin is said to keep her young one with her for a twelvemonth.

The king penguins (*Aptenodytes*) are among the largest. They stand three feet high, and are grayish blue with black heads, white breasts, and orange or yellow throats. They exist in colonies of many thousands. The 'jackass-penguins' (*Spheniscus*) are medium-sized or small species with a stout bill. They receive their popular name from their cry. The rock-hoppers or *macaronis* (*Eudyptes*) are notable for being curiously crested with curly yellow plumes on each side of the head. The smallest known species of penguin is *Eudyptula minor* of Australia and New Zealand, which is only about a foot long. In the Eocene rocks of New Zealand fossil remains of a giant penguin (*Palæudyptes antarcticus*) have been found, indicating a bird six or seven feet high.

Consult: Newton, *Dictionary of Birds* (New York, 1893); Stejneger, *Standard Natural History*, vol. iv. (Boston, 1885); Buller, *Birds of New Zealand* (2d ed., London, 1888); Darwin, *A Naturalist's Voyage* (New York, 1899); Mosely,

The Naturalist in the Challenger (London, 1879); and the writings of Antarctic navigators. See Plate of AUKS, ALBATROSS, ETC.

PENHALLOW, pēn-hōl'lo, SAMUEL (1665-1726). An American colonist and historian, born at Saint Mabon, Cornwall, England. He came to Massachusetts with the Rev. Charles Morton, his teacher, in 1686; lived for a time at Charlestown, Mass., and then removed to Portsmouth, N. H., where by marriage and business successes he acquired a considerable fortune, and was successively made a magistrate, a member of the council, recorder of deeds, and justice of the Supreme Court of Judicature (1714), of which court he was Chief Justice from 1717 until his death. He was also for several years treasurer of the colony. He is remembered as the author of a *History of the Wars of New England with the Eastern Indians, or a Narrative of Their Perfidy and Cruelty* (1726; reprinted in the *Collections of the New Haven Historical Society* in 1824, and separately at Cincinnati in 1859), which covers the period from 1703 to 1726, is the chief contemporary authority in English on Queen Anne's War, and the so-called Lovewell's War, and has been of great value to historians.

PENINSULAR CAMPAIGN. The name given to the campaign of General McClellan, at the head of the Federal Army of the Potomac, against Richmond, Va., in April-July, 1862, during the Civil War. The campaign was so named because of McClellan's attempt to reach the Confederate capital by way of the peninsula formed by the York and the James rivers. For details see McCLELLAN, G. B.; CIVIL WAR IN AMERICA; YORKTOWN; WILLIAMSBURG; SEVEN PINES; GAINES'S MILL; SEVEN DAYS' BATTLES; MALVERN HILL.

PENINSULAR STATE. Florida. See STATES, POPULAR NAMES OF.

PENINSULAR WAR, THE. The struggle carried on in the Iberian Peninsula from 1807 to 1814 between the Emperor Napoleon on the one side and the Spaniards, the Portuguese, and the English on the other. After the Treaty of Tilsit Napoleon resolved to seize Portugal in order more perfectly to enforce his Continental System (q.v.) against England. With the connivance of Spain, a French army under Junot invaded Portugal and occupied Lisbon on November 30, 1807. The flight of the royal family to Brazil left the Portuguese for the moment leaderless, but the English soon came to their assistance and, under the command of Sir Arthur Wellesley, afterwards Duke of Wellington, defeated Junot at Vimeiro on August 21, 1808, and by the Convention of Cintra, nine days later, forced him to evacuate Portugal. In the meanwhile the family affairs of Spanish royalty gave Napoleon a pretext for interfering in Spain. Armies under the direction of Murat occupied the country and on June 6, 1808, Joseph Bonaparte was proclaimed King of Spain. (See CHARLES IV.; FERDINAND VII.) One of the divisions of the French army of occupation was trapped by the Spaniards and forced to surrender at Bailen (q.v.) on July 20, 1808. This disaster so startled Napoleon that immediately after the Congress of Erfurt he in person undertook a campaign in Spain with three large armies and occupied Madrid on December 4, 1808. His army was lured away from Madrid by an English army under Sir John Moore,

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of Louis XIV. After studying law a short time at Lincoln's Inn, he was sent by his father to Ireland to look after his estates in the County of Cork. In the city of Cork, however, he fell in with Thomas Lee, and for attending a Quaker meeting was, along with some others, imprisoned by the Mayor, though he was promptly released. He now became a minister, and on his return to England he and his father again quarreled, because his 'conscience' would not allow him to take off his hat to anybody—not even to the King, the Duke of York, or the Admiral himself. Penn was for a second time turned out of doors by his father, but his mother smoothed matters so far that he was allowed to return home, and the Admiral even exerted his influence with the Government to wink at his son's attendance at the illegal conventicles of the Quakers, which nothing could induce him to give up. Meantime he was engaged in preaching and writing tracts on various religious subjects. In 1668, however, he was thrown into the Tower, where he was confined for eight months on account of a publication entitled *The Sandy Foundation Shaken*, in which he attacked the ordinary doctrines of the Trinity. While in prison he wrote the most famous and most popular of his books, *No Cross, No Crown*, and *Innocency With Her Open Face*, a vindication of himself which contributed to his liberation through the interference of the Duke of York. In September, 1670, Admiral Penn died, leaving his son an estate of £1500 a year, together with claims upon the Government for £16,000. In 1671 he was again committed to the Tower for preaching in violation of the Conventicle Act, and, as he would take no oath at his trial, he was sent to Newgate for six months. Here he wrote four treatises, one of which, entitled *The Great Cause of the Liberty of Conscience*, is an admirable defense of the doctrine of toleration. After regaining his liberty he, together with Fox and Barclay, visited Holland and Germany for the advancement of Quaker interests. The Countess Palatine Elizabeth, the granddaughter of James I., showed him particular favor. On his return he again engaged in preaching and writing on religious topics, but circumstances soon turned his attention to the New World. In 1676 Penn and several associates founded a Quaker colony in West Jersey, which had come into their possession by purchase. In 1681 Penn obtained from the Crown, in lieu of a debt of £16,000 due from the King to his father, a grant of the territory now forming the State of Pennsylvania. By a royal charter he was made full proprietor of the territory of Pennsylvania. His great desire was to establish a home for his co-religionists in America, where they might preach and practice their convictions in unmolested peace. In the same year he sent out a governor to take possession of the province, and in the following year, 1682, with several friends, sailed for the Delaware, arriving in October. After taking formal possession he laid out a site for his new capital, which he named Philadelphia. Some time during the following year he had his famous interview with the Indians under the great Elm at Shakamaxon (now Kensington) and concluded a treaty of lasting friendship with them. Penn's colony in its infancy escaped the horrors of Indian warfare which befell some of the other American settlements, and under the wise and liberal government of its founder made

immense progress during the next few years. Not only Quakers, but persecuted members of other religious sects, sought refuge in his new colony, where, from the first, the principle of toleration was established by law. Having called the colonists together, he gave the colony a constitution in twenty-four articles. Almost from the beginning Delaware, which was secured by a grant from the Duke of York, formed part of the Pennsylvania colony. In 1682 Penn and other Quakers bought East Jersey. Neither West Jersey nor East Jersey, however, remained permanently in the possession of the Quakers, the whole region being surrendered to the Crown in 1702. Toward the end of the reign of Charles II., in 1684, Penn returned to England to exert himself in favor of his persecuted brethren at home, leaving behind a prosperous colony of 7000 inhabitants. His influence with James II.—an old friend of his father—was so great that his exertions in favor of the Quakers secured in 1686 a proclamation by which all persons imprisoned on account of their religious opinions were released, and more than 1200 Quakers were set free. In the April following, largely as a result of the same influence, James issued an edict for the repeal of all religious tests and penalties, but the mass of non-conformists distrusted his sincerity, and refused to avail themselves of it. After the accession of the Prince of Orange as William III., Penn was twice accused of treason as a result of his relations with the exiled monarch, but was acquitted. In 1690 he was arrested on a charge of conspiracy, but was again acquitted for lack of evidence. Nevertheless in the following year the charge was renewed, and for a time he was deprived of the government of Pennsylvania. Nothing further appears to have been done for some time, but at last, through the kindly offices of his friends, Locke, Tillotson, and others, the matter was thoroughly investigated, and he was finally and honorably acquitted November, 1693, and restored to the government of his province. In 1699 he paid a second visit to the New World, and found Pennsylvania in a prosperous condition. His stay, which lasted two years, was marked by many useful measures, and by efforts to ameliorate the condition both of the Indians and of the negroes. Penn departed for England toward the end of 1701, leaving the management of his affairs to a Quaker agent named Ford, by whose dishonesty he was virtually ruined. When the agent died, he left to his widow and son false claims against his principal, and these were so ruthlessly pressed that Penn allowed himself to be thrown into Fleet Prison in 1708 to avoid extortion. His friends afterwards procured his release, but not until his health had been fatally impaired. Later he was stricken with paralysis and in this condition lingered until his death in 1718. He was twice married and left issue by both marriages. The works of Penn were published in 1782 in five volumes, and again in 1825 in three volumes. An important biography of Penn is that of Janney (Philadelphia, 1852). His *Memoirs*, in two volumes, were edited by Clarkson (Philadelphia, 1813). A biography refuting charges made against him by Lord Macaulay was written by Dixon (new ed., Philadelphia, 1856). A small popular biography is that by Hodges (Boston, 1901). Consult also Fisher, *The True William Penn* (Philadelphia).



WILLIAM PENN

AFTER THE PAINTING BY BENJAMIN WEST

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PEN'NACOOK (nut place, or crooked place). A confederacy of Algonquian tribes formerly occupying the Merrimac River basin and adjacent region in New Hampshire, Massachusetts, and southern Maine. They occupied a middle ground between the Southern New England tribes, with whom the English had dealing, and the Abnaki and others of the north, who were under French influence. Their early treaties were with the English, but their later alliances were with the French. The capital of the confederacy and the residence of the head chief, Passaconaway, was at Amoskeag, the present Manchester, New Hampshire. Wamesit village, with Pawtucket Falls, was the great rendezvous during the fishing season. When first known to the English they were estimated at 3000, which was probably below their real number, under the rule of the noted chief and medicine man, Passaconaway. He was friendly to the whites and invited the English to settle upon the Merrimac. Before his death, about 1669, he saw almost his whole country in the hands of the whites and was himself obliged to petition for enough ground to live upon. In the meantime his people had been reduced by small-pox and other introduced diseases to about 1200. On the outbreak of King Philip's War in 1675, one or two of the Pennacook bands joined the hostile Indians, but the greater portion, under Wanalancet, the son of Passaconaway, remained on friendly terms with the English until, angered by the treacherous seizure of a number of their people, they abandoned their country and fled, part to the French in Canada, others to the Mohican on the Hudson. Those who removed to Canada were finally settled at Saint Francis (q.v.), Quebec Province.

PENNAMITE-YANKEE WAR. See WROMING VALLEY.

PENNANT (variant of *pennon*, with excrement *t*, possibly associated by popular etymology with *pendant*, from OF., Fr. *pennon*, sort of flag, augmentative of OF. *penne*, from Lat. *penna*, feather, wing). A narrow flag or streamer tapering from the "hoist" to the "fly" or tip. In the signal codes pennants are two to five times as long as they are wide. The old commodores' 'broad pennant' was a 'swallow-tail' flag. The pennant of the 'senior officer present' is blue and nearly equilateral. The narrow pennant worn by all vessels commissioned in the Government service is carried at the main and signifies that she is of a public character. See COLORED PLATES OF FLAGS OF THE UNITED STATES, and SIGNALS, MARINE.

PEN'NANT, THOMAS (1726-98). A British naturalist, born at Downing, near Holywell, in Flintshire, and educated at Queen's College, Oxford. In 1754 he visited Ireland, and about this time began those tours of the British Islands, the published accounts of which contributed greatly to his reputation. In 1761 he began his *British Zoology*, the first part of which was published five years later. This work and his *History of Quadrupeds* (1781) were long held in the highest esteem by scientists. Among his other writings are: *Tour in Scotland* (1771); *Tours in Wales* (1810); *Arctic Zoology* (1784-87); and *Outlines of the Globe* (1798-1800). Consult: *The Literary Life of the Late Thomas Pennant, Esq., By Himself* (London, 1793); Parkins, *Memoir*, in Rhys's edition of the *Tours*

in *Wales* (1883); and Jardine, *Memoir*, in "The Naturalists' Library," vol. xv.

PENNANT'S MARTEN. See FISHER.

PENNANT-WINGED NIGHTJAR. A nightjar (*Macrodipteryx vexillarius*) of equatorial Africa, in which one of the quill feathers in each wing is greatly elongated and has a vane only near the end. The bird is rare and little known; but has been observed in the daytime seated upon the ground with the two modified wing-feathers held perfectly erect, their feathery tips fluttering among the grass heads, from which they were scarcely to be distinguished. Compare STANDARDWING.

PENN COLLEGE. A coeducational Friends' college at Oskaloosa, Iowa, founded in 1873, and comprising collegiate and preparatory courses, with departments of biblical instruction and a summer school. It had in 1902 an attendance of 242 collegiate and 124 preparatory students, 15 instructors, and a library of 6000 volumes. The college property was valued at \$200,000, and the grounds and buildings at \$150,000. The endowment was \$100,000, with an income of \$15,000.

PENNELL, pën'el, JOSEPH (1800-). An American etcher, illustrator, and author, born in Philadelphia. He was a pupil of the Pennsylvania Academy of Fine Arts and the Pennsylvania School of Industrial Arts. He showed the picturesque possibilities of old Philadelphia in a series of clever etchings, and also executed many Italian and several English subjects, such as the "Thames Embankment," and the "Nelson Monument." He is one of the best of American etchers. His work is clean, strong, and intelligent, and is characterized by sharp contrasts of light and shade. He received honorable mentions and medals at Paris, Philadelphia, and Chicago, and a first class gold medal at the Paris Exposition of 1900. Some of the books which he illustrated, and the text for which usually was prepared by his wife, Elizabeth Robins Pennell, include *A Canterbury Pilgrimage* (1885); *An Italian Pilgrimage* (1886); *Our Sentimental Journey Through France and Italy* (1888); *Pen Drawing and Pen Draughtsmen* (1889); *Our Journey to the Hebrides* (1889); *To Gypsy Land* (1893); *Modern Illustration* (1895); *The Illustration of Books* (1896); and *The Alhambra* (1896).

PENNI, pën'é, GIANFRANCESCO, called 'Il Fattore' (c.1488-c.1528). An Italian painter, born in Florence. He was one of the favorite pupils and a friend of Raphael, and with Giulio Romano was his legatee and artistic executor. He painted from Raphael's designs in the Loggia of the Farnesina, and the Vatican, completed the "Coronation of the Virgin" for Monteluce, and copied the "Transfiguration" and the "Entombment." Besides these paintings he is said to have worked on the cartoons, and to have executed the "Visitation" in the Madrid Museum, and the "Madonna del Passeggio" in the Bridgewater Gallery, after Raphael's designs. His original work is of little importance.

PENNINE ALPS. See ALPS.

PENNINE CHAIN. A range of hills in Northern England. See GREAT BRITAIN.

PENN'SYLVANIA (from *Penn* + Neo-Latin *sylvania*, woodland, from Lat. *silvanus*, *sylva*, relating to a forest, from *silva*, *sulea*, wood; est; named in honor of William Penn).

Atlantic State of the United States, situated at the apex of the arch formed by the coast States from North Carolina to New England, whence it is popularly called the 'Keystone State.' It lies between 39° 43' and 42° 15' north latitude, and between 74° 43' and 80° 31' west longitude. It is bounded on the north by New York State, and for about 60 miles in the west by Lake Erie, on the east by New York and New Jersey, on the south by a small part of Delaware and by Maryland and West Virginia, and on the west by West Virginia and Ohio. In shape it forms a rectangle. The north and south boundaries are straight lines running along parallels 157½ miles apart, except for the small projection of the northwestern corner. The western boundary is a straight line running along the meridian, but the eastern boundary is formed by the Delaware River, which forms two large and regular zigzag bends, making the extreme length of the State 302 miles. The area is 45,215 square miles, of which 44,985 square miles, or 28,790,400 acres, are land surface. The State ranks twenty-ninth in size among the United States.

TOPOGRAPHY. Three of the four topographical belts which form the Eastern United States may be recognized in this State, running across its territory from southwest to northeast. The Atlantic coastal plain does not come within the State limits, so that the first of the three belts is the Piedmont Plain (q.v.), which occupies the southeastern portion between the lower course of the Delaware and the Blue or Kittatinny Mountain range. It has a width of about 60 miles, and ascends by gentle undulations from sea-level at the Delaware estuary to an elevation of 500 feet at the base of the mountains. It is broken, however, by several low ridges in the southeast, and farther inland by the interrupted chain of semi-isolated groups of hills known as the South Mountain, which farther north becomes the Highlands of New Jersey and New York. The second belt is the Appalachian Mountain region. It crosses the State toward the northeastern corner as a system of more or less parallel ridges, together from 50 to 80 miles wide. The eastern ridge is the Blue Mountain, known farther north and in New Jersey as the Kittatinny Range. It rises abruptly from the plain to a uniform height of a little over 1000 feet, or about 1500 feet above the level of the sea. It is broken by but few river gaps, notably that of the Susquehanna (which pierces the entire mountain belt), and the Delaware Water-Gap, on the eastern boundary of the State. West of the Blue Mountain there follow a succession of low ridges bearing various names, and intersected here and there by transverse river valleys. They appear almost like waves on the ocean, turning their steep faces southeastward and sloping gently toward the northwest, and they inclose a number of fertile and populous valleys. North of the Susquehanna they pass in the west into irregular masses which merge with the western plateau, but in the southern half the undulating belt is sharply limited on the west by the high and steep face of the Allegheny Range. The western slope of the latter falls gradually toward the plateau, though it is flanked by a few minor ridges, the extreme western outliers of the system, chief among which is Laurel Hill in the southwestern part of the State. The highest point in the State is North Knob, 2684 feet above the sea. The third

topographical region is the broad Allegheny Plateau, covering the entire western half of the State. Its horizon has an elevation of 1000 to 2000 feet, sloping gently to the south and west. But it has been reduced by erosion to a complicated hill-country, or rather valley-country, being intersected in all directions by river-valleys, some broad and open, others narrow, with abrupt slopes 500 to 800 feet deep. The line of 1000 feet elevation is only two to five miles from the shore of Lake Erie, so that there is here no lake-shore plain.

HYDROGRAPHY. The three chief river systems are, in the order of their drainage areas, the Susquehanna, the Ohio, and the Delaware. These together drain over 90 per cent. of the State. An insignificant area in the south belongs to the Potomac system, and in the north to the Genesee, while the extreme northwestern corner is drained by short streams flowing into Lake Erie. The Delaware, which is navigable for the largest ships to Philadelphia, and for small steamers some distance above, drains the eastern slope through its right tributaries, chief of which are the Lehigh and the Schuylkill. The Susquehanna traverses the State in a large zigzag from north to south, receiving its two main tributaries, the West Branch and the Juniata, from the west. It is broad, but shallow and unnavigable. The western part of the State is drained by the Ohio and its two great headstreams, the Allegheny and Monongahela, both of which are navigable for some distance above their junction at Pittsburgh.

CLIMATE. The climate in the southeastern part along the Delaware is much warmer, both in summer and in winter, than in the western upland. The mean temperature for January at Philadelphia is 32.3°, and for July 76.2°. The corresponding figures for Wilkesbarre, among the mountains, are 27° and 72°; for Pittsburgh, 31° and 75°; and for Erie, on the lake shore, 27° and 70°. The summer heat south of the Blue Mountain has been as high as 107°, and is prolonged far into autumn. Northwest of the mountains the snow sometimes lies several feet deep throughout the winter, and the temperature may fall to 28° below zero. The average annual rainfall for the State is 44.6 inches. It is evenly distributed both as to season and through the larger regions of the State, though it may range from 35 to 50 inches in isolated localities.

SOIL AND VEGETATION. The soils are on the whole somewhat more fertile than those of the average Atlantic State, there being no Tertiary sand area, and comparatively small areas of primary rocks. The soil is to a large extent decomposed limestone material, which is a good grain soil, and, where least fertile, is well suited for pasturage. Pennsylvania was originally one of the most densely forested States, and there are still considerable forest areas on the western plateau. The predominating trees on the lowlands are white oak, hickory, chestnut, walnut, and cherry; on the higher ground are the white pine, hemlock, pitch pine, maple, beech, and black and yellow birch; and on the mountains above 1800 feet the black and red spruce, balsam fir, and larch predominate. On the western plateau the forests are mostly deciduous, with chestnut and oak abundant, and in the southwest the common trees of the State mingle with those characteristic of Kentucky, such as the honey locust and Kentucky coffee tree. The sugar-maple is

AREA AND POPULATION OF PENNSYLVANIA BY COUNTIES.

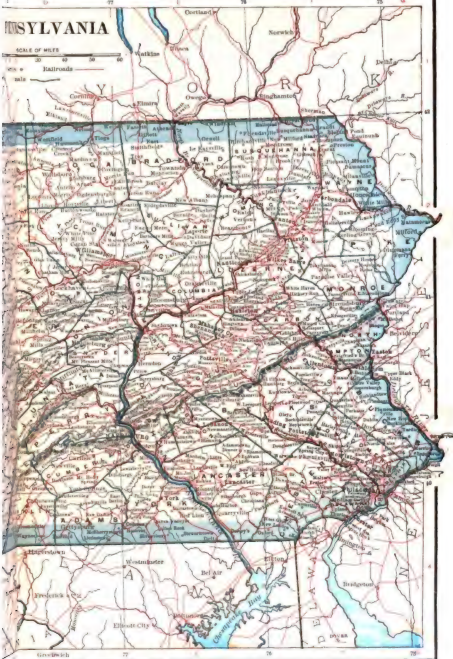
County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1880.	1900.
Adams.....	D 4	Gettysburg.....	537	53,486	54,496
Allegheny.....	A 3	Pittsburg.....	758	521,069	775,058
Armstrong.....	B 3	Kittanning.....	640	47,747	52,551
Beaver.....	A 3	Beaver.....	426	50,077	56,432
Bedford.....	C 4	Bedford.....	1,070	38,644	39,498
Berks.....	E 3	Reading.....	874	137,327	159,615
Blair.....	C 3	Hollidaysburg.....	530	70,866	83,069
Bedford.....	E 2	Towanda.....	1,140	59,233	59,403
Bucks.....	F 3	Doylestown.....	620	70,615	71,190
Butler.....	B 3	Butler.....	765	55,339	56,962
Cambria.....	C 3	Ebensburg.....	690	66,375	104,837
Cameron.....	C 2	Emporium.....	375	7,238	7,044
Carbon.....	F 3	Mauch Chunk.....	400	38,624	44,510
Center.....	D 3	Belleville.....	1,130	43,399	42,864
Chester.....	F 4	West Chester.....	760	89,277	95,695
Clarion.....	B 2	Clarion.....	566	26,802	34,283
Clearfield.....	C 3	Clearfield.....	1,141	69,565	80,614
Columbia.....	D 2	Lock Haven.....	892	28,695	39,197
Columbia.....	E 2	Bloomsburg.....	490	36,832	39,806
Crawford.....	A 2	Mechville.....	1,020	65,394	63,643
Cumberland.....	D 3	Carlisle.....	536	47,271	50,344
Dauphin.....	E 3	Harrisburg.....	514	96,977	114,443
Delaware.....	F 3	Media.....	178	74,683	94,762
Elk.....	C 2	Hidgway.....	760	22,229	32,903
Erie.....	A 1	Erie.....	782	98,074	98,473
Fayette.....	B 4	Uniontown.....	824	80,006	110,412
Forest.....	B 2	Tionesta.....	420	8,482	11,639
Franklin.....	D 4	Chambersburg.....	731	51,433	54,902
Fulton.....	C 4	McConnellsburg.....	416	10,137	9,924
Greene.....	A 4	Waynesburg.....	568	28,635	28,281
Huntingdon.....	C 3	Huntingdon.....	940	33,751	34,650
Indiana.....	B 3	Indiana.....	820	42,175	42,556
Jefferson.....	B 3	Brookville.....	620	44,005	50,113
Juniata.....	D 3	Mifflintown.....	308	16,655	16,054
Lackawanna.....	F 2	Scranton.....	470	142,048	163,831
Lancaster.....	E 3	Lancaster.....	960	149,095	159,241
Lawrence.....	A 3	Newcastle.....	360	37,517	57,042
Lebanon.....	E 3	Lebanon.....	370	48,131	53,827
Lehigh.....	F 3	Allentown.....	328	76,631	93,863
Luzerne.....	E 3	Wilkesbarre.....	910	301,303	327,171
Lycoming.....	D 2	Williamsport.....	1,340	70,579	75,663
McKean.....	C 2	Smethport.....	976	46,863	51,343
Mercer.....	A 2	Mercer.....	680	55,744	57,387
Mifflin.....	D 3	Lewistown.....	411	19,996	23,160
Monroe.....	F 3	Stroudsburg.....	620	30,111	21,161
Montgomery.....	F 3	Norristown.....	501	123,290	139,595
Montour.....	E 3	Danville.....	142	15,045	15,536
Northampton.....	F 3	Easton.....	370	84,920	99,087
Northumberland.....	F 3	Sunbury.....	469	74,698	90,911
Perry.....	D 3	New Bloomfield.....	561	36,976	36,263
Philadelphia.....	F 4	Philadelphia.....	139	1,046,964	1,295,697
Pike.....	F 2	Milford.....	630	9,412	8,796
Potter.....	D 2	Coudersport.....	1,049	22,778	30,021
Schuylkill.....	E 3	Pottsville.....	789	154,163	172,927
Snyder.....	D 3	Middleburg.....	320	17,651	17,304
Somerset.....	B 4	Somerset.....	1,040	37,317	45,461
Sullivan.....	E 2	Laporte.....	470	11,620	12,134
Susquehanna.....	E 2	Montrose.....	925	49,063	40,043
Tioga.....	D 2	Wellsville.....	1,180	52,313	49,686
Union.....	D 3	Lewisburg.....	316	17,890	17,562
Vermejo.....	B 2	Franklin.....	371	46,640	49,648
Warren.....	B 2	Warren.....	860	37,585	39,946
Washington.....	A 3	Washington.....	830	71,155	92,181
Wayne.....	F 2	Honesdale.....	831	31,010	30,171
Westmoreland.....	B 3	Greensburg.....	1,060	132,819	160,175
Wyoming.....	E 2	Tunkhannock.....	469	15,891	17,152
York.....	E 4	York.....	875	99,489	116,413



PENNSYLVANIA

SCALE OF MILES

0 10 20 30 40 50 60
 miles
 Railroads



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image

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available

still one of the most common trees all over the State.

For FAUNA see this section under UNITED STATES.

GEOLOGY. The great Archæan belt which forms the entire eastern flank of the Appalachian system from Alabama to Canada crosses the southeastern corner of the State in a band about 50 miles wide and consisting chiefly of gneisses with tracts of serpentine. It is exposed in two sections, one ending in a point near Trenton, and broadening southwestward along the Delaware, forming the hills near Philadelphia, the other running southwest from the confluence of the Lehigh River with the Delaware, and forming the South Mountain chain. Between these two outcrops the Archæan belt is crossed by a band of Triassic red sandstone, which runs northeastward and extends across New Jersey. Both this and the Archæan belts are crossed by numerous dikes of trap-rock. Against the western flank of the South Mountain rests the lowest stratum of the great Paleozoic series which covers the entire remainder of the State as well as the whole of the Ohio and Upper Mississippi Valley. On the western plateau these strata lie nearly horizontal, but in the Appalachian uplift they are much tilted, folded, and broken, so that they outcrop in narrow successive bands. Here the hard sandstone strata generally form the ridges, while the softer limestone forms the valley floors. The series begins with a narrow belt of Cambrian running along the edge of the Archæan outcrop. West of this, between the South and the Blue or Kittatinny Mountains, the Kittatinny Valley runs across the State as a belt of Lower Silurian limestone, from which rise the Appalachian ridges of Devonian rocks, with some belts of Silurian. The great Devonian area of southwestern New York extends across the whole length of the boundary, and is especially prominent in the northeastern part of the State. It is overlaid with Carboniferous strata, which, with the exception of the Triassic belt in the east, is the most recent formation in the State, and covers the entire southwestern and west central regions, with isolated patches east of the Susquehanna.

MINERAL RESOURCES. In these isolated Carboniferous areas in the Appalachian valleys the coal seams were subjected to metamorphosis by the folding and crushing action of the older strata during the great upheaval, and were changed into invaluable beds of anthracite, while on the western plateau, where the strata were undisturbed, they remained in the bituminous form. The underlying Devonian sandstone strata in the west are heavily charged with petroleum and natural gas. Iron is found as brown hematite in the Silurian slates in the region of the Lehigh River, and as magnetite in the metamorphic rocks, while it is also imbedded with the Carboniferous strata. Other minerals found are zinc, cobalt, nickel, lead, copper, tin, chrome iron, salt, and soapstone. White marble is quarried in the Silurian limestone beds, and building stone, such as the trap and red sandstone in the east, is abundant.

Mining. No State in the Union compares with Pennsylvania as to mining. Its mineral wealth has been in a large measure the basis of its diversified and highly developed industrial life. The annual output of coal alone exceeds in value the total mineral product of any other State, and

has annually, since 1880, been equal in amount to that of all the coal mined in the other States. Anthracite has been mined continuously since 1820. The demand and the output rapidly increased, particularly after 1840, when it came into use for smelting iron ore. The annual output of anthracite coal much more than doubled in both bulk and value from 1880 to 1901. The amount in short tons for 1880 was 28,649,811; for 1890, 46,468,641; and for 1901, 67,471,667, the value for the year 1901 being \$112,504,020. The anthracite coal fields of Pennsylvania yield almost the entire product for the United States, and represent the only high-grade anthracite producing region in the world. These mining districts fall principally into three sections in the northeastern part of the State—the Northern Field, in the Wyoming and Lackawanna valleys, the Middle or Lehigh and Mahanoy Fields, and the Southern or Schuylkill Field. The bituminous coal is mined chiefly in six parallel valleys west of the Allegheny slope, in the southwestern corner of the State. It was not until about 1875 that bituminous coal began to be extensively used in iron-smelting, but since then it has far exceeded anthracite in annual tonnage. The tonnage increased from 19,416,171 short tons in 1880 to 82,305,496 in 1901, the value for the latter year being \$81,397,586. In 1900 there were 92,692 employees engaged in coal-mining.

Pennsylvania has always ranked first in the production of coke, usually yielding about two-thirds of the total for the United States. The yield increased from 2,821,384 tons in 1880 to 8,560,245 in 1890 and to over 13,000,000 tons in 1900. The coal used requires little or no preparation before charging into the ovens, and the greater part of it is unwashed run-of-mine. Nearly three-fourths of the total product of coke is made in the Connellsville district.

The utilization of petroleum in the United States began in Pennsylvania in 1859. The output increased almost constantly until 1882, when the yield was 30,053,500 barrels. This figure was not exceeded until 1891, when the output was 33,069,236 barrels. The yield has since fallen off over half, being 12,625,378 barrels in 1901, valued at \$15,430,609. Prior to about 1885 Pennsylvania produced almost the whole product for the United States, and up to 1900 had produced 60 per cent. of the total output for the country. However, since 1894 Ohio has annually outranked Pennsylvania, and it was also outranked by West Virginia in 1900. The first oil pipe lines were laid in 1865, and have been extended until they reach numerous distant points. Natural gas became prominent as a fuel in Pennsylvania earlier than in other gas States, and its annual sales of gas exceed those of any other State. Gas came into general use from 1880 to 1885, reaching its climax in 1888, in which year the sales amounted to \$19,282,375. As the supply in certain regions became exhausted, the receipts decreased to less than \$6,000,000 in 1895 and 1896; but the growing scarcity has resulted in a considerable rise in price, and this fact has largely been responsible for a recent gain in receipts, which amounted in 1900 to \$12,688,161.

Iron-mining began early in the colonial period, and until 1850 the local product supplied the iron furnaces of the State with all the raw material required. And though the greater part of

the iron used in the latter part of the nineteenth century came from outside regions—especially the Lake Superior mines—the output within the State has not decreased, and Pennsylvania takes fourth rank among the iron-mining States. The yield in 1901 amounted to nearly 1,040,684 long tons, valued at \$1,890,100. Over 771,000 tons were of the magnetite variety, for which the Cornwall hills, near Lebanon, are noted. Brown and red hematites and a small quantity of carbonate are also mined.

Pennsylvania is without a rival in the stone-quarrying industry. The values of the product in 1901 for limestone, slate, and marble, respectively, were \$5,081,387, \$2,984,264, and \$157,547, each figure being larger than the corresponding one for any preceding year. The production of slate is about two-thirds that for the whole country. Pennsylvania also ranks first in the amount of limestone quarried. About two-fifths of the limestone is used for flux, and a somewhat less amount is burned into lime. The value of the granite for the same year was \$396,271, but from year to year the value of the output fluctuates greatly. The value of sandstone has recently increased enormously, being put in 1901 (including bluestone) at \$2,063,082, and giving the State second rank. Pennsylvania stands second in the value of its clay products and first in the output of brick, the value of which in 1900 was \$12,000,875. The State produces in value over half the total product of Portland cement for the United States. This industry is rapidly developing, the value of the product having increased from 3,142,711 in 1898 to nearly \$6,382,350 in 1901. Some rock cement is also produced. Other products worthy of note are metallic paint, mineral water, salt, and ochre.

AGRICULTURE. Farming is carried on more or less extensively in all sections, there being many arable and fertile valleys, even in the more mountainous regions. Districts too hilly to be readily cultivated are admirably adapted for grazing. In the southeastern counties the soil is an exceedingly rich loam, and agriculture is highly developed. About 67 per cent. of the area of the State is included in farms, and of this 68 per cent. is improved. The area of improved land increased rapidly until 1880, since when it has not materially changed. The average size of farms decreased in each decade between 1850 and 1900, being reduced from 117 acres in 1850 to 86.4 in 1900. Seventy-four per cent. of the farms are operated by owners. Pennsylvania leads the Atlantic States in the production of cereals. It yields considerably over twice as much corn and about three times as much wheat as New York. The acreage for each of these in 1900 exceeded that in 1880 and in 1890. Oats, which are only a little less important, decreased slightly in acreage during the same period. Oats are grown most extensively in the eastern section, and corn and wheat in the southeastern. The State leads in the production of rye, and is exceeded by New York alone in the area of buckwheat, having over a third of the total acreage for the United States. The acreage of hay is greatly exceeded in New York and slightly in two or three Western States. Potatoes form one of the chief money crops. Other varieties of vegetables are also abundantly grown, particularly sweet corn and cabbage, the acreages separately reported in 1900 being respectively 12,879 and 10,851. Tobacco is

a very important crop in Lancaster and York counties. Pennsylvania is a large producer of orchard fruits. Between 1890 and 1900 the number of trees increased 59.4 per cent., the increase in the peach trees being particularly noteworthy. Of the total number of trees, 11,774,211, or 66 per cent., were apple. Grapes and small fruits are grown in considerable quantities, and floriculture is extensively carried on.

The following table shows the acreages of the leading farm crops:

	1900	1890
Hay.....	3,269,441	3,323,099
Corn.....	1,440,933	1,252,399
Wheat.....	1,514,043	1,318,472
Oats.....	1,173,847	1,310,197
Rye.....	310,048	326,041
Buckwheat.....	342,840	310,488
Potatoes.....	227,867	291,992
Tobacco.....	37,760	26,655

STOCK-RAISING. The adaptability of the State for grazing has resulted in an extensive dairying industry. In every decade between 1850 and 1900 there was an increase in the number of dairy cows. Only three other States have a larger number, and in only one is the value of the product as great. The yield of milk in 1900 was 32 per cent. greater than in 1890. In 1900 \$17,274,430 was received from the sale of milk, and \$9,466,575 from the sale of butter. There was a large gain between 1890 and 1900 in the number of 'other neat cattle,' and of mules and asses, but a decrease in horses, swine, and particularly sheep. The annual income from poultry products is important. The following table of live-stock holdings is self-explanatory:

	1900	1890
Dairy cows.....	943,773	927,254
Other cattle.....	953,074	779,164
Horses.....	590,981	618,690
Mules and asses.....	38,635	39,562
Sheep.....	959,483	1,612,197
Swine.....	1,107,961	1,278,029

MANUFACTURES. Between 1850 and 1900 Pennsylvania ranked second as a manufacturing State. In the development of the factory system proper as indicated by the amount of power used it easily ranks first. The per cent. of the wage-earning population increased from 6.3 in 1850 to 11.6 in 1900. Between 1890 and 1900 this increase amounted to 28.7 per cent. The value of manufactured products for 1900 was \$1,834,790,860. Pennsylvania has the advantage of navigation on the ocean, Great Lakes, and the Mississippi River. The Mississippi system was of great moment in the early period of development, enabling Pennsylvania to supply the frontier with manufactured products, while the Lake system more recently played a similar important part in rendering accessible vast resources of raw materials. An important network of canals and canalized rivers also figured early, and an elaborate system of railways figured in the later period. Furthermore, the manufacturing interests have been carefully fostered by a number of societies, which owe much to the activities and inspiration of one man, Benjamin Franklin.

No other industry has contributed so greatly to the reputation of the State as that of iron and steel. Although it developed earlier in other

colonies, it was spoken of as 'most advanced' in Pennsylvania as early as 1758. In 1900 it furnished 54 per cent. of the total product for the United States. The localization of the industry is determined by the accessibility to ore and fuel, and consequently until about 1850 the industry was most extensive in the eastern anthracite coal and iron ore district. (Charcoal, however, had been universally used prior to 1840.) Since then the Pittsburg district, in the western part, has far surpassed the eastern district. This change is coincident with the substitution of bituminous coal and coke and natural gas for anthracite coal, and with the development of the Lake Superior ore region. The pig iron produced in 1900 by the use of bituminous coal and coke amounted to 76 per cent. of the total for

the State. The ore used in this part of the State comes from the Lake Superior district, having the advantage of cheap water transportation. From 1890 to 1900 the increase in iron and steel was 64.2 per cent. Although the industry is largely centered in the towns of Allegheny County, it is important in almost every large town. The manufacture of Bessemer steel began in 1847. Within the last two decades, however, the Bessemer process has been largely supplanted by the open-hearth process.

In foundry and machine-shop products the State ranks first. For instance, it made in 1900 more than one-half the total number of steam locomotives made in the United States. Since 1845 locomotives of Pennsylvania make have been shipped in constantly increasing numbers

INDUSTRIES	Year	Number of establishments	Average number wage-earners	Value of products, including custom work and repairing
Total for selected industries for State.....	1900	15,665	478,780	\$1,291,000,950
	1890	12,613	381,769	935,363,641
Increase, 1890 to 1900.....		3,052	97,020	\$355,637,309
Per cent. of increase.....		24.2	25.4	38.0
Per cent. of total of all industries in State.....	1900	0.0	65.2	70.4
	1890	32.1	66.9	72.2
Iron and steel, total.....	1900	291	110,964	\$434,445,200
	1890	311	92,353	285,571,624
Blast furnaces.....	1900	77	16,075	101,575,497
	1890	116	15,612	75,219,303
Rolling mills and steel works.....	1900	209	94,604	332,588,174
	1890	196	75,000	188,714,190
Iron and steel, pipe, wrought.....	1900	10	3,675	15,348,660
	1890	14	9,170	30,249,795
Foundry and machine shop products.....	1900	1,260	62,828	127,292,440
	1890	886	38,247	67,587,025
Electrical apparatus and supplies.....	1900	63	7,817	19,112,645
	1890	10	360	674,565
Cars and general shop construction and repairs by steam railroad companies.....	1900	144	28,554	43,065,171
	1890	61	22,649	26,769,739
Cars, steam railroad, not including operations of railroad companies.....	1900	11	5,840	19,260,910
	1890	15	4,355	10,080,722
Coke.....	1900	49	9,265	22,282,358
	1890	96	5,855	10,415,628
Textiles.....	1900	1,102	102,213	158,782,087
	1890	1,028	79,379	154,091,259
Boots and shoes, factory product.....	1900	148	9,144	13,235,953
	1890	138	7,618	10,354,880
Clothing, men's, factory product.....	1900	461	10,487	23,580,043
	1890	337	7,675	26,732,348
Clothing, women's, factory product.....	1900	320	8,311	11,694,580
	1890	46	2,960	3,900,556
Flouring and grist-mill products.....	1900	2,719	2,195	36,659,423
	1890	2,226	3,378	39,476,076
Slaughtering, total.....	1900	111	1,689	25,238,772
	1890	242	1,560	21,991,604
Cheese, butter, and condensed milk, factory product.....	1900	749	976	10,290,006
	1890	300	766	5,319,434
Liquors, total.....	1900	281	4,974	34,520,358
	1890	205	3,548	22,608,423
Liquors, distilled.....	1900	73	471	5,357,615
	1890	40	400	4,339,690
Liquors, malt.....	1900	208	4,505	29,162,743
	1890	165	3,148	18,268,734
Tobacco, total.....	1900	7,712	25,483	33,353,872
	1890	3,025	18,550	23,387,910
Leather, tanned, curried and finished.....	1900	254	13,396	55,615,069
	1890	410	10,056	49,931,716
Glass.....	1900	119	19,430	22,011,130
	1890	99	18,510	17,179,137
Petroleum, refining.....	1900	38	3,299	34,977,706
	1890	55	3,364	19,498,777
Sugar and molasses, refining.....	1900	7	1,249	30,163,817
	1890	10	1,459	46,599,754
Chemicals.....	1900	100	4,278	13,034,384
	1890	71	3,284	13,144,210
Printing and publishing, total.....	1900	1,795	16,991	26,455,629
	1890	1,497	15,000	24,496,463
Lumber and timber products.....	1900	2,538	13,510	35,749,965
	1890	1,948	19,508	29,087,970
Lumber, planing mill products, including sash, doors, and blinds.....	1900	542	7,472	16,736,829
	1890	467	7,608	18,398,686
Paper and wood pulp.....	1900	73	4,840	12,267,900
	1890	72	2,951	7,839,299

to other countries. Also important is the production of iron and steel pipe and electrical apparatus and supplies, the latter industry having grown up almost entirely since 1890. The same advantages, together with the large railroad interests of Pennsylvania, have led to the most extensive car-construction and general shop works of steam railroad companies of any State. Altoona, Reading, and Philadelphia are the chief centres of this industry.

An entirely different group of industries, less dependent upon the material resources of the State, is the manufacture of textiles, in which the State takes second rank. Philadelphia, the principal seat of the industry, is the largest textile centre in the country. In 1900 the silk product amounted to 29 per cent. of the total for the United States, and the State was exceeded only by New Jersey. In recent years the operations are confined largely to 'throwing,' the thrown silk being sent to other States to be woven into cloth. Pennsylvania ranks second in the manufacture of woolen goods and hosiery. Both industries were begun at an early period, the former having been introduced by the English and the latter by the German settlers. A lower rank is held in the manufacture of worsteds and cottons. In 1900 Pennsylvania manufactured 48 per cent. of the total carpet product of the United States. More ingrain carpets are probably made in Philadelphia than in any other city in the world.

The agricultural resources supply materials for the flour and grist milling, slaughtering, and butter-making industries, and the manufacture of liquor and tobacco products. Prior to the Whisky Rebellion in western Pennsylvania large quantities of distilled liquors were made in that part of the State, but more recently the product is mainly malt liquors, in the output of which the State took second rank in 1900. The tobacco products are mainly cigars and cigarettes, the State ranking second also in this industry. The large tanning business, in which Pennsylvania stands first, with 27.3 per cent. of the total product for the United States, is due to the large quantities of hemlock bark attainable from the large forests of this tree. The manufacture of glass is a long established industry. The utilization of natural gas in the western part of the State gave great impetus to its manufacture. In 1900 the product amounted to 38.9 per cent. of the total for the country. The resources of petroleum have given the State first rank in the refining of oil. Pennsylvania has always held an important rank in the printing and publishing business. Other important industries are sugar and molasses refining, and the manufacture of chemicals. The preceding table shows the relative importance of the leading industries. It will be seen that the per cent. of increase for the value of products is more than twice as great as the per cent. of increase for the number of establishments. Among the industries showing the greatest tendency toward centralization are those connected with the production of iron and steel, coke, and leather.

FORESTS AND FOREST PRODUCTS. Pennsylvania has always been one of the leading States in the lumber industry. In 1900 three of the lake States exceeded it in the value of lumber products, but for more than half a century Pennsylvania had taken a higher rank, being first in

1860. The figure in 1900, however, exceeded that of any previous census year. The manufacture of wood pulp is growing in importance, as shown in the table above, but the planing-mill industry scarcely holds its own. The woodland has been reduced (1900) to about 23,000 square miles, or 51 per cent. of the total area, and the merchantable timber has been removed from a large part of the region specified as woodland. The hemlock is the most abundant merchantable species and the one most extensively drawn upon at present. The white pine is next in importance. Hard woods are common in the southeast corner of the State.

TRANSPORTATION AND COMMERCE. Pennsylvania is exceeded in railroad mileage by only one other State. There was an increase from 2598 miles in 1860 to 8638 miles in 1890 and 10,310 miles in 1900. For the fiscal year ending in 1900 the number of passengers carried was 216,603,748 and the receipts per passenger per mile averaged 1.852 cents. During the same year there were 478,684,683 tons of freight carried, for which the receipts per ton per mile averaged .6 of a cent. A large number of the smaller lines have fallen into the hands of the Pennsylvania Railroad, which operates 2912 miles in the State.

Other important roads are the Philadelphia and Reading; the Lehigh Valley; the Pittsburg, Cincinnati, Chicago and Saint Louis; the Baltimore and Ohio; the Erie; the Philadelphia, Wilmington and Baltimore; the Delaware, Lackawanna and Western; the Western New York and Pennsylvania; and the Pittsburg, Fort Wayne and Chicago. The canal and slack-water navigation facilities are mostly controlled by railroad and coal-mining corporations. The State expended large sums in canal construction, but the rapid extension of the railroad system has caused many such waterways to be abandoned.

Philadelphia and Erie are the ports of entry, and control a considerable amount of foreign commerce. Philadelphia ranks third among the Atlantic Coast ports in the value of its foreign trade. Erie has one of the best harbors on Lake Erie, and carries on a large import trade in Michigan iron and Canadian lumber, and exports large quantities of coal. Pittsburg also, at the eastern head of navigation on the Western rivers, has an immense inland trade, while its local shipyards build large numbers of steamboats for use on the Western streams.

BANKS. The Bank of North America, originally chartered by Congress in 1781, was the first bank in Pennsylvania, where it obtained a charter in 1782. In 1793 the Bank of Pennsylvania was incorporated as the official agent of the State, which was heavily interested in it. A few other banks were chartered by individual acts of the Legislature. In 1814 there were six banks, and the State owned stock in the most important ones. In 1814 the State policy toward the banking business underwent a radical change. The Commonwealth was divided into twenty-seven banking districts, each of which was allotted a definite number of banks. Unincorporated banking was prohibited and a comprehensive banking law passed. This could not avert the injurious results of the speculative inflation, and in 1816 many banks had to suspend specie payments. Banking became the object of popular disfavor and was held responsible for the critical times. A law

was passed in 1819 providing for forfeiture of charter in case of suspension of specie payments, and it somewhat reduced the number of banks. The period of extensive internal improvements that followed stimulated the banking business as well as all other business of the State, and for ten years the banks were exceptionally prosperous. In 1836 the second United States Bank, at the expiration of its national charter, became a Pennsylvania State institution, paying heavily for the privilege. The crisis of 1837 again caused a suspension of specie payment, and in 1840 after a hard struggle the United States Bank failed, ruined by its heavy investments in the State improvements and its heavy contributions to the State treasury. This failure, together with financial difficulties of the State treasury between 1840 and 1845, was felt by the other banks, and the stocks of most of them were sold far below par. Efforts were made to correct this by special legislation, by the levying of a tax on banking stock below par, and by making specie payments obligatory; but this last provision was frequently suspended by necessity. A slight improvement between 1850 and 1855 was followed by the severe crisis of 1857, when several Pennsylvania banks failed and a general suspension followed.

An agitation for a free banking system, with guaranteed circulation, was started, and in 1860 a free banking act was passed which was very similar to the New York Banking Law of 1837, but before the value of this act could be tested the national banking system came into existence. There was a marked demand for the national charters, which were supposed to exempt the banks from State taxation. By 1868 only 12 State banks remained, as against 108 national banks. In 1870-73 more than 90 State banks were chartered by special acts, but the Constitution of 1874 prohibited the organization of banks, except under the general law. At present State banking is regulated by the law of 1876 as amended in 1891, when a Banking Department was established. National banks remain by far the more important ones. Trust companies are conducted mostly in conjunction with the banks, and take care of business which the law prohibits the banks from doing. Savings banks have existed in Pennsylvania for almost a century. The first savings bank was chartered in 1819. Before the Civil War there were 14 of them. A general law for their regulation, strictly limiting their avenues for investment, was passed in 1889. A clearing house was established in Philadelphia in 1858, or five years later than the one in New York. The condition of the banks in 1902 is shown as follows:

that year. In 1790 a new Constitution, of a more democratic cast, was adopted. The Constitution, as amended in 1838, vested the legislative power in a General Assembly, consisting of a Senate and a House of Representatives. An amendment to the Constitution, adopted in 1850, made the judiciary elective. An amended Constitution was adopted in 1873, by a popular vote of 253,744 against 108,594, and went into force January 1, 1874. If a proposed amendment receives a majority vote of both Houses at two successive regular sessions, it will be submitted to the people, and if approved by a majority of those voting, it becomes a part of the Constitution. No amendments can be submitted oftener than once in five years. A voter must have been a citizen of the United States one month, a resident of the State one year, and of the election district two months, and have paid State or county taxes. No elector can be deprived of the privilege of voting because he has not registered. The general election is held annually on the Tuesday next following the first Monday in November. The State has thirty-two members in the National House of Representatives.

LEGISLATIVE. The Senate is limited to 50 members chosen for four years, and the House to a varying number, apportioned after each Federal census, chosen for two years. No city or county is entitled to more than one-sixth the whole number of Senators. Sessions are biennial, on the first Tuesday of January, without time limit. The Governor is empowered to call extra sessions for urgent business, and required to do so in case of a vacancy in the office of a United States Senator occurring during the recess. No bill can contain more than one subject, and revenue bills must originate in the Lower House. The power of impeachment rests with the Lower House, the trial of impeachment with the Senate.

EXECUTIVE. The executive department consists of a Governor and a Lieutenant-Governor, both elected for four years, and a Secretary of Internal Affairs, an Auditor-General, elected for three years, and a Treasurer, elected for two years, an Attorney-General, a Secretary of the Commonwealth, and a Superintendent of Public Instruction, appointed for four years by the Governor, with the consent of two-thirds of the Senators. The Governor is not eligible for two consecutive terms. He is empowered to commute sentences and grant pardons within clearly defined limits, and vested, besides the ordinary veto powers, with the prerogative of a partial veto on appropriation bills. The department of the Secretary of Internal Affairs embraces a bureau of industrial statistics, and maintains the supervision of corpora-

	National Banks	State Banks	Trust Companies	Private Banks	Savings Banks
Number.....	550	105	158	25	13
Capital.....	\$98,301,000	\$9,460,000	\$62,797,000	\$990,000	
Surplus.....	70,185,000	8,296,000	36,929,000	361,000	\$6,994,000
Cash, etc.....	51,304,000	2,779,000	7,758,000	443,000	2,415,000
Deposits.....	453,710,000	106,165,000	299,227,000	7,424,000	120,441,000
Loans.....	447,756,000			6,630,000	

There were 396,877 depositors in the savings banks and the average deposits amounted to \$303.

CONSTITUTION AND GOVERNMENT. The State Government was organized in 1776. The convention, of which Benjamin Franklin was president, signed the State Constitution September 28th of

tions, charitable institutions, and the agricultural, mineral, timber, and other interests of the State. The Lieutenant-Governor and the president pro tempore of the Senate are in the line of succession to the Governorship in case of vacancy.

JUDICIARY. The judiciary embraces a Supreme Court, consisting of seven judges, elected by the people for 21 years, ineligible for reelection, with the judge the oldest in commission as Chief Justice. The court holds annual sessions at Philadelphia, Harrisburg, Sunbury, and Pittsburg. Other courts are a Superior Court, courts of common pleas, of oyer and terminer and general jail delivery, of quarter sessions of the peace, magistrates' and orphans' courts. Judges of the Supreme Court, and those of the Common Pleas, are justices of oyer and terminer and general jail delivery in the respective counties; the latter discharge also the functions of judges of quarter sessions of the peace and of orphans' courts in districts where special provision for them has not been made. Criminal matters of the respective districts belong likewise to their cognizance. There are 51 judicial districts in the State, in each of which the people elect one or more common pleas judges for ten years.

LOCAL GOVERNMENT. The creation of new or alteration of old counties is conditioned on a minimum population limit of 20,000 and a minimum area limit of 400 square miles for all counties affected. Each county elects sheriffs, coroners, prothonotaries, register of wills, recorder of deeds, treasurer, surveyor, clerk, three auditors, and three commissioners, all for three years. Towns of over 10,000 may be chartered upon the approval of one-half the electors. The State has classified the cities for charter purposes into four classes.

FINANCES. The first direct State tax was levied in 1785, but was discontinued in 1789. Taxes were very unpopular and the State expected to cover its expenditures by income from public property, sale of public lands, etc. Some taxes were introduced in the beginning of the nineteenth century, but in 1810 the revenue from them amounted only to 20 per cent. of the total receipts. In 1825 there were no direct State taxes. About this time the construction of public improvements, which had been going on in a quiet way since 1789, became the cry of the day. Loans were the only available source of necessary means. In 1821 the public debt incurred during the War of 1812 amounted only to \$1,230,000, but new loans followed one another in great rapidity. Canals, roads, bridges, and railroads were built. Between 1789 and 1828 more than \$22,000,000 was spent on these improvements. In 1834 the system of canals and railroads to connect Pittsburg and Philadelphia was completed at the cost of more than \$14,500,000, and lateral canals were added in 1838 at the cost of almost \$6,500,000. The large sum (more than \$12,000,000) which the United States Bank furnished in 1837, partly as a bonus and partly as a loan to the State, in exchange for a State charter, further stimulated this feverish activity. The State debt was \$24,500,000 in 1835 and in 1842 reached \$40,000,000. Expecting large returns from these improvements, the State did not provide a thorough system of taxation. Interest had to be paid by means of further loans. The credit of the Commonwealth was therefore so much impaired in 1840 that failure was threatening. The income from the improvements did not even cover their expenses, and a law was passed in 1840 imposing small taxes on banks, personal property, and salaries. The revenue from this law did not cover even a tenth part of the ex-

pensitures, and the interest on the bonds continued to be paid by issue of special bonds. In 1844 a radical change was made in the financial system. A comprehensive tax was imposed upon all property, stocks, incomes, etc., and cash payment of interest was resumed the next year. For 15 years the debt remained on the same level; the State was not able to cancel any of its obligations and kept on refunding the maturing bonds. In 1857 and 1858 the State works, which were built at the expense of over \$75,000,000, were sold for \$11,000,000 to the Pennsylvania Railroad Company and Sunbury and Erie Railroad Company, and a gradual reduction of the State debt dates from that time.

In 1860 the debt decreased to \$38,000,000, but the military loan of 1861 increased it by \$3,000,000. A steady decline came after the war. In 1870 the debt was \$28,980,071; in 1880, \$21,561,990; in 1890, \$12,349,920; and from 1895 to 1902 it remained \$6,815,299. In 1902 bonds to the amount of \$2,008,650 were bought at a high premium by the sinking fund and the debt was reduced to \$4,806,649, against which the sinking fund had \$4,432,023. These results were only possible by vigorous taxation. The law of 1844 taxed all property, but real estate was released from State taxation in 1867. The income tax survives, but contributes a trifling sum. The taxes on personal property and inheritances are productive of more revenue. The main sources, however, are the taxes on corporation stocks and receipts and various licenses, Pennsylvania having introduced the high-license principle.

During the fiscal year 1901-02 the receipts were \$22,947,890 and expenditures \$17,787,106. Discounting the operations of the sinking fund, the receipts were \$19,374,093, and the expenditures \$15,210,793. The cash balance in the sinking fund was \$3,717,440, and in the general fund \$9,151,368. Of the expenditures more than 50 per cent. was for schools and 17 per cent. for charitable institutions.

MILITIA. In 1900 there were 1,405,916 men of militia age. The number of the militia in 1901 was 9343.

POPULATION. The following figures show the growth of the population: 1790, 434,373; 1820, 1,047,507; 1850, 2,311,786; 1860, 2,906,215; 1870, 3,521,951; 1880, 4,282,891; 1890, 5,258,014; 1900, 6,302,115. The State has nearly always ranked second in population. The absolute increase in each decade has been greater than that of the decade preceding. The per cent. of the increase between 1890 and 1900 was 19.9, as compared with 20.7 for the United States. The State ranks second in the number of foreign born, with a total of 985,250. This element is not so greatly centralized in the large cities as in some of the other Eastern States, being found in large numbers in the mining districts. The Irish, Germans, and English are the most numerous; but there are, besides, a larger number of Welsh and natives of Hungary than in any other State. In 1900 the negroes numbered 156,845. Of the total population 51 per cent. is urban—i.e. they live in places which contain over 4,000 inhabitants, there being, in 1900, 119 such places, or more than in any other State. The average number of inhabitants to the square mile in 1900 was 140.1.

CITIES. The population of the 18 largest cities in 1900 was as follows: Philadelphia, 1,293,697; Pittsburg, 321,616; Allegheny, 129,896;

Seranton, 102,026; Reading, 78,961; Erie, 52,733; Wilkesbarre, 51,721; Harrisburg, the capital, 50,167; Lancaster, 41,459; Altoona, 38,973; Allentown, 35,416; Johnstown, 35,936; McKeesport, 34,227; Chester, 33,988; York, 33,708; Williamsport, 28,757; Newcastle, 28,339; Easton, 25,238.

RELIGION. The Roman Catholics form over one-eighth of the population. The principal Protestant denominations are the Methodist, Presbyterian, and Lutheran, each with over one-sixth of the total number of church members. Then follow in order the Baptists, the Protestant Episcopalians, the Disciples of Christ, and the Congregationalists.

EDUCATION. The first settlers of Pennsylvania, the Swedes and the Dutch, usually relegated the matter of education to the ministers. William Penn, in his Frame of Government, provided that the "Governor and Provincial Council shall erect and order all public schools" and "that the children within this province of the age of 12 years shall be taught some useful trade or skill." This provision was subsequently strengthened by the clause in the second Frame, adopted by the second Assembly in 1683, which provided for compulsory instruction in reading and writing, as well as in some manual trade. With the passing of the control of the colony from the hands of the Quakers, education received very little attention from the Legislature. It was left entirely to the Church and private initiative during the first three quarters of the eighteenth century. Private schools were meanwhile being established all over the province, and the agitation for a higher educational institution in Philadelphia, carried on by Benjamin Franklin, resulted in the foundation of the Academy and Charitable School of the Province of Pennsylvania (now University of Pennsylvania) in 1749. The first free public schools in Pennsylvania were opened by the settlers from Connecticut in 1769. The provisional Constitution of 1776 provided for the establishment of a school in each county, but it was only in 1834 that a free school system was successfully established.

The public school system is under the supervision of a State Superintendent, appointed by the Governor. The county superintendents are elected by the school directors, and the latter are elected by the people. Pennsylvania has no permanent school fund, the school revenue being obtained principally from local taxations and State appropriations. School attendance is compulsory between the ages of 8 and 16, and text books are free. In 1900 Pennsylvania had illiterates amounting to 6.1 per cent. of the total population of 10 years of age and over, being 2.1 per cent. for the native white population, 19.9 per cent. of the foreign white, and 15.3 per cent. for the colored population. Of the school population 68.22 per cent. were enrolled in the public schools in 1901. The number of public schools in the same year was 29,046, including 16,625 graded, and the average attendance was 847,445, or about 73 per cent. of the total enrollment. In the same year there were employed in the public schools 30,044 teachers, of whom the male teachers formed 30.6 per cent., as against 45.5 in 1880. The average monthly salaries were \$44.14 for male and \$38.23 for female teachers, being considerably below the salaries paid in most of the North Atlantic States. Also the length of the school

term was 165.6 days in 1901, as compared with an average of 177.2 days for the entire North Atlantic division. An attempt to solve the rural school problem by centralization has so far been attended with little success, owing to the poor condition of the roads. Pennsylvania suffers in common with other States in the low professional standing of the teachers, especially in the rural districts. For normal education the State maintains fifteen normal schools, which had a total attendance of 8839 in 1901, including 5436 female students. In that year the school revenue amounted to \$26,159,774, consisting of \$5,250,000 derived from State taxes, \$15,482,898 from local taxes, and \$5,426,876 from other sources. The expenditure amounted in the same year to \$22,813,395, or \$26.92 per pupil in average attendance. The 391 public schools had a total attendance of 32,438 in 1901. In the same year there were in the State 137 private high schools and academies, with a total attendance of 11,236. Commercial and professional education is provided by numerous commercial colleges, schools of law, medicine, dentistry, etc., and theological seminaries.

The principal institutions of higher education, besides the University of Pennsylvania, are the Western University of Pennsylvania (non-sectarian), at Allegheny; Lafayette College (Presbyterian), at Easton; Lehigh University (non-sectarian), at South Bethlehem; Bucknell University (Baptist), at Lewisburg; Dickinson College (Methodist Episcopal), at Carlisle; Haverford College (Friends), at Haverford; Swarthmore College (Friends), at Swarthmore; Pennsylvania State College, at State College; and La Salle (Roman Catholic), at Philadelphia. The principal college for women is Bryn Mawr (q.v.).

CHARITABLE AND PENAL INSTITUTIONS. The State maintains hospitals for the insane at Harrisburg, Danville, Norristown, Warren, Dixmont, and Warrensville, which together with the State aided asylums contained 7411 inmates on September 30, 1900. On the same date the hospitals for the sick and wounded, and homes for children, etc., held a population of 21,665. The four institutions for the deaf contained 408 persons, the two blind asylums 271, and the two institutions for feeble-minded 1655. The almshouses for that date had a population of 12,168. The State maintains a soldiers' and sailors' home at Erie. There are State penitentiaries located at Philadelphia and at Allegheny, a House of Correction at Philadelphia, a Workhouse in Allegheny County, a House of Refuge at Philadelphia, a Reform School at Morganza, and an Industrial Reformatory at Huntingdon; the aggregate population of these institutions together with the 3493 inmates of county jails was, in 1900, 9109. The aggregate for all classes remaining in institutions September 30, 1900, was 41,908. Besides these, about 40,800 had received public outdoor relief during the year. The total public expenditure incurred for all the foregoing was \$16,050,406. The foremost Indian training school in the country is maintained by the National Government at Carlisle.

HISTORY. Henry Hudson in the *Half Moon* anchored in Delaware Bay, August 28, 1609, and founded the Dutch claim to the bay and river, though he did not land. After 1614 exploring parties were sent out and trading posts founded on the eastern side of the river. Gustavus Adolphus, of Sweden, planned to found a colony in

America, and under his daughter, Queen Christina, Peter Minuit, formerly Governor of New Netherland, built Fort Christina within the present limits of Delaware, in 1638, and began to trade with the Indians. John Printz arrived with other colonists in 1643, and built New Gottenburg on Tinicum Island, the first settlement within the present limits of Pennsylvania. The Dutch looked with jealousy upon these and other Swedish settlements afterwards founded, and to offset the advance made by the Swedes, built Fort Casimir, at the site of the present town of New Castle, Del. This was captured by the Swedes in 1654; but in September, 1655, Governor Stuyvesant, of New Netherland, appeared in the bay with seven vessels and overthrew the Swedish authority. The city of Amsterdam had furnished much of the money for this conquest, and in return the southern settlements were assigned to that city under the name of New Amstel. The 'Company' colony was left in charge of Governor Stuyvesant, but in 1663 the two were reunited. When the Duke of York took possession of New Netherland in 1664 the settlements on the Delaware were included and remained attached to New York until 1682. On March 4, 1681, William Penn (q.v.), in return for a debt of £16,000, owed to his father by Charles II., secured a grant of the territory west of the Delaware River between 40° and 43°, extending to the west five degrees, at an annual rent of two beaver skins and one-fifth of the gold and silver ore discovered in the region. As New Castle was supposed to be on or near the 40th degree, the eastern boundary was to begin where a circle, having its centre at that settlement, twelve miles in radius, intersected the Delaware River and the southern boundary at the point where that circle intersected the 40th degree. Full feudal rights, both to the soil and to the government, were granted. On December 6, 1682, Penn secured from the Duke of York the grant of the soil of the lower settlements, and by consent assumed governmental rights. These settlements were within the original Maryland patent, but Lord Baltimore complained in vain. They remained attached to Pennsylvania, though with separate legislatures after 1703, until the Revolution, under the names 'the Lower Counties' or 'the Territories.' The southern boundary caused much trouble later. When it was found that the 40th degree was north of the present site of Philadelphia, the ingenious theory was announced that the beginning of the 40th degree was at 39°. The matter was finally settled by a compromise in 1760 (see MASON AND DIXON'S LINE), when also the northern boundary was fixed at 42°.

Upon receiving the grant Penn sent over his kinsman, William Markham (q.v.), as Deputy Governor, and followed himself in 1682, arriving at Uplands (now Chester) October 27th. A few days later he concluded a treaty with the Indians, though the purchase of the lands could not have taken place until later. The 'Frame of Government' previously published in England was submitted to the first General Assembly in December, 1682, and was adopted together with the 'great law,' made up largely of the suggestions of the Proprietor. Universal suffrage and entire religious toleration made the scheme notable. Settlers came over in great numbers, chiefly Quakers and Germans from the Palati-

nate. Philadelphia, which had been planned before Penn left England, grew rapidly, and before 1683 contained more than five hundred inhabitants, while more than 3000 settlers had come to the province. Land was offered at forty shillings the hundred acres, subject to a quit rent of a shilling a year. Penn returned to England in 1684, leaving the Council in charge, but its authority was soon disputed by the Lower House, which had a veto power on legislation, though it could not originate measures. Slanders were circulated in England, and in 1693 the province was resumed by William III., and attached to New York. Governor Fletcher met with little success in his attempts to secure aid for his Indian wars, and had several contests with the Legislature. The province was restored to Penn in August, 1694, and in 1696 a new and more democratic constitution was adopted with the Proprietor's consent. Penn's second and last visit to the province lasted from December, 1699, to October, 1701. During this time he granted the 'Charter of Privileges,' adopted October 26, 1701, which served as a constitution until the Revolution. The governors whom Penn appointed were involved in frequent disputes with the Assembly, and in consequence the Proprietor grew discouraged. In 1712 he was on the point of selling the province to the Crown for £12,000, but a paralytic stroke prevented the completion of the sale. Though the province was a constant source of expense to him, it made his descendants rich. After Penn's death in 1718, the disputes between the Assembly and the Proprietors continued with renewed vigor.

Immigration was large. There were Scotch-Irish in the province as early as 1698, and after 1730 they came in great numbers. These generally pushed on to the frontier, as did also the later influx of Germans. The first years were free from Indian warfare, but after 1740 the Indians were restless and soon became openly hostile. The efforts of the French were successful, and forts were established on the Ohio. The province sent few men to the aid of General Braddock in his expedition against Fort Duquesne in 1755; but his defeat aroused the Assembly, and a chain of forts was erected at a cost of £85,000. Until after 1764 danger from the Indians was constant. Meanwhile, in 1753, Connecticut laid claim to a tract of land on the Susquehanna, seventy miles west of the Delaware, under the charter of 1662, which granted to Connecticut the land to the 41st degree. A company was formed, the land was purchased from the Indians in 1754 (though previously purchased by Pennsylvania), and Susquehanna County was formed. Settlers went in and the formation of a distinct colony was considered. The Indians claimed that the purchase was made by fraud and protested vigorously. Armed forces were sent from eastern Pennsylvania and brought on the so-called Pennamite War; the dispute had its influence in causing the Wyoming Massacre in 1778. See WYOMING VALLEY.

The colony's agent, Benjamin Franklin, vigorously resisted the Stamp Act, and in July, 1774, a Provincial Congress met at Philadelphia, adopted resolutions, and elected delegates to the first Continental Congress, to be held at Philadelphia. The Provincial Convention in 1775 authorized the Committee of Safety to prepare a system of defense for the colony. Troops were raised

and boats were built. After the Declaration of Independence the Proprietary government ceased in Pennsylvania, and a State constitution was drawn up, September 28, 1776. It provided for a Supreme Executive Council, one Legislative House, and a Board of Censors. The Royal Charter was annulled by the King in 1778, and the State secured the commutation of the quit-rents in 1779. During the Revolution the eastern part of the State was the scene of important operations. Philadelphia was at different times the seat of the Continental Congress and the British headquarters. The question of the western boundary was settled in 1784, with the consent of Virginia, by measuring five degrees west from the Delaware River and then due north. The possession of the Wyoming lands was given to the State by decision of Congress in 1782, but when it was found that the line of 42° excluded Lake Erie, Congress, in 1788, authorized the addition of the triangle bordering upon the lake. In 1787 the State ratified the Federal Constitution. In 1790 a new constitution was adopted. The growth and prosperity of the State was marked, though the population was turbulent. The Whisky Rebellion (1794) grew out of the unwillingness of the Scotch-Irish to submit to the excise tax. The imposition by the National Government of the window tax led to the 'Hot-water Rebellion' among a part of the German population in 1798. Internal improvements were projected early, and the Schuylkill Canal was begun in 1815 and completed in 1825. From 1829 to 1836 the projected improvements called for the construction of 292 miles of canal and 126 miles of railroad, at a total cost of \$35,000,000. The first bill for a public school system was passed in the face of violent opposition in 1834. Though both iron and coal had been known to exist before the Revolution, it was not until 1839 that anthracite was successfully applied to the manufacture of iron. The first oil well was sunk near Titusville in 1859.

At the outbreak of the Civil War five companies of Pennsylvania troops were the first to arrive in Washington under President Lincoln's call for troops on April 15, 1861, and twenty-five regiments were formed during the month. The draft was necessary before the end of the war, but troops were furnished. The State was three times invaded, twice at Chambersburg and once by General Lee's army, which fought the battle of Gettysburg (q.v.). Since the war the chief events of importance have been the rapid growth of the steel, oil, and coal industries and frequent labor troubles. In 1877 a great strike of railroad employees led to violence and the defeat of the militia at Pittsburgh. The despatch of regular troops was necessary to quell the disorder. On May 31, 1889, a dam at the outlet of Conemaugh Lake broke and a great wall of water overwhelmed Johnstown (q.v.) and several smaller towns, drowning more than 2000 people and destroying property to the value of \$10,000,000. The strike at the Carnegie Company's mills at Homestead, near Pittsburgh, July 6, 1892, was one of the most serious ever known in America. Martial law was declared, and the entire militia force was called out. An extensive strike of coal-miners in Hazleton region in 1900 was followed by a general strike in the anthracite region in 1902.

In national elections the State was at the

outset Federalist, but in 1796 fourteen of its fifteen votes were cast for Jefferson. Eight votes were cast for him again in 1800, while seven went to the Federalist candidate. From this time until 1840 the State was Democratic. In 1835 the Anti-Masonic party succeeded in electing the Governor and the agitation gave the State to the Whig electors in 1840. In 1838 a dispute between the Democrats and Whigs concerning the results of an election in one of the State Congressional districts caused much excitement, each party contending that it had elected not only the Congressman, but the members of the State Legislature in that district. The disturbance, which was later known as the 'Buck-Shot War,' was, however, short-lived, and the dispute was settled in favor of the Democrats. The State gave its vote to Polk in 1844, to Taylor in 1848, and in 1852 and 1856 to the Democratic candidates. Since 1860 the State has been overwhelmingly Republican in national affairs, though, on account of factional fights in the Republican ranks, a Democratic Governor has been twice elected.

GOVERNORS OF PENNSYLVANIA.

UNDER THE SWEDS

Peter Minuit.....	1624-41
Peter Hollandner.....	1641-43
John Printz.....	1643-53
John Pappogeorga.....	1653-54
John Claudius Rysingh.....	1654-55

UNDER THE DUTCH

Peter Stuyvesant, Director-General of the New Netherlands.....	1655-64
Derek Smidt, Schout Fiscal.....	1655
John Paul Jacquet, Vice-Director.....	1655-57

COLONY OF THE CITY

Jacob Alicka, Director.....	1657-59
Alexander d'Huyosson.....	1659-63

COLONY OF THE COMPANY

Goran Van Dyck, Schout Fiscal.....	1657-58
William Beekman, Vice-Director.....	1658-63
Alexander d'Huyosson, Director of united colony.....	1663-64

UNDER THE ENGLISH

Richard Nicolls.....	1664-67
Francis Lovelace.....	1667-73

RECAPTURED BY THE DUTCH 1673

Anthony Calve, Governor-General.....	1673-74
Peter Alicks, Commander.....	1673-74

UNDER THE ENGLISH

Sir Edmund Andros.....	1674-81
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PROPRIETARY GOVERNMENT

William Markham, Deputy Governor.....	1681-83
William Penn, Proprietor.....	1683-84
The Council (Thomas Lloyd, President).....	1684-88
The Five Commissioners.....	1688
Capt. John Blockwell.....	1688-90
The Council (Thomas Lloyd, President).....	1690-91
Thomas Lloyd, Deputy Governor.....	1691-92
William Markham, Deputy Governor Lower Counties.....	1691-92

UNDER THE CROWN

Benjamin Fletcher, Gov. of New York, Governor.....	1693-96
William Markham, Lieutenant-Governor.....	1694-96

PROPRIETARY GOVERNMENT

William Markham, Lieutenant-Governor.....	1696-99
William Penn, Proprietor.....	1699-1701
Andrew Hamilton, Lieutenant-Governor.....	1701-03
The Council (Edward Shippen, President).....	1703-04
John Evans, Lieutenant-Governor.....	1704-06
Charles Gordon, ".....	1706-11
Sir William Keith, ".....	1711-26
Patrick Gordon, ".....	1726-36
The Council (James Logan, President).....	1736-38
George Thomas, Lieutenant-Governor.....	1738-47
The Council (Anthony Palmer, President).....	1747-48
James Hamilton, Lieutenant-Governor.....	1748-54
Robert Hunter Morris.....	1754-56
William Henry.....	1756-59
James Hamilton, ".....	1759-63
John Penn, ".....	1763-71

The Council (James Hamilton, President).....	1771
Richard Penn, Lieutenant-Governor.....	1771-73
John Penn, ".....	1773-76
Council of Safety (Thomas Wharton, President).....	1776-77

PRESIDENTS OF THE SUPREME EXECUTIVE COUNCIL

Thomas Wharton, Jr.....	1777-78
George Bryan (acting).....	1778
Joseph Reed.....	1778-81
William Moore.....	1781-82
John Dickinson.....	1782-85
Benjamin Franklin.....	1785-88
Thomas Mifflin.....	1788-90

GOVERNORS OF STATE

Thomas Mifflin.....	Federalist.....	1790-99
Thomas McKean.....	Democratic-Republican.....	1799-1808
Simon Snyder.....	".....	1808-17
William Findlay.....	".....	1817-20
Joseph Holster.....	Independent Democrat.....	1820-23
John Andrew Shulze.....	Democratic-Republican.....	1823-29
George Wolf.....	".....	1829-35
Joseph Ritner.....	Anti-Masonic.....	1835-39
David Rittenhouse Porter.....	Democratic.....	1839-45
Francis Rawn Shunk.....	".....	1845-48
William Freame Johnston.....	Whig.....	1848-52
William Bigler.....	Democratic.....	1852-55
James Pollock.....	".....	1855-58
William Fisher Parker.....	".....	1858-61
Andrew Gregg Curtin.....	Republican.....	1861-67
John W. Geary.....	".....	1867-73
John F. Hartranft.....	".....	1873-79
Henry M. Hoyt.....	".....	1879-83
Robert E. Pattison.....	Democratic.....	1883-87
James A. Beaver.....	Republican.....	1887-91
Robert E. Pattison.....	Democratic.....	1891-95
Daniel H. Hastings.....	Republican.....	1895-99
William A. Stone.....	".....	1899-1903
Samuel W. Pennypacker.....	".....	1903—

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PENNSYLVANIA, HISTORICAL SOCIETY OF.

An association organized in Philadelphia December 2, 1824, and incorporated June 2, 1826. Its object is the elucidation of history, with special reference to that of Pennsylvania. It has a valuable historical library and a museum at Philadelphia. The society has a subscribed publication fund of \$40,000, the revenue from which is expended in printing matter of historic interest. This fund has published 14 volumes of *Memoirs of the Society*, and 26 volumes of *The Pennsylvania Magazine of History and Biography*, issued in quarterly numbers. The society has also published an historical map of the State, a volume of *Collections*, and one on *Pennsylvania and the Federal Constitution*.

PENNSYLVANIA, UNIVERSITY OF. An institution of higher learning in Philadelphia, Pa.,

established in 1740 as a charitable school, and raised to the grade of an academy in 1751 through the efforts of an association of citizens formed in consequence of a pamphlet published by Benjamin Franklin, entitled, "Proposals Relative to the Education of Youth in Pennsylvania." The academy, consisting of an English, a mathematical, and a Latin school, each under a master, with subordinate tutors and ushers, proved so successful that in 1753 it received a charter from the Proprietaries, Thomas and Richard Penn. Two years later it had attained a standard which justified the granting of degree conferring powers, and in 1755 the institution was converted into the College and Academy of Philadelphia. During the agitated times of the wars with the French the provost, Rev. William Smith, opposed so vehemently the non-resistance policy of the Pennsylvania Legislature that he was arbitrarily thrown into prison, where he faithfully received his classes. He was subsequently sent to England to raise funds for an endowment, and there met the commissioner from King's (Columbia) College on a similar mission. Through the influence of the Archbishop of Canterbury they received a circular letter from the King, and succeeded in raising a considerable endowment for each college. On Doctor Smith's return a letter to the trustees from the Archbishop of Canterbury, Thomas and Richard Penn, and Rev. Samuel Chandler represented that the institution was originally founded and carried on for the benefit of a mixed body of people; that at the time of making the collection its officers included representatives of various Christian denominations; and, since jealousies had arisen between parties, it was recommended to the trustees to make a fundamental declaration to prevent inconveniences of this kind. Accordingly, in 1764, the trustees bound themselves and their successors to retain the original wide plan of the institution and "to use their utmost endeavors that the same be not narrowed, nor the members of the Church of England, or those dissenting from them (in any future election to the principal offices), be put on any worse footing in this seminary than they were at the time of receiving the royal brief." In 1779 this resolution was construed by the Legislature into a "narrowing of the foundation," and seized as a pretext for confiscating all the rights and properties of the college, which were bestowed upon a new organization, called in the charter the "Trustees of the University of the State of Pennsylvania." Ten years later these rights and properties were restored, and in 1791 an act was passed amalgamating the old college with the new university under its present title. In 1872 the university was removed to the present site.

The departments of the university are the college, including the School of Arts, the Towne Scientific School, and the courses for teachers; the Departments of Philosophy (Graduate School), Law, Medicine, Dentistry, Veterinary Medicine, and Archæology; the Wistar Institute of Anatomy and Biology; the Laboratory of Hygiene; the Veterinary Hospital; the Library, and the Flower Astronomical Observatory; Physical Education. The School of Arts offers courses in arts and science, finance and commerce, biology and music. The Towne Scientific School offers courses in architecture, science and technology, mechanical, electrical,

civil; and chemical engineering, and chemistry. Candidates are admitted on passing the examination set by the college, or by the Entrance Examination Board of the Middle States and Maryland, or on the diplomas of the public high schools. Free tuition is offered through the 2 Penn scholarships, filled by the Governor of the State, 50 Philadelphia free city scholarships, 5 competitive State scholarships, a General Alumni Society scholarship, and 31 scholarships not confined to special localities. The college courses in arts and sciences, finance and commerce, and biology are planned to enable the student to complete his work in three, four, or five years, at his option, the successful completion of 60 units of work being required for graduation. Students are not permitted to take less than 12 units a year, a unit being defined as one hour's work a week for one year in lectures or recitations, or two hours' work a week in laboratory practice. In the course in arts and sciences the prescribed studies amount to 22 units and group studies to 18 units, the remaining 20 units being made up of free electives. Provision is made for a senior composite year in which eight units are credited to the work of the first year class in medicine. In the Scientific School, the architectural course covers four years. The courses in science and technology cover five years. The Graduate Department offers eight scholarships on the Harrison Foundation, entitling the holder to free tuition and an income of \$100, 30 university scholarships, providing only free tuition, and 29 fellowships, with incomes ranging from \$200 to \$800. The Graduate Department for women offers 5 fellowships.

Of the professional schools of the university, that of medicine is best known and has always been one of the strong departments. The Dental School especially has a wide reputation in Australia and in Spanish American countries. The Flower Astronomical Observatory is situated two miles beyond the city limits, and there is a small working observatory in the college grounds. The university buildings, 29 in number, stand on Woodland avenue, on property covering over 56 acres in the city proper, and provide dormitory accommodations for about 500 students. They include a University Hospital, with a training school and home for nurses, and the Howard Houston Hall, a students' club.

The university confers the degrees of Bachelor of Arts, Laws, Music, and Science, Master of Arts and Science, Doctor of Philosophy, Medicine, Dental Surgery, and Veterinary Medicine, and the technical degrees of Civil, Mechanical, Electrical, and Chemical Engineer. In 1902 the faculty numbered 281, and the student body 2578, distributed as follows: School of Arts, 476; Scientific School, 431; Teachers' Courses, 206; Graduates, 192; Law, 339; Medicine, 475; Dentistry, 403; Veterinary Medicine, 62. The library contained 212,861 volumes. The university grounds and buildings were valued at about \$4,500,000 and extensive plans were undertaken in the early part of 1903 for a group of new buildings to be erected outside the present limits of the university grounds. The first step toward this end was the announcement of a new building for the Wharton Scientific School, to cost \$200,000, the gift of Joseph Wharton, the founder. The endowment of the university in 1902 was \$9,000,000 and its income was \$1,490,000. The heads of the

university, since its beginning as a collegiate institution in 1755, have been: William Smith (1755-80); John Ewing (1780-1802); John McDowell (1807-10); John Andrews (1810-13); Frederick Beasley (1813-28); William Heathcote de Lancey (1828-33); John Ludlow (1834-53); Henry Vethake (1854-59); Daniel Raynes Goodwin (1860-68); Charles Janeway Stille (1868-80); William Pepper (1881-94); Charles Custis Harrison (1894-).

PENNSYLVANIA, WESTERN UNIVERSITY OF. An institution at Allegheny, Pa.; the second oldest institution of learning west of the Appalachian Mountains, founded as the Pittsburg Academy in 1786, incorporated in 1787, and re-incorporated under its present name in 1819. Since 1895 women have been admitted on the same terms as men. The university comprises collegiate, engineering, medical, and law departments, and colleges of pharmacy and dentistry. Several of the schools are institutions formerly independent. The Medical School became a part of the university in 1892, and the Law School in 1895. The Allegheny observatory was founded in 1859 by the Allegheny Astronomical Society, and in 1867 was transferred to the university. It has achieved an international reputation through the work of its successive directors, Professors Langley and Keeler, in the fields of solar physics and astronomical spectroscopy. New buildings for this department were erected in 1901. In 1902 the university had 892 students, 116 instructors, and a library of 20,000 volumes.

PENNSYLVANIA COLLEGE FOR WOMEN. An institution for the higher education of women in Pittsburg, Pa., founded in 1899, under the auspices of the Presbyterian Church. Besides the collegiate department it has a preparatory school and departments of music and art, with a total registration in 1902 of 185 and 20 instructors. In that year the income was \$40,000 and the college property was valued at \$250,000. The library contained 3000 volumes.

PENNSYLVANIA DUTCH, or **PENNSYLVANIA GERMAN.** The language of the Germans who emigrated to Pennsylvania between 1683 (when Pastorius settled in Germantown) and the middle of the eighteenth century. During this time some 100,000 settled principally in the southeastern counties of the State, such as Lancaster, York, Franklin, Cumberland, Berks, Schuylkill, and Lehigh. The emigration was due partly to the ravages of the armies of Louis XIV., and partly to religious persecution. The settlers came principally from the Rhenish Palatinate, Württemberg, and Switzerland, with a sprinkling from the Lower Rhine, Bavaria, Alsace, and Saxony. As most of the dialects spoken by these people belonged to the Alemannic and Franconian groups (see **GERMAN LANGUAGE**), the idiom of the Pennsylvania Dutch is really High German, and the confusion with Dutch is due to the fact that the settlers called their language 'Deutsch' (German). Although a variety of dialects were originally represented, that of the Rhenish Palatinate (Rheno-Franconian) so predominated and influenced the others that the language may be regarded as fairly homogeneous. Owing to their segregation in religious communities, the emigrants clung tenaciously to their mother tongue, but were gradually compelled by force of circumstances to accept many English words, especially

the names of objects in daily use, until the dialect can best be described as a fusion of Franconian and Alemannic with an admixture of English varying from one per cent. in the rural districts to a large percentage in the towns.

The language exhibits the characteristic dialectic darkening of a to o (*schlaf* for *Schlaf*; *for* for *Jahr*), further the fronting of ö to e (*here* for *hören*; *bes* for *döse*) and of ü to i (*bicher* for *Bücher*). German *ei* and *äu* generally appear as *e* (*del* for *Teil*; *bem* for *Bäume*). The consonants *p*, *pp*, and *d* are not shifted (*pund* for *Pfund*; *kloppe* for *klopfen*; *kopp* for *Kopf*; *tag* for *Tag*; *mudder* for *Mutter*). Final vowels and inflectional *n* are dropped (*mid* for *müde*; *bem* for *Bäume*; *finne* for *finden*; *gunne* for *gefunden*).

The writings of the Pennsylvania Germans have been mainly of a religious character, such as hymns and polemical pamphlets. They were written as a rule in the High German literary dialect, with, however, a number of exceptions. Within the last forty years, however, a number of poems in the dialect have been written. Consult: Seidensticker, *Bilder aus der deutsch-pennsylvanischen Geschichte* (2d ed., New York, 1886); id., *The First Century of German Printing in America* (Philadelphia, 1893); Cobb, *Story of the Palatines, an Episode in Colonial History* (New York, 1897); Sachsse, *The German Sectarians of Provincial Pennsylvania, 1694-1800* (ib., 1895-1900); Haldeman, *Pennsylvania Dutch* (ib., 1872); Learned, *The Pennsylvania German Dialect* (Baltimore, 1889).

PENNSYLVANIA-GERMAN SOCIETY. THE. An association organized in Lancaster, Pa., April 15, 1891, to collect, preserve, and publish documents relating to the history of the Pennsylvania Germans, and cause original papers to be prepared and read before the society. Its regular members, who now number about 400, must be direct descendants of the early German or Swiss emigrants to the colony of Pennsylvania. The society holds an annual meeting in some one of the smaller cities of eastern Pennsylvania, and publishes annually a volume of *Proceedings*, including the papers read at each meeting.

PENNSYLVANIA STATE COLLEGE. A coeducational institution of higher learning at State College, Pa., organized on a collegiate basis as the Farmers' High School in 1859. In 1862 the name was changed to The Agricultural College of Pennsylvania, and in 1874 to its present title. The principal income of the college is derived from the sale of public lands held in trust by the State. The grounds contain 400 acres, of which the campus covers 60 acres, the remainder being devoted to a model farm. The courses of instruction occupy four years. The general courses offered are a classical general science, a Latin scientific, and a philosophical course. The technical courses include agriculture, biology, chemistry, civil, electrical, mechanical, and mining engineering, mathematics, and physics. All courses, except the classical, lead to the B.S. degrees. In the graduate courses the degrees of C.E., M.E., E.M., E.E., and M.S. are conferred. In 1902 the faculty numbered 48; the college was attended by 602 students, of whom 420 were in the School of Engineering; 1800 persons took correspondence courses in agriculture. The endowment was \$517,000, the income was \$137,992, and the value of the college grounds, build-

ings, and equipment was \$850,000. The library contained 19,181 volumes.

PENNY (AS. *penig*, *pennig*, *peneg*, *pening*, *pening*, *pending*, OHG. *phantinc*, *pfenninc*, *pfending*, *phenning*, Ger. *Pfennig*, *Pfennig*, *peny*; perhaps connected with OHG. *phant*, *phant*, Ger. *Pfand*, *pawn*, *pledge*, or less plausibly with OHG. *pfanna*, *phanna*, *panna*, Ger. *Pfanne*, AS. *panne*, Eng. *pan*, from ML. *panna*, from Lat. *patina*, shallow bowl). A British coin and money of account. After the sceatæ (q.v.) it is the most ancient of the English coins, and was the only one generally current among the Anglo-Saxons. The penny is first mentioned in the laws of Ina, King of the West Saxons, about the close of the seventh century. It was at that time a silver coin, and weighed about 22½ troy grains, being thus about 1½ of the Saxon pound weight. This relation to the pound weight is evidently derived from the usage of the early Franks, who retained the Roman division of the *libra* into 20 *solidi*, and the *solidus* into 12 *denarii* (the *denarius* being thus the 240th part of the *libra* or pound). (See MARK.) Half-pence and farthings were not coined in England till the time of Edward I., but the practice previously prevailed of so deeply indenting the penny with a cross mark that the coin could be easily broken into two or four parts as required. Silver farthings ceased to be coined under Edward VI., and silver half-pennies under the Commonwealth. By this time the penny had steadily decreased in weight; it was 18 grains under Edward III., 15 and 12 under Edward IV., 8 under Edward VI., and under Elizabeth it was finally fixed at 7½ grains, or ⅓ of an ounce of silver, a value to which the subsequent copper pennies, which till 1860 were the circulating medium, closely approximated. In 1672 an authorized copper coinage was established, and half-pence and farthings were struck in copper. The penny was not introduced till 1797, and at the same period the coinage of twopenny pieces was begun; but these latter, being found unsuitable, were withdrawn. The penny of the present bronze coinage is of only about half the value of the old copper penny. The German *pfennig* was also originally a silver coin, bearing the same relation to the German pound of silver as the English penny to its pound. And in the twelfth century it was made so broad, in imitation of the Byzantine coins, that it would no longer bear to be struck with a die on each side as before, but was struck on one side only. In the beginning of the fourteenth century the mark of silver was anew divided into 60 parts or coins, which, to distinguish them from the old coins, were called *grossi denarii*, whence the term *groschen*. In the modern monetary system of Germany, the *pfennig* is a nickel coin, the hundredth of the mark, the latter being equal to a shilling or about \$0.25.

PENN YAN. A village and the county-seat of Yates County, N. Y., 45 miles north by west of Elmira; on Lake Keuka, and on the Northern Central and the New York Central railroads (Map: New York, C 3). It has an attractive location on the lake, the shores being covered with cottages and the hills with vineyards. There are Penn Yan Academy, a public school library, and a fine county court house and jail. The village is situated in a noted grape-growing region, and has extensive agricultural, fruit, and wine-making

Interests, as well as manufactures of flour, hubs and spokes, grape baskets, malt, and paper. The manufacturing industries are promoted by excellent water power derived from the lake. Penn Yan is governed by a village president and board of trustees. The water-works are owned and operated by the village. Penn Yan was settled about 1800 and was incorporated as a village in 1833. The early settlers were partly Pennsylvanians and partly New Englanders (Yankees); hence the name. Population, in 1890, 4254; in 1900, 4650.

PENNYPACKER, GALUSHA (1844-). An American soldier, born in Chester County, Pa. He received an academic education, and on April 22, 1861, enlisted for three months in the Federal service as a quartermaster-sergeant in the Ninth Pennsylvania Infantry. On August 22d he re-entered the service as a captain in the 97th Pennsylvania; served throughout the war, and on February 18, 1865, was commissioned a brigadier-general of volunteers. Until April, 1864, he was principally engaged in the operations along the Atlantic coast. He was then transferred to the Army of the James, and participated in the action at Drury's Bluff (May 13-16, 1864), where he was wounded, and led a brigade at the capture of Fort Harrison, where he was again wounded. He recovered in time to participate in the final assault on Fort Fisher (January 15, 1865), but was again wounded, this time so severely that he was confined to the hospital until April, 1866, when he resigned from the service. During this time he received his commission as brigadier-general of volunteers and the Congressional medal for bravery in battle. The following July he was appointed colonel of the 34th regular infantry, and on March 2, 1867, was brevetted major-general U. S. A. In 1869 he was transferred to the 16th Infantry, which he commanded until his retirement, in 1883.

PENNYROYAL (variant, influenced by popular etymology with *penny*, of obsolete *pulio-royal*, ME. *puliall real*, from ML. *pulium regale*, Lat. *pulcium regale*, royal fleabane, from *pule-ium*, fleabane, from *pulex*, flea, and *regale*, royal, from *rex*, king). A species of mint (q.v.). In North America a small plant (*Hedeoma pulegioides*), also bears this name, and having, like the mints, a pleasant aromatic smell and a warm pungent taste, it is used as an infusion in domestic medicine to promote perspiration. The plant is common from New England to the Dakotas and southward. The name is also sometimes applied to *Mentha Canadensis*, which resembles the English pennyroyal (*Mentha pulegium*).

PENOBSCOT. A former leading tribe of the Abnaki confederacy (of the Algonquian stock). They claimed the entire basin of the Penobscot River, Maine, and had their principal village, of the same name, about the present Veazie or Bangor. A French mission was established there in 1688. When first known to the whites the Penobscot, under their chief, Rashaba, seem to have had dominion over all the New England tribes southward to or beyond the Merrimac River. They took active part on the French side in all the colonial wars on the New England frontier up to 1749, when they made a treaty of peace with the English and have remained quiet ever since. This treaty brought them into disfavor with the Abnaki and other refugees at Saint Francis, who

continued hostilities in the French interest, for which reason very few of the Penobscot ever joined their emigrant brethren in Canada, but remained in their old homes. For their services on the American side in the Revolution they were confirmed in possession of a small reservation on the Penobscot above Bangor, where they still reside, their principal settlement being Oldtown, upon an island in the river. They number now about 400, still preserving their language and subsisting by hunting, fishing, lumbering, and basket-making.

PENOBSCOT BAY. An inlet of the Atlantic Ocean indenting the coast of Maine (Map: Maine, F 7). It is 28 miles wide at the mouth and penetrates an equal distance inland, narrowing gradually to its head, where it receives the Penobscot River. It contains several large and a number of small islands, and on its shores are numerous coves with deep water.

PENOBSCOT RIVER. The principal river of Maine. It rises on the northwestern boundary of the State, and flows east to Lake Chesuncook, then southeast through Pamedumcook Lake at the foot of Mount Katahdin, and finally southward until it empties into the Atlantic Ocean through Penobscot Bay (Map: Maine, F 5). It is nearly 300 miles long, and is navigable for large vessels to Bangor, 55 miles from its mouth. Above Bangor there are falls supplying power to sawmills, and the upper course of the river is used for floating large numbers of logs from the forests of northern Maine.

PENOLOGY (from Lat. *pæna*, punishment + Gk. *λογία*, *-logia*, account, from *λέγω*, *legein*, to say). A term defined by Dr. F. H. Wines, one of the foremost penologists of the United States, as the treatment of crime for its repression and prevention, and of criminals for their extirpation or rehabilitation. The oldest form of the forcible repression of crime and treatment of criminals is execution. The death penalty naturally suggested itself to primitive peoples as the simplest, surest means of ridding society of its dangerous members. With the advance of civilization, however, the number of offenses for which the death penalty is inflicted has steadily decreased. (See CAPITAL PUNISHMENT.) A later important form of forcible repression is that of transportation, or the establishment of penal colonies, to which criminals are removed. England, Russia, and France have employed this system with more than doubtful success. England, indeed, has abandoned it. (See TRANSPORTATION.) A third and yet later form is the prison. The idea of punishment by imprisonment does not seem to have entered the mind of the rulers of antiquity, although the prison was as a matter of fact, from its crowded and filthy condition, its want of ventilation, the foul fevers and plagues engendered there, and the starvation inflicted upon its hapless inmates, a place of torture and speedy death. It was primarily a place for the sequestration of persons obnoxious to the despotic ruler, as well as of debtors, and for the detention of persons charged with other crimes, until they were tried. It is only in comparatively recent times that the prison itself has come to be regarded as a place of punishment, a place for the confinement of condemned persons; and the name 'jail' is now generally employed to designate the place where persons under accusation are com-

pelled to abide pending the determination of their guilt or innocence. Of all the institutions of this kind in the United States the county jails are the most unsatisfactory; they are generally breeding places of crime and licentiousness, because prisoners of all grades, of all ages, and sometimes even of both sexes, are herded together.

The idea of reformation has for a century played an increasingly important part in our modern prison systems. In 1773 John Howard, an English country gentleman, having been appointed high sheriff of Bedford, found so many abuses in the jails of his county that he was moved to call the attention of all England to its prisons everywhere. Up to this time the management of jails in England was under no public supervision whatever. It was the custom of the jailer, who was not even paid by the community for the performance of his duties, to collect his fees from the prisoners in his custody. Howard's life was henceforward spent in attempts to improve the conditions of the prisoner, but his reforms were mainly those which looked to the humane treatment rather than to the reformation of the criminal.

The problem of the restoration of the criminal to society is a later work of the penologist. As to the method of its solution penologists do not all agree. Two distinct systems of prison discipline, which are commonly known as the Pennsylvania, or Philadelphia, and Auburn systems, have grown up in the United States. The first, or 'separate system,' insists upon the separation of prisoners by day and by night; the second, by night only. From these two a third has been evolved, which is in a certain sense a combination of the two, but has also distinct features of its own. It is known as the Irish system, because it has been most fully and successfully applied in Ireland, under Sir Walter Crofton.

The essential principle of the separate system is the complete physical separation of prisoners. It rests upon the conviction that mutual contact between them is necessarily corrupting, and that classification upon any basis except that of individual character is impossible. At first, solitary confinement, without labor or recreation or mental contact with any human being, even with the officers of the prison, except in case of necessity, was the form which this experiment assumed. But the severity of this rule has been relaxed on account of the injury which it wrought in some cases both to the body and the mind of the subject. Now the prisoner is not excluded from a degree of companionship with the prison officials and authorized visitors. The convict, however, sleeps, eats, and works in his cell alone, and takes his exercise in an adjoining space outside. It is claimed for this system that it removes a man from evil associates; trains him as an individual, and increases the personal influence of the authorities and teachers; that it gives greater opportunity for reflection; that the convict who reforms under it cannot afterwards be identified by professional criminals and so led back to evil ways; and that discipline may be varied according to the needs of individual convicts. The objections to this system are: that it necessitates a large ground area and costly buildings; that it unfit a man for ordinary methods of work, because he has worked alone, and under exceptional conditions, such as do not prevail in the outside world where men cooperate; that loneliness is in-

jurious to morals and to mental and physical health. It is claimed, however, that this system has produced excellent results; its friends maintain that, more than any other system, it reduces the number of recidivists, that is, of discharged convicts who lapse again into crime. The International Prison Congress of 1900 reached the conclusion that this method must be regarded with favor as having checked criminality.

The prison at Auburn, in the State of New York, represents the 'congregate' or 'silent' system, which now prevails throughout the United States. Prisoners sleep in separate cells, but are brought together during the day in large workshops; separation between them, the necessity for which was acknowledged, is secured by a rule forbidding them to communicate with one another or with visitors. The difficulty of enforcing this rule has led to its relaxation. The Eastern Penitentiary in Philadelphia was intended to be a strictly cellular prison for convicts of the higher grades in the United States, but it has long since ceased to be such, because of its seriously overcrowded condition. Among the causes which have contributed to the general adoption of the Auburn system are: The comparative cheapness of construction and maintenance of congregate prisons; the ease with which profitable labor may be introduced into them, especially in connection with machinery of all sorts; the facilities which they afford for contracting out the labor of convicts, thus relieving the administration of financial responsibility.

The Irish system was, in its origin, an outgrowth of the experience of Captain Maconochie as governor of the penal settlement of Norfolk Island. Maconochie devised the 'mark system,' which is added to the 'ticket of leave' system, or conditional liberation (also an Australian invention), and the 'progressive' classification and the 'intermediate' prison, to constitute the four elements of the Crofton system. Briefly described, this system consists of four stages, of which the first is not less than eight months of strictly cellular confinement in the Mountjoy Prison, Dublin, with short rations and no employment but picking oakum for the first half of the time. The second is an indefinite period, not less than one year, of associated imprisonment, at Spike Island, where the prisoners are divided into four classes, and are promoted from one to the other according to their demeanor, labor, and study—an account being kept with them by the use of marks, and their promotion depends upon their record. The third is a short period of probationary detention in a condition intermediate between imprisonment and freedom, at Lusk, where the men are trained for entire freedom, and their capacity for it is tested prior to their liberation; the fourth is conditional liberation with police supervision. This system is supplemented by a scheme for obtaining employment for liberated prisoners.

The first American institution managed along these lines is the Elmira Reformatory (q.v.) opened in 1876 in the State of New York, and known as the New York State Reformatory. Prisoners received here are such as are convicted of their first offense for felony, and are held under what is known as the indefinite or indeterminate sentence; that is, they are not sentenced for a specific period of time, but may be held for the maximum period for which they might have been sentenced for the crime committed, and cannot be

discharged until they have served the minimum period provided by statute for such offense. Having served such minimum period, they may be allowed by the Board of Managers to leave the prison on parole, but must remain while on parole under the control of the Board and subject to be taken back to the institution.

Concerning the 'indeterminate sentence,' it should be noted that eminent penologists have favored this device on the ground that it is impossible for courts of justice to know just how long a period of incarceration is necessary to produce the desired effect upon an offender. Of two criminals sentenced to 10 years' imprisonment, one may be at the expiration of this period entirely unfit to be released, while another may have become ready and willing to assume the duties and responsibilities of citizenship. The fixed sentence, they claim, is as absurd as it would be for a physician to prescribe medicine for a period of ten days, and then omit to inquire what effect this treatment has produced in the patient at the expiration thereof. With an indeterminate sentence the prisoner is virtually his own custodian. When he understands this, his reformation—assuming him to be a reformable person and not a criminal by instinct—is rendered far more probable. The hope of freedom is the one stimulus to which he may be depended upon to respond. When the criminal is convinced that this hope is to be realized, not through some vague chance of pardon or escape, but whenever by his conduct in prison he makes it apparent to those in charge that society has nothing to fear from him, the work of his reformers is comparatively easy. Most penologists, therefore, see in this almost certain means of securing the coöperation of the criminal—a principle of reform of the greatest importance.

By means of the indeterminate sentence, a prisoner may be liberated conditionally, on parole. It is this actual experience with the outside world which establishes a man's powers and intentions. Within the prison walls he cannot steal or murder or forge signatures, or otherwise menace the life or property of his fellow-man.

The indeterminate sentence has been tried in more than a quarter of the American commonwealths since 1876, but it has met with much opposition from the courts, judges very generally regarding it as an infringement of their prerogative of sentence, and finding constitutional objections to it unless the statute creating it is drawn with extreme care to fix a definite period for the expiration of sentence, and in some cases unless the release on parole is specifically described as a commutation for good behavior.

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PEN'RITH. A market town in Cumberland, England, in a picturesque and fertile valley, with rich and striking scenery in the vicinity, 17 miles southeast of Carlisle (Map: England, D 2). It has ruins of a fine old castle and in the parish churchyard is a monument of great antiquity known as the 'Giant's Grave,' formed of two

pyramidal stones about 12 feet high. The town contains an ancient free grammar school. There are tanneries, saw-mills, and breweries; the trade is chiefly agricultural. Population, in 1901, 9180.

PEN'ROSE, BOIES (1860—). An American political leader, born in Philadelphia. He graduated at Harvard in 1881, was admitted to the bar in 1883, and the next year was elected to the Pennsylvania State Legislature. From 1887 to 1895 he was a member of the State Senate, and from 1897 until 1903 a member of the United States Senate. He wrote a *History of the City Government of Philadelphia* (1887) and contributed to the *American and English Encyclopædia of Law*.

PENROSE, FRANCIS CRANMER (1817—). An English architect, born at Bracebridge, near Lincoln. He studied under the architect Edward Blore and graduated at Magdalene College, for which he was traveling bachelor from 1842 until 1845. His *Principles of Athenian Architecture* (1851), a valuable work, was published by the Society of Dilettanti. In 1852 he became surveyor of the fabric of Saint Paul's Cathedral, which position he occupied until 1897. He was awarded the royal gold medal of the Institute of British Architects in 1883, and was president of that body in 1894 and 1895. In 1886 he was made director of the British Archaeological School at Athens. Other works by him include *Graphical Method of Predicting Occultations of Stars and Solar Eclipses* (1869) and "Orientation of Greek Temples," in the *Transactions of the Royal Society* (1893-97).

PEN'RY, JOHN (1559-93). A Puritan writer. He was born in Wales, and graduated B.A. at Cambridge, 1584; M.A. Oxford, 1586. Although always a layman, he was deeply interested in controversial theology on the Puritan side. It is, however, as the moving spirit of the little company of writers and printers who brought out the Martin Marprelate tracts (q.v.) that he is remembered. The excitement caused by these bitter attacks upon the alleged evils of the Church of England made it necessary for Penry to seek refuge in Scotland (1590-92). He was well received by the Presbyterian ministers and preached there. In September, 1592, he ventured to return to England, and settled in London. The following year he was arrested, brought to trial, and found guilty of treason. He was hanged on May 29, 1593. Consult his *Life* by Waddington (London, 1854).

PENRYN, pën-rin'. A municipal borough and market town in Cornwall, England, in a richly productive valley bordering on Falmouth Harbor, two miles northwest of Falmouth (Map: England, A 6). The famous Penryn granite is obtained here; 20,000 tons have been exported in the year. The rental of corporate property covers all principal expenses, and the town levies no local rates. Its incorporation dates from 1216. Population, in 1901, 3200.

PEN'SACO'LA. The second city of Florida, a port of entry, and the county seat of Escambia County, 204 miles west of Tallahassee; on the Louisville and Nashville and the Pensacola, Alabama and Tennessee railroads (Map: Florida, A 1). Situated on Pensacola Bay about six miles from the Gulf of Mexico, it has a land-

locked, deep, and commodious harbor, the entrance to which is defended by forts Pickens, Barrancas, and McRee. There is a large navy yard here; and the remains of the Spanish fortresses San Miguel and San Bernardo are of interest. Among the fine structures in the city are the State Armory, opera house, court house, and the Federal Government building, the last having cost \$250,000. There are public parks of considerable beauty. Pensacola is chiefly a commercial centre, its lumber interests being notable. It has a trade also in fish, coal, cotton, naval stores, grain, etc. The commerce of the port in 1901 included exports valued at \$13,456,000 and imports to the amount of \$238,000. Because of the increased trade, especially with the West Indies, extensive improvements are being made in connection with the railroad terminal facilities. Population, in 1890, 11,750; in 1900, 17,747.

Pensacola was permanently settled in 1696 by Spaniards from Vera Cruz. It was captured by the French in 1719, was restored to Spain in 1723, and passed into the hands of the British in 1763. In 1781 it was captured by a Spanish force under Governor Bernardo Galvez. During the War of 1812, owing to the assistance given here to the English, it was taken (1814) by General Jackson, who again in 1818 captured it on account of Spanish encouragement of hostile Indian attacks. The United States took formal possession in 1821, in pursuance of the treaty of 1819. In 1861 the Confederates seized the navy yard here, but were unable to capture Fort Pickens, and in 1862 they evacuated the city. A destructive fire occurred in 1864.

PENSACOLA BAY. An inlet of the Gulf of Mexico on the coast of Florida near the western boundary of the State (Map: Florida, A 1). Across its entrance lies the long, narrow island of Santa Rosa, leaving a passage only a mile wide, but deep and navigable. The inner bay is from 4 to 12 miles wide, and divides into two large branches, which penetrate about 25 miles inland. The entrance is fortified, and on the west shore lies the city of Pensacola (q.v.).

PEN'SERO'SO, IL (It., the pensive). A poem by Milton, written probably in 1632 at Horton. It is the complement of *L'Allegro* (q.v.) and is the unrivaled description of the impressions made by scenes of nature, art, and music on the mind of a thoughtful cultivated man.

PENSILE NESTS (from Lat. *pensilis*, hanging, from *pendere*, to hang). Nests of birds woven in the form of a bag, cup, or hammock, and suspended by the rim from the twigs of a tree, bush, or other plant. Many birds construct such nests, which are not only safer than in most other situations, but usually most skillfully and beautifully made. Prominent American examples are the nests of the Baltimore and orchard orioles, of the vireos, and of certain warblers. In South America, the caciques and some humming-birds; in Europe, the titmice; and in Asia, the tailor-birds and weaver-birds, afford other examples in a great variety of forms and materials. See articles under the names of these birds; and Plates under NIDIFICATION and WEAVER-BIRD.

PENSION (Lat. *pensio*, payment, weight, from *pendere*, to weigh out). A pension is an annual income granted by public authority, usually for an antecedent public service, mili-

tary or civil. In earlier days the granting of pensions was a royal prerogative which was frequently abused. At the present time in England civil list pensions are granted by the free grace of the sovereign and are frequently bestowed upon men of letters. Hereditary pensions granted in former times to national heroes and their descendants have been almost entirely commuted. Pensions are bestowed upon officers of the army and navy and to judges, as in the United States. Like most of the countries of Europe, England has a system of pensions for civil servants. A similar system is widely advocated for the United States. The theory of such pensions is generally that the assured provision for old age is a compensation for the low rates of pay which attach to the Government service. In some of the European countries a system of pensioning working-men is now in force. (See OLD AGE PENSIONS.) In the ordinary service of the United States retiring pensions are confined to the Federal judges and the officers of the army and navy. The former at the age of seventy, after ten years of judicial service, may retire on full pay. The maximum pay on the retired list for officers of the army and navy is 75 per cent. of the active pay of their respective ranks. Congress has also by special act granted pensions to some of the widows of the Presidents.

MILITARY PENSIONS IN THE UNITED STATES. The system of military pensions in the United States had its germ in the colonial epoch. The necessity of calling upon the inhabitants for armed defense against the Indians and other foes seemed to impose the necessity of providing at public expense for those who were disabled, and for the families of those who perished in the struggles. In the Revolutionary struggle the troops were promised similar pensions, and officers who should remain in the service till the end of the war were promised half pay for life. The Continental Congress was unable to fulfill this obligation. After the adoption of the Constitution Congress took up the matter of pensions, and passed in 1792 a general pension law. Successive laws were passed improving the machinery for granting pensions, and enlarging the number of claimants, but no increase of rate was granted until 1816, when the rate of a full pension was raised from \$5 per month to \$8. The application of the law was at the same time extended to those who had fought in the War of 1812.

The principle of service pensions was introduced by the act of March 13, 1818. All survivors of the Revolutionary army or navy who had served until the close of the war, or at any period of the struggle for at least nine months, were entitled, if in needy circumstances, to pensions for life. For privates the rate was fixed at \$8 per month. The law was loosely worded and the door wide open to fraud. The grants of pensions became a public scandal, and a law of 1820 required all pensioners and applicants to file a statement of property in proof of their alleged indigence. Many were stricken from the rolls. Up to September, 1822, as many as 18,880 claims had been admitted, but at that time the number of pensioners was only 12,331, owing to the effect of the law of 1820. In 1832 a law was passed which granted full pay for life to all who had served at least two years in the Revolutionary War, and proportional payments to those

who had served less than two years but more than six months.

In 1836 began a long series of acts in favor of the widows of Revolutionary soldiers, restricted at first to those who had married before the close of the Revolution, but gradually growing more liberal until pensions were granted to all, irrespective of the date of marriage.

A similar development of legislation occurred with respect to pensions growing out of the War of 1812, and of the Mexican War. A part of this legislation is of recent date and was affected by the more liberal views as to pension legislation which followed the Civil War.

The first law pensioning soldiers of the Civil War was a disability pension law of July 14, 1862. It provided for the disabled survivor, and for the widows, orphan children, and dependent mothers of those who died by reason of any wound received or disease contracted while in the service of the United States and in the line of duty. Rates for total disability ranged from \$8 to \$30 a month, according to rank, and these were the rates accorded to widows. Successive laws beginning July 4, 1864, have increased the rates, adopting fixed rates for various kinds of disability.

A powerful stimulus was given to pensions expenditure by the passage of the Arrears Act in 1879. This provided that all pensions which had been granted or might hereafter be granted should date from the time of disability, provided application were made prior to the first of July, 1880. The operation of the law is shown by the fact that in 1881 the average of first payments to army invalids was \$953.62, and \$1,021.51 to army widows.

A bill to establish service pensions for persons in dependent circumstances was vetoed in 1886 by President Cleveland. A similar bill was passed June 27, 1890, providing that all persons who had served ninety days in the war and who were suffering from any mental or physical disability of a permanent character which incapacitates them from performing manual labor may receive pensions of from \$6 to \$12 a month, proportioned to the degree of inability to earn a support. Widows of soldiers who served ninety days who are dependent upon their daily labor for support may receive \$8 per month.

In addition to the pensions granted under general laws, many claims, often rejected by the Pension Bureau, have been granted by special legislation. From 1861 to 1902 no less than 9296 acts have been passed granting such pensions. A large part of the activity of Congress is devoted to such measures, though a legislative body is ill-adapted to the proper investigation of claims. Elaborate rules which have been framed by the committees of the two Houses for their guidance offer, however, a certain guaranty for the justice and reasonableness of their procedure.

The provisions of the general pension law were of course applicable to the war with Spain, and this brief struggle has already brought forth a considerable number of pensions. Up to 1902 50,071 applications had been filed. There were on the roll July 1, 1902, 6611 Spanish War invalids and 2854 Spanish War widows.

The development of the pension system in the United States can be seen from a few typical figures taken from the Reports of the Commissioner of Pensions:

	Number of pensioners	Paid for pensions
1866.....	126,722	\$15,450,550
1870.....	198,086	29,351,489
1875.....	234,821	29,270,407
1880.....	250,802	56,600,529
1885.....	345,125	65,171,957
1890.....	537,944	106,094,250
1892.....	876,068	139,394,147
1895.....	970,524	139,807,789
1900.....	993,529	138,462,131
1901.....	997,735	138,531,484
1902.....	999,446	137,304,396

This table indicates the considerable increase of pension expenditure between 1875 and 1880, due to the Arrears Act. This is brought out more fully by separating the first pension payments from the others, as is done in the following statement:

PENSION PAYMENTS		
	First payments	Payments since the first
1878.....	\$2,392,502	\$23,538,439
1880.....	12,468,191	44,558,903
1883.....	29,906,754	29,915,481
1889.....	21,442,549	66,831,764
1890.....	38,721,866	66,808,314
1892.....	45,114,168	94,045,188
1896.....	11,289,378	126,925,483
1902.....	8,677,548	128,936,730

This statement shows the great increase in first payments immediately following the passage of the Arrears Act and its subsidence until 1890, when the great number of new pensioners increased such payments to a large extent. Our first table showed the rapid increase of the pension roll after 1890. At present we have in fact two systems of pensions—one under the general law, and the other under the law of 1890. Under the first there were 372,268 pensioners on the rolls in 1902 on account of service in the Civil War, and under the second 597,319 pensioners.

The Commissioner of Pensions gives in his report for 1902 the following statement of the aggregate cost of pension expenditures since July 1, 1790:

Revolutionary War (estimated).....	\$70,000,000.00
War of 1812 (service).....	45,025,267.99
Indian wars (service).....	5,814,200.53
Mexican War (service).....	31,861,577.57
War of the Rebellion.....	2,744,878,276.16
War with Spain.....	3,275,194.10
Total.....	\$2,900,884,301.45

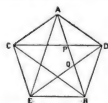
* Pensions on account of disabilities and deaths due to these wars are included under War of the Rebellion.

Consult: *Reports of the Commissioner of Pensions, Laws of the United States relating to army and navy pensions* (Washington, 1902), and *Glasgow, History of Military Pension Legislation in the United States* (New York, 1900).

PENTACRINUS (Neo-Lat., from Gk. *pente*, five + *krinos*, krinos, lily). A genus of stalked crinoids living in the deeper waters of the modern ocean and found fossil in rocks of Triassic to Pliocene age. The calyx is small, with slender arms that branch innumerable times to form a beautiful feathery head. The stem is long, pentagonal in section, and provided with numerous prehensile cirri which constitute organs of attachment to various foreign objects. *Pentacrinus* was extremely abundant in the Jurassic

seas of Europe, and many slabs bearing numerous fine examples have been obtained from the Liassic rocks of Württemberg. The stems seem to have been of great length, one of them having been traced through many convolutions for about seventy feet. Though of such large size, the entire structure was extremely delicate. In some cases several individuals of various degrees of development and age have been found attached to pieces of fossil wood which must have been originally floating logs drifting about the surface of the ocean and supporting the sessile pentacrinids. See CRINOIDEA.

PENTAGON (Lat. *pentagonium*, from Gk. *πεντάγωνος*, *pentagōnos*, five-cornered, from *πέντε*, *pentē*, five + *γωνία*, *gōniā*, angle). A polygon (q.v.) of five sides. A pentagon in the form of a star of five rays is called a *pentagram* (*πένταγραμμος*, *pentagrammos*, line). This figure was used as a



badge by the members of the Pythagorean school, and is said to have symbolized health. In the figure, if A, D, B, E, C, A are connected in order, a regular *convex* pentagon is formed and the sides of the pentagram become diagonals of the pentagon, and divide one another in golden section (q.v.). Whence in the pentagram Q divides AB, and P divides BA in golden section, and the figure may be constructed from this relation.

PENTAGRAM. See PENTAGON.

PENTAM'ERON (Neo-Lat., from Gk. *πέντε*, *pentē*, five + *ἡμέρα*, *hēmera*, day), THE. One of the best of the *Imaginary Conversations*, by Walter Savage Landor (1837). The participants are Petrarch and Boccaccio, who discuss the great Italian writers of the fourteenth century. There is an appreciative setting of Tuscan scenery.

PENTAM'ERUS (Neo-Lat., from Gk. *πενταμήρης*, *pentamēris*, having five parts, from *πέντε*, *pentē*, five + *μέρος*, *meros*, part). A group of binged fossil brachiopods in which the shells are characterized by a more or less distinctly marked division of their interiors into five chambers by radiating septa that arise from the umbonal region. The type of the genus is *Pentamerus oblongus*, an oval to oblong smooth-surfaced shell that is very characteristic of the Upper Silurian rocks of North America and Europe. With this typical species have been associated a number of forms that are now recognized as more properly belonging in other genera. Such are: *Gypidula galeata*, a very characteristic species of the Lower Helderberg limestone; *Pentamerella arata*, a strongly plicate shell of the Lower Devonian; *Camerophoria*, an Upper Devonian to Permian genus which strongly resembles the rhynchonellids; and *Capellina*, *Clorinda*, *Amphigenia*, *Conchidium*, *Stricklandinia*, all of which are important horizon-markers in the hands of the expert paleontologist.

PENTAM'ETER (Lat., from Gk. *πέντε*, *pentē*, five + *μέτρον*, *metron*, measure). The name of a verse composed of five feet or measures. Its most frequent use is in iambic verse. The iambic

pentameter is employed for the dialogue of Greek plays, and in English is used for two of the most popular forms, blank verse and the heroic couplet. In the Spenserian stanza, also, it supplies all verses except the last. The dactylic hexameter in Greek and Latin poetry alternates with the pentameter to make up the common form known as elegiac verse.

PENTATEUCH, *pen'ta-tōk* (from Lat. *Pentateuchus*, *Pentateuchum*, *Pentateuch*, from Gk. *πεντάτευχος*, *pentateuchos*, consisting of five books, from *πέντε*, *pentē*, five + *τεῦχος*, *teuchos*, tool, book, from *τεύχω*, *teuein*, to prepare). The name given by the Greek translators to the group of five books which tradition ascribed to Moses: Genesis, Exodus, Leviticus, Numbers, and Deuteronomy. Among the Jews these five books are known as *Book of the Law*, or *The Five Parts of the Law*. The division into five books (to which the division of the Psalms into five sections presents a parallel) was made before the Septuagint translation, apparently for liturgical purposes, though the division into 54 sections (known as *parashioth* or *sifre*) represents the more specifically Jewish division adopted for the distribution of the Pentateuch over the Sabbaths of the year. The division into books or into sections is arbitrary, and has merely conventional significance. For the Pentateuch is a continuous work. In the opinion of modern scholars the Book of Joshua must also be added as an integral part, and it is customary at the present time to speak of the Hexateuch (sixfold book) rather than the Pentateuch. This term Hexateuch, however, must not be understood as implying that the six books are sharply separated from those which follow. The theory regards that part of the Old Testament which extends from Genesis to the end of Kings as a unified historical compilation, brought to its present shape in the Greek period, and aiming to give a complete history of the Hebrews from the creation of the world to the Babylonian captivity in a.c. 586. The Hexateuch covers the portion of this history to the conquest of Canaan and the distribution of the territory among the tribes; the Pentateuch ends with the death of Moses.

Scholars who hold this view reject the opinion, traditionally held till the beginning of the nineteenth century, that the Pentateuch is essentially a law book and the work of Moses. They regard it as a compilation at which many different individuals have worked throughout a long period of time; various sources have been used in making the compilation, among them certain legal codes, originally independent, which have been incorporated and constitute the legal portions. For a statement of what these sources are believed to be and a history of the discussion by which the theory has been developed and strengthened until it has come to be accepted by well nigh all scholars, see the article HEXATEUCH. In addition to what is there said the following points may be here noted.

The difference in style and point of view between the Prophetic narrative (JE) and the Priestly document (P) is very marked. Both begin with the creation of the world and cover the same ground, but the Priestly compiler passes more rapidly over the histories of the earlier and later patriarchs, emphasizing only such incidents as have a bearing on the religious theory underlying his narrative. His chief interest is

theological and ceremonial; his style stilted and formal. The Elohist and Yahwist, on the other hand are genuine story-tellers; events are told for their own sake, in a style flowing and attractive, which makes some of their narratives models of story-telling. In the Book of Exodus, likewise, historical incidents are rapidly passed over by the Priestly compiler till the revelation at Sinai is reached. Here, beginning with chapter xxv., his real object reveals itself—the formulation of the various ordinances, the construction of the tabernacle, its furniture, the organization of the priesthood, the distinction between Levites and priests, duties of both, ceremonies of consecration, sacrificial laws, festival regulations, and the like. The greater part of Leviticus and Numbers is taken up with sections of the Priestly Code introduced by the narrator at the point which he regarded as appropriate.

The chronological order of the codes (Book of the Covenant, Deuteronomic Code, Law of Holiness, Priestly Code) rests upon the detailed study of their contents and language. For example, in the Book of the Covenant there is no restriction of the Yahweh cult to a single sanctuary, which is the distinguishing mark of Deuteronomy and the other codes. A general demarcation between Deuteronomy and the two remaining codes is the lack of a distinction between Levites and priests in the former. The Code of Holiness recognizes the Aaronites only as priests; the Priestly Code is distinguished by a sharp division between Levites and priests. Besides these general indications there are many special ones which go to confirm the thesis.

The chief difficulties are introduced by the complicated and long continued editorial processes involved in the combination of the sources and the additions and modifications introduced in the course of time, which, while of minor importance, yet have a bearing on the problems involved. Thus the Book of Deuteronomy, which is more of an independent work than any other part of the Pentateuch, contains, besides the laws, a series of farewell discourses delivered by Moses and two poems—the so-called Song and Blessing of Moses (chaps. xxxii., xxxiii.). These must have been the work of writers who flourished subsequent to the promulgation of the codes. Such additions involve a long continued process which was not brought to a close till after the Exile, and which produced finally, not only the Hexateuch, but its continuation from the conquest of Canaan to the Exile. It is but natural that the details of this complicated editing should escape us and that some of the problems involved should be incapable of definite solution.

The combination of the codes, the historical narratives of the Hexateuch, and the additional sources used in the books from Judges to Kings, was effected under the influence of a theory which is already evident in the earlier compilers and becomes more fully and consistently adopted by the later schools of redactors. It was believed that the Hebrew clans had been selected as the chosen people of Yahweh, the one God of the universe, and a covenant made between the people and the deity at Mount Sinai. This covenant had been forfeited by a personal one between Yahweh (under other names, e.g. El-Shaddai) and the patriarchs, Abraham, Isaac, and Jacob, and a promise for the future of the people had been given to Abraham and confirmed to the two

other patriarchs. In close connection with the covenant at Mount Sinai a body of laws had been received directly from Yahweh and promulgated through Moses. As a direct consequence of these views the pious writers who put the Hexateuch into its final shape looked upon the entire history of Israel subsequent to the revelation at Mount Sinai as a constant falling away from the teachings given to the nation at the outset of its career. Even the progress from the crude religious notions of the early time to the lofty monotheism of the post-exilic prophets is represented as a retrogression, not an advance. The struggles, trials, and misfortunes of the nation are punishments sent by Yahweh for disobedience to his decrees. The leaders of the people, notably the kings, are viewed favorably or unfavorably according as they represent an approach to the supposed commands of Yahweh or a departure from them. The natural difficulties encountered in dispossessing the Canaanites, the equally natural rivalry and quarrels between the Hebrews and surrounding peoples (Moabites, Edomites, Philistines, Amalekites), even a distinct social advance, the establishment of a definite political organization in the shape of a kingdom, are all forms of punishment sent by Yahweh. These punishments culminated in the destruction of the two kingdoms in B.C. 722 and 586. The Exile, when Yahweh could no longer be appealed to in his legitimate sanctuary, was the grievous atonement for past sins.

For the literature, see the article HEXATEUCH.

PENTATHLON (Gk. *πενταθλον*, quintuple contest, from *πέντε*, *pentē*, five + *ἀθλον*, *athlon*, contest). A combination of running, jumping, wrestling, throwing the discus, and casting the javelin, which formed one of the contests in Greek athletic games. The victory in the five events was settled by the wrestling, in which only the contestants victorious in the preceding events took part.

PENTAUR (Egyptian *Pen-ta-icere* (t)). An Egyptian scribe, who was formerly regarded as the author of the poem celebrating the valor of Rameses II. in the battle fought against the Hittites at Kadesh on the Orontes. In this character he is the hero of Eber's novel *Narda*. It is now known, however, that he was merely the copyist of the papyrus (Sallier 3) in which the poem has been preserved. According to the first Sallier papyrus he was still living in the tenth year of Menephtah. Another Pentaure, who seems to have been a member of the royal family of Egypt, is mentioned in the Turin judiciary papyrus as being concerned in the conspiracy against Rameses III. He was found guilty by the commission appointed to try the case and was forced to kill himself. Consult Wiedemann, *Geschichte von Alt-Aegypten* (Stuttgart, 1891).

PENTECOST, *pen'te-kōst* (OF. *pentecoste*, Fr. *pentecôte*, from Lat. *pentecoste*, from Gk. *πεντηκοστή*, *pentēkostē*, fiftieth, *sc. ἡμέρα*, *hēmera*, day, from *πεντήκοντα*, *pentēkonta*, fifty). The Greek name of the second of the three chief festivals among the Hebrews, in the Old Testament commonly called the Feast of Weeks. It received the name Pentecost from the fact that its celebration was determined by an interval of seven weeks or fifty days from the Passover. (See WEEKS, FEAST OF.) From the Jewish Church it was introduced into the Christian, and with spe-

cial solemnity, as being the day of the descent of the Holy Ghost on the Apostles, and of the first solemn preaching of the Christian religion (Acts ii.). From early times Pentecost has been regarded as one of the great festivals of the Christian year, and it was chosen as one of the times for the solemn administration of baptism. The English name of the festival, Whitsunday, is derived from the white robes in which the newly baptized were clad. It is regarded as specially sacred to the Third Person of the Trinity, to whose honor the services of the day are directly addressed. As a trace of its originally agricultural character, the practice prevails in the East as well as in the West of decorating the churches with evergreens and flowers, as is done in England at Christmas, and it is interesting to note also that the whole time intervening between Easter and Pentecost is celebrated in the Roman Catholic Church with great solemnity. See PASS-OVER.

PENTECOST, GEORGE FREDERICK (1842—). An American Presbyterian clergyman and author, born in Albion, Ill. He left Georgetown College to enter the Union Army, in which he served as chaplain (1862-64). He then entered the ministry, and between 1864 and 1887 was pastor of churches in Indiana and Kentucky, in Brooklyn and Boston. After evangelical work in Scotland, and a special mission to English-speaking Brahmins in India, Dr. Pentecost was for six years pastor of Marylebone Church, London, and (1897-1902) pastor of the First Presbyterian Church of Yonkers, N. Y. In 1902 he was appointed a special commissioner to China, Japan, and the Philippines to examine the missionary work of the Presbyterian and Congregational churches of America. He wrote: *A South Window* (1886); *Bible Studies* (1881-91); *Birth and Boyhood of Christ* (1896); *Systematic Beneficence* (1897); and *Christian Imperialism* (1902).

PENTHESILE'A (Lat., from Gk. Πενθεσίλεια, *Penthesileia*). The daughter of Ares and Queen of the Amazons. In the latter part of the Trojan War she aided Priam, and showed great valor. Achilles slew her, and, in admiration of her deeds, desired to honor her with a tomb. The ridicule and offensive words of Thersites at this suggestion so provoked Achilles that he killed him, whereupon Diomedes threw the Amazon's body into the Scamander.

PENTHEUS (Lat., from Gk. Πενθεύς). The son of Agave, daughter of Cadmus, and his successor on the throne of Thebes. He opposed the introduction of the Bacchic worship, and, being discovered watching the orgies of the Bacchantes, was torn in pieces by his mother and sisters on Mount Cithæron. The *Bacchæ* of Euripides is based on this legend.

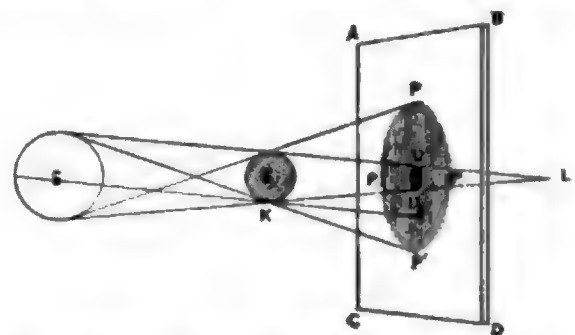
PENTLAND FIRTH. A channel connecting the Atlantic Ocean with the North Sea and separating the Orkney Islands from the mainland of Scotland (Map: Europe, C 3). It is 14 miles long, 6 to 8 miles wide, and crossed by a ferry-line. Its navigation is dangerous owing to strong currents, eddies, and rocks, but it is lighted by several lighthouses, and used by a large number of vessels.

PENTREMITES, pên'trô-mî'têz (Neo-Lat., nom. pl., from Gk. πέντε, *pente*, five + Lat. *remus*, oar). A genus of fossil echinoderms

typical of the class Blastoida. The blastoids were crinoid-like animals that lived in abundance in the sea of late Paleozoic time. They resembled the crinoids in respect of the general plan of their organization, but they differed in that the calyx has only 13 principal plates arranged in very regular order, generally forming a bud-shaped head (whence the name), and in the absence of well-developed arms. In place of the arms there were very efficient pinnules that screened the food from the water. The calyx is usually small, pear-shaped, ovate, or globose in form and more or less pentangular in section. The stem is seldom found attached to the calyx. About 20 genera and 150 species of blastoids are known, by far the larger proportion of which are American only.

The blastoids appear to have been derived from some of the more regular cystideans of Ordovician time. The earliest member of the group is *Troostocrinus*, an elongate slender species from the Niagara group of Tennessee. *Elruecrinus* (*Nucleocrinus*) *verneuili* is a well-known index fossil of the Lower Devonian limestones of the Central States. The blastoids attained great prominence in the Subcarboniferous of North America, especially in the Saint Louis and Kaskaskia limestones of the Mississippi Valley. Here the most prominent genus is *Pentremites*, which seems to be unknown in Europe, where it is represented in the Devonian rocks by an ancestral form *Pentremitidea*. See Von Zittel and Eastman, *Textbook of Paleontology*, vol. i. (New York and London, 1900); and Etheridge and Carpenter, *Catalogue of the Blastoida in the Geological Department of the British Museum*. The latter work contains a full bibliography to the literature of the group. See CRINOIDEA; ECHINODERMATA.

PENUMBRA (Neo-Lat., from Lat. *pene*, *pæne*, almost + *umbra*, shadow). When the shadow of an opaque object is thrown upon a surface at some distance from it by a light of considerable apparent size, it is observed that the shadow is divided into two portions, a dark portion in the centre, and a lighter portion surrounding it. The former is known as the *umbra*, or complete shadow; the latter as the *penumbra*, or partial shadow. A reference to the figure will



at once make plain their origin and relation: for if S be the illuminating body, E the object whose shadow is cast on the surface, ABCD, it is seen that the small portion, UU' receives (omitting all consideration of refraction, dispersion, etc., of light) no light from S, while the whole surface outside of PPP' is completely illuminated. The point P' receives light from the whole of S; the point F is only half illuminated, and that by the lower part of S, the illumination of the points becoming less and less as they approach U', which

is unilluminated. The portion within UU' is the umbra, and that between the boundaries $PPPP'$ and UU' is the penumbra, which, as we have seen, gradually shades from perfect light at the outer boundary to perfect darkness at the inner, so that it is almost impossible exactly to note its limits on either side. This phenomenon, it is evident, can only occur when the illuminating body is of such a size, real or apparent, as to make the angle, $P'KU'$, of sensible magnitude; and it is equally evident that the nearer the body E approaches the plane on which its shadow is cast, the larger is the umbra and the smaller the penumbra; while by increasing the distance between E and the plane, so that the point L shall fall between them, the umbra is made to vanish, and the penumbra is increased. This is well illustrated by natural phenomena; the shadow of a man cast by the sun on the ground presents almost no penumbra; the shadow of the earth thrown by the sun upon space at the distance of the moon gives a penumbra many times as large as the umbra; and sometimes, when the moon is new at her apogee, for instance, her shadow cast upon the earth exhibits no umbra. Spectators on the earth who see a partial eclipse of the sun are situated within the penumbra, but within the umbra when they observe a total eclipse; while if the eclipse be annular, the umbra does not exist in the shadow cast by the moon on the earth's surface. See ECLIPSE.

PENZA, pěn'zá. A government of Central Russia, bounded by the Government of Nizhni-Novgorod on the north, Simbirsk on the east, Saratov on the south, and Tambov on the west (Map: Russia, F 4). Area, about 15,000 square miles. The surface is undulating, intersected by numerous ravines and sloping toward the northwest. The district is watered principally by the Moksha, a tributary of the Oka, and the Sura, an affluent of the Volga—both navigable. The climate is harsh, the mean annual temperature at Penza, the capital, averaging 39° . Agriculture, the chief occupation, is favored by a soil of remarkable fertility. Rye, oats, and wheat are the leading cereals raised. Flax is cultivated to a considerable extent, and gardening and stock-raising are well developed. Modern farm methods are making some progress among the peasantry. The manufacturing industries employed in 1895 over 12,000 men, and their products were valued at over \$8,000,000. The chief manufactures are spirits, paper, flour, oil, and matches. Population, in 1897, 1,491,215, of whom about 90 per cent. were Great Russians and the rest Mordvins and Tatars.

PENZA. The capital of the government of the same name in Russia, at the confluence of the Penza with the Sura, 440 miles by rail southeast of Moscow (Map: Russia, F 4). It has a monastery and a convent, a mosque, three gymnasia, a realschule, a seminary for teachers and one for priests, a technical school, a school of drawing, and a picture gallery. The municipality owns the waterworks and directs a pawn shop. Paper, lumber, flour, and various iron products are the chief manufactures. Penza was founded in 1666. Population, in 1897, 61,851.

PENZANCE, pěn-zāns'. A municipal borough, market, and seaport town in Cornwall, England, on the northwest shore of Mount's Bay, 65 miles southwest of Launceston (Map: Eng-

land, A 6). It is the most westerly town in England. The town, exceedingly picturesque in situation, stands on a finely curved shore, surrounded by rocky eminences, and is famous for its mild climate. Its esplanade, one of the finest in the west of England, commands charming land and sea views. The chief buildings are the town hall and corn market, and the chapels of Saint Paul and Saint Mary. Its educational institutions include mining and science schools, and a free library. Woolen yarns and cloths are made and the fisheries employ upward of 2000 persons. Agricultural produce, pilchards, china clay, granite, and tin and copper ores produced from the mines of the vicinity are exported; and timber, iron, hemp, and hides are the chief imports. The harbor has two piers, dry docks and wet docks, and a lighthouse. The town owns much remunerative property, wharfs, modern docks, quays, markets, public baths, and water supply. Penzance, meaning 'holy head,' originated in a chapel to Saint Anthony. Edward III. gave it the grant of a weekly market, and in the fifteenth century it was described as 'a place of ships and merchandise.' The Spaniards burned and sacked the town in 1595, and it suffered in the Civil Wars from Fairfax. It enjoyed the privilege of a coinage charter from 1663 to 1838. Population, in 1891, 12,430; in 1901, 13,120. Consult: Millett, *History of Penzance* (Penzance, 1876-80); Lach-Szyrma, *Short History of Penzance* (London, 1878).

PEONAGE. A term loosely used to denote the system of labor formerly prevalent in Spanish America, and especially in Mexico. The system originated in the desire of the Spanish Government to protect the natives from the rapacity of their conquerors. In Mexico the Indians were early given all the privileges of minors, and as such were exempt from compulsory military service, the payment of tithes, aside from a moderate annual tribute, and certain ecclesiastical and legal restrictions, and the royal officials were especially charged with their protection. These privileges and exemptions, however, served equally well as a mark of inferiority, and their natural protectors often took advantage of their helpless political and social condition to force them into virtual slavery. The labor required of the *peones*, as these Indians were called, was of two kinds; the free labor (*obirajes*), a system under which the laborer served by definite contract, with the days of service, tasks, compensation, etc., strictly regulated by the laws of the Indies; and forced labor, as punishment for crime or debt. With the administration of the law in the hands of corrupt officials, it was comparatively easy to extend almost indefinitely the number of the second class, and with the requirement that each Indian must perform a certain number of days' work each year, the condition of laborers of the first class was far from being one of free contract. During the latter period of the Spanish rule many restrictions were adopted to prevent the Indians from falling into debt, and the conduct of employers was so strictly regulated that the condition of the natives was much better than during the first years of Mexican independence.

The principal evils of the system arose from the strict segregation in separate villages of the Indians, which kept from them any opportunities to advance by more intimate contact with a

superior race, and which speedily nullified the first feeble efforts to educate them; and from the feeling of race contempt which their isolated and defenseless condition engendered in their masters. Though in a legal sense the institution itself long since disappeared, the name *peon* is still used to designate the laborer of native or mixed blood, and through his ignorance and credulity many of the worst features of the system are yet fastened upon him. The system as then prevailing in Mexico survived in New Mexico and Arizona a few years after the annexation of the Southwest to the United States, but was removed by national enactment March 2, 1867. Recent revelations have shown that the worst features of the convict labor system of the South, especially as applied to negro prisoners, closely parallel some of the most flagrant evils of early Spanish-American peonage, and consequently that term has been used, though not with strict accuracy, to designate the condition of these convicts.

PEONY (OF. *pione*, *pioine*, Fr. *pivoine*, from ML. *peonia*, Lat. *pæonia*, from Gk. *παῖων*, *paîōnia*, peony, from *παῖον*, *Paîōn*, *παῖαν*, *Paian*, the physician of the gods; so called because originally regarded as medicinal), *Pæonia*. A genus of plants of the natural order Ranunculaceæ, natives of Southern Europe, Northern Africa, and Asia. The species are large herbaceous or rarely half shrubby perennials often with tuberous roots. The half-shrubby species are known as tree peonies. On account of the beauty of their large flowers, some of the species are extensively cultivated in gardens, and many varieties and hybrids have been originated. The common peony (*Pæonia officinalis*), a native of Southern Europe, is the most generally cultivated species. It produces in early summer large solitary blossoms, usually red or crimson, but varying to white. The white peony (*Pæonia albiflora*), another favorite species, with beautiful white or pink and fragrant flowers, is a native of Siberia, where its roots are used by the Mongolian Tartars as a food. These two species are the parents of many cultivated forms. The Chinese peonies, a large group including many hardy double-flowered and fragrant varieties, are hybrids obtained by intercrossing various species. The term Chinese peony, however, is often applied to several different species. The less common tree peonies are derived mainly from *Pæonia Moutan* and *Pæonia lutea*, which latter is a comparatively recent introduction from China and is as yet not so well known as the other species. It begins to blossom in late spring and produces its yellow flowers for about a month. *Pæonia Moutan*, the commonest of the tree peonies and much larger than the foregoing, attaining a height of 3 or 4 feet, is a native of California and Japan. It blossoms in spring and produces very large and handsome flowers representing a wide range of shade and colors. It is often grown as a greenhouse plant for early spring blossoms. The tree peonies prefer a good, strong sandy loam. They require a rich soil and applications of well-rotted cow manure are very advantageous to the growing plants. They are rather tender, and in many localities require protection. The plants are propagated from cuttings at the base, usually made with a piece of the ripened stem, potted in sandy soil and placed in a cold frame or the greenhouse. They are also grafted in early fall

on the roots of *Pæonia albiflora* and *Pæonia officinalis*. The shoots for grafting are without a flower bud and the grafts are potted in sand and kept in cold frames. The herbaceous peonies are commonly increased by divisions of the shoots in fall or spring. New varieties are grown from seed.

PEOPLE'S CHORAL UNION. See CHORAL SOCIETIES.

PEOPLE'S PALACE. An institution at Mile End, London, established to furnish the people of East London with facilities for education and recreation. In 1840 John B. Beaumont left a sum of money, the income of which was to be spent in promoting education and entertainment for the people in the neighborhood of Beaumont Square. This bequest was badly managed until Sir Edmund Hay Currie took the work in hand and added to the \$60,000 which remained the quarter of a million he had raised for its extension. In 1882 Walter Besant published his story, *All Sorts and Conditions of Men*, describing a "Palace of Delight." This novel suggested the name for the new enterprise, created a wider interest in the work, and emphasized the recreation idea, for the further development of which the means soon offered. Besant, as trustee, was closely connected with the work. A central location was chosen and Queen's Hall was formally opened by Queen Victoria on May 14, 1887. Technical classes had already been started in temporary buildings in October. Other buildings were gradually added. The institution contains, in addition to Queen's Hall, with its large organ and stage, and a seating capacity of 4000, a library, class-rooms, laboratories, machinery rooms, social rooms, reading rooms, a gymnasium, a swimming tank, and a winter garden. The activities are educational and social. The only religious work is that carried on by voluntarily formed branches of the Young Men's Christian Association. The main object is to furnish boys with a technical training, an opportunity to learn a trade, and wholesome entertainment. There is a day school for boys, limited to 500, which prepares for the technical courses; evening polytechnic classes, scientific classes, language and commercial classes. The technical courses include music, dress-making, and training for the civil-service examination. A school of art teaches design in relation to the crafts. Its aim is to elevate the taste and improve the skill. Social rooms provide sewing, music for the girls, and reading and billiard rooms for the boys. Debating, athletic, cycling, and rambler clubs are formed among the members. Balls have been given with success. Refreshments are served at a small charge. The library is open to all during the day, to members only in the evening. It is also open on Sundays from 3 to 10 P.M. Several concerts are given during the week to which a small admission fee is charged. There are also Sunday concerts of sacred music at half-past twelve to one o'clock, when the saloons open, and at half-past four and eight in the afternoon. The choral societies of the Palace sometimes give concerts. Exhibitions of pictures have greatly interested the people: as well as 'shows' of chrysanthemums, poultry and pigeons, dogs, cats and rabbits, donkeys and ponies, and exhibits of the work of London apprentices, where prizes and premiums are awarded. The Palace is primarily

for the young, membership being limited to persons from sixteen to twenty-five years; a junior section includes those from thirteen to sixteen. There is a small membership fee for which is received the privilege of attending concerts and other entertainments, the use of the library in the evening, and admission to clubs and classes. The membership the first year was 4200. In 1890 the Drapers Company took the management of the educational work and two years later decided to contribute £7000 annually, while the Charities Commission give £3500.

The *Maisons du Peuple* of Belgium have a similar purpose. They are, however, an outcome of the socialistic movement for coöperative production. They provide a gathering place open to all, where concerts, lectures, and entertainments are given, and books and companionship can be obtained. They are the people's temples.

Jersey City, N. J., has a People's Palace in connection with the People's Tabernacle. A day nursery, baths, swimming tank, a gymnasium, industrial training, and amusements (bowling, billiards, theatricals, dancing) are provided.

The social settlement of to-day is a later development of the People's Palace idea. Institutions like the Educational Alliance and the University Settlement of New York City are organized to meet the need for a more intimate acquaintance with the home life and interests of the poor.

BIBLIOGRAPHY. Besant, *All Sorts and Conditions of Men* (London, 1882); *Century*, 18, 163 (1890); *Nineteenth Century*, 27, 344; *Contemporary*, 51, 226; *North American Review*, 147, 56. For *Maisons du Peuple*, consult Halévy, *Essais sur le mouvement ouvrier en France* (Paris, 1901).

PEOPLE'S PARTY. See FARMERS' ALLIANCE; POPULIST PARTY.

PEORIA. One of the five principal tribes of the Illinois Confederacy. Their home territory was in central Illinois, about the lake of the same name. They shared in the swift decline of the Illinois tribes, largely brought upon themselves by the murder of Pontiac, and were soon reduced to a mere remnant. In 1832 they and the Kaskaskia removed to Kansas, whence in 1854 they again removed to the reservation in the northeastern corner of Indian Territory, where they still reside, confederated with the remnant of the Kaskaskia, Wea, and Piankishaw, the entire body numbering only 180, all probably of mixed blood. See ILLINOIS; KASKASKIA.

PEORIA. An important manufacturing city and railroad centre, the county-seat of Peoria County, Ill., 160 miles southwest of Chicago, on the Illinois River, at the outlet of the expansion called Peoria Lake, and on the Chicago, Burlington and Quincy, the Chicago and Alton, the Chicago, Peoria and Saint Louis, the Chicago, Rock Island and Pacific, the Iowa Central, the Lake Erie and Western, the Toledo, Peoria and Western, and other railroads (Map: Illinois, C 3). The city occupies an area of more than 8¼ square miles on a plateau, and is surrounded by a fine rolling country. There are 43 miles of paved streets (principally brick and asphalt), 50 miles of street railways, 75 miles of sewers, and a well-conducted system of parks and drives, the public park system comprising about 350 acres and including Glen Oak and Bradley parks. A soldiers'

monument is among the attractions of the city, as is also a wagon bridge across the Illinois River. The city hall and court-house are handsome buildings. Peoria has a public library of 75,000 volumes and the Peoria Law Library, Bradley Polytechnic Institute, and Spalding Institute. It is an important commercial centre, controlling a large trade both by rail and river. It is also a great grain market, and its live stock and meat-packing interests are extensive. The manufacturing establishments include distilleries, glucose works, strawboard mills, wagon works, malting houses, breweries, wire-fence works, a peanut-roaster factory, agricultural implement works, foundries and machine shops, lumber mills of various kinds, and flouring mills. In the production of high wines Peoria ranks first among cities of the United States, the output of its distilleries, according to the census of 1900, being valued at \$26,792,000. A very small amount of whisky is made in Peoria, the high wines being sent to rectifying establishments to be changed into whisky.

The government is vested in a mayor, elected every two years, a council, and in administrative officials who are all, with the exception of the treasurer, city clerk, city attorney, and police magistrate—these being chosen by popular vote—nominated by the executive, subject to the consent of the council. Peoria spends annually in maintenance and operation about \$610,000 the principal items being \$234,000 for schools, \$80,000 for the fire department, \$80,000 for the police department, and \$37,000 for municipal lighting. The valuation of property (real and personal) is assessed at over \$10,000,000. Population, in 1880, 29,259; in 1890, 41,024; in 1900, 56,100, including 8900 persons of foreign birth and 1400 of negro descent. Since the census of 1900, North Peoria, which had a population of 2358, has been annexed to Peoria.

In 1680 La Salle visited the site of Peoria and built near here Fort Crevecoeur, which, however, was soon abandoned. Some time in the eighteenth century French traders settled here. In 1812 General Craig of the United States Army broke up their settlement, suspecting them of assisting the Indians. The present city really dates from 1819. In 1835 Peoria (named from the Peoria Indians) was incorporated as a town, and in 1845 it was chartered as a city. Consult Ballance, *The History of Peoria* (Peoria, 1870).

PEPI, pā'pē. The name of two Kings of Egypt of the Sixth Dynasty.—PEPI I., the greatest monarch of this dynasty, reigned for some twenty years about 2500 B.C. Memorials of him are found throughout Egypt from Elephantine to Tanis, as well as in various mines and quarries. An inscription carved on the rocks of the Wadi Maghâra, in the peninsula of Sinai, records the fact that he sent an expedition thither in the eighteenth year of his reign, and there is other evidence of his military activity. An official named Una, in an inscription found at Abydos, relates that, at the command of King Pepi, he gathered an army, chastised the Bedouins of the Sinaitic peninsula in several expeditions, and conducted an expedition against a more distant Asiatic country, whose name has not yet been identified. Pepi was the founder of Memphis (q.v.), which took its name from the King's pyramid Men-nof-er, erected in the vicinity. This pyramid, which

is situated near the modern village of Sakkara, was opened in 1881, and its inner walls were found to be covered with religious texts. The successor of Pepi I. was his son, Mer-en-rê, and he, dying after a brief reign of four years, was succeeded by his brother PEPI II., of whose reign little is known. According to the Turin papyrus he reigned for ninety years, while Manetho, who calls him Phiops, states that he reigned for a hundred years. His pyramid at Sakkara was opened in 1881; it contains religious texts similar to those found in the other pyramids of this dynasty. Consult: Petrie, *A History of Egypt* (3d ed., New York, 1897); Budge, *A History of Egypt* (ib., 1902).

PEPIN, or **PIPPIN**. The name of several Frankish mayors of the palace, ancestors of the Carolingian kings. **PEPIN THE ELDER** (died 639), also known as **PEPIN OF LANDEN**, was the first of the name to become prominent. He was *major domus* of King Dagobert I. of the Franks, and, together with his friend Arnulf, Bishop of Metz, controlled the policy of the State. The son of Arnulf was Ansegisel, and he married Bega, the daughter of Pepin. Their son was **PEPIN OF HERISTAL** (died 714), who became *major domus* in the eastern part of the Frankish realm, known as Austrasia, about 679. For several years he waged an unsuccessful war against Ebroin, *major domus* of Neustria or West Frankland, until in 687 he won a decisive victory at Testry, which gave predominance to Austrasia, the Germanic part of the Frankish country, over Neustria, which on the whole was Celtic. Pepin became the ruler over all the Franks, completely overshadowing the various kings. His natural son was the famous Charles Martel (q.v.).—**PEPIN THE SHORT** (714-768) was King of the Franks from 751 to 768. He was the second son of Charles Martel, and hence a grandson of Pepin of Heristal. In 741 he and his brother Karlmann received the office of mayors of the palace. In 742 they found it necessary to place a Merovingian, Childerich III., upon the throne which their father had left vacant. For some years the two brothers ruled conjointly, but in 747 Karlmann abdicated and became a monk, and later abbot of Monte Cassino. In 751, supported by the Pope, Pepin was crowned king, thus becoming the first king of the Carolingian dynasty. Childerich was compelled to enter a monastery. In 754 Pepin was made patrician of Rome. Soon after he made an expedition into Italy against the Lombards, whom he conquered. The portion of the Exarchate of Ravenna which the latter had seized Pepin gave to the Pope. (See **AISTULF**.) In the following year he made another expedition against the Lombards, whom he subdued thoroughly, and renewed his gift to the Papacy. This is sometimes called the Donation of Pepin (q.v.). Besides the Lombard wars, Pepin conquered Aquitaine, took some cities from the Saracens, added Bavaria to his empire, and began the wars against the Saxons which his son Charles was to wage successfully. Pepin was closely associated with the great missionary Boniface (q.v.), and did much to strengthen the relations between the Papacy and the Franks. He died September 24, 768, and was succeeded by his sons Karlmann and Charles the Great (q.v.). Consult: Bonnell, *Die Anfänge des karolingischen Hauses*

(Berlin, 1866); Fustel de Coulanges, *Histoire des institutions politiques de l'ancienne France* (Paris, 1892); Waitz, *Deutsche Verfassungsgeschichte* (Kiel, 1879-96); Oelsner, *Jahrbucher des fränkischen Reiches unter König Pepin* (Leipzig, 1871); Hodgkin, *Italy and Her Invaders*, vol. vii. (Oxford, 1899).

PEPIN, LAKE. An expansion of the Mississippi River, forming the boundary of Pierce and Pepin counties, Wis., on the northeast, and Goodhue and Wabasha counties, Minn., on the southwest (Map: Minnesota, F 6). It is 27 miles long, extending from Red Wing south to the mouth of the Chippewa River, and from two to three miles wide. The lake is surrounded by bluffs of limestone, rising some 400 feet, weather-beaten into fantastic shapes.

PEPITA JIMENEZ, pá-pē'tá hé-mā'nāth. A romance by Juan Valera (1874), the story of a young seminarian, whom the power of a natural love overcomes, in spite of his churchly training.

PEPOLI, pá'pō-lē, GIOACCHINO NAPOLEONE. Marquis (1825-81). An Italian statesman, grandson of Murat. He was born at Bologna, and married at nineteen his cousin, Friederike of Hohenzollern-Sigmaringen. In 1848 he led the national guards with success against the Austrian troops, and when his native city was taken by the Austrians he fled to Tuscany. In 1859, seven years after his return, he was put at the head of the provisional government of Bologna. After the annexation of the Romagna, he entered the Italian Parliament as a member of the Left Centre, and was Ambassador to Saint Petersburg (1863-64) and to Vienna (1868-70). His close relations with the Hohenzollerns and Bonapartes were influential in securing recognition and assistance for the Italian kingdom. From 1868 to his death Pepoli was a Senator.

PEPPER (AS. *pipor*, *piper*, from Lat. *piper*, from Gk. *πίπερι*, *piperi*, *πέπερι*, *peperi*, pepper, from Skt. *pippala*, long pepper). *Piper*. A genus of plants of the natural order Piperaceæ (q.v.), with woody stems, solitary spikes opposite to the leaves, and covered with flowers on all sides, the flowers mostly hermaphrodite. The most important species is common pepper or black pepper (*Piper nigrum*), which is a native of the East Indies, cultivated also in many tropical countries, and extensively in some parts of the new world, its fruit being the most common and largely used of all spices. It is a rambling and climbing shrub, with smooth and spongy stems, 12 to 20 feet in length, and broadly ovate, acuminate, leathery leaves. The fruit is about the size of a pea, of a bright-red color when ripe, not crowded on the spike. In cultivation, the pepper plant is supported by poles, or by small trees planted for the purpose. It is propagated by cuttings, comes into bearing in three or four years after it is planted, and yields two crops annually for about twelve years. When any of the 'berries' of a spike begin to change from green to red, all are gathered, as when more fully ripe they are less pungent, besides being apt to drop off. Pepper was known to the ancients; Hippocrates used it as a medicine. In the Middle Ages pepper was one of the most costly spices, and in the thirteenth century a few pounds of it were reckoned a princely present. The *black pepper* of commerce consists of the dried berries. *White pepper* is the seed freed

from the skin and fleshy part of the fruit, to effect which the dried fruit is soaked in water and then rubbed. Pepper depends for its properties chiefly on an acrid resin and an acrid volatile oil; it contains also a crystalline substance called *piperin*. The fruit of *Piper tricoicum*, a species very similar to the common pepper, is more pungent, and is cultivated in some parts of India. Red pepper is chiefly obtained from species of *Capsicum* (q.v.), especially *Capsicum annuum* and *Capsicum frutescens*, varieties of which are grown in gardens in temperate climates. The larger fruited sorts, green or ripe, furnish peppers for pickling; while the smaller sorts are used in making chili, capsicum, or cayenne sauce for meats, etc. The culture of red peppers is about the same as for eggplant (q.v.). See illustrations of VEGETABLES; FLAVORING PLANTS.

Jamaica pepper (or pimento) is a species of *Eugenia*, of the natural order Myrtaceæ, and Guinea pepper, or Meleguetta pepper, species of the natural orders Scitamineæ and Anonaceæ. See CAPSICUM; ALLSPICE; GRAINS OF PARADISE; and GUINEA PEPPER.

PEPPER, WILLIAM (1843-98). An American physician. He was born in Philadelphia, the son of a physician of the same name, a professor in the University of Pennsylvania, and was graduated from that institution in arts (1862) and medicine (1864). His professional advancement was steady and rapid. After a resident hospital service, he became successively curator and pathologist to the Pennsylvania Hospital (1866), visiting physician to the Philadelphia Hospital (1867), pathologist to the latter (1867), lecturer on morbid anatomy at the University of Pennsylvania (1868), visiting physician to the Children's Hospital (1870). In this year he became lecturer on, and in 1876 professor of, clinical medicine, and shortly afterwards he succeeded Alfred Stillé in the chair of the theory and practice of medicine in the University of Pennsylvania. In 1881 he was elected provost of this institution, in which position he displayed conspicuous ability in reorganizing and building up the college. Dr. Pepper was widely noted as a clinician and teacher, and was always in demand as a consultant. He was a member of many medical societies, and was president of the first Pan-American Medical Congress in 1893. For his service as medical director of the Centennial Exhibition at Philadelphia in 1876 he was decorated by the King of Sweden. He was a prominent figure in the social life of Philadelphia. Besides a large number of articles on several medical topics, contributed to journals, Pepper published, with Meigs, a book on *Diseases of Children* (1870; 6th ed. 1877). His most important literary work was the editing of the *System of Medicine by American Authors* (1866), which bears his name. He established (1870) and was for a time editor of the *Philadelphia Medical Times*.

PEPPER BRAND. A disease of cereals. See BUNT.

PEPPER CORN. A disease of wheat. See EARCOCKLES.

PEPPERELL, Sir WILLIAM (1696-1759). An American soldier, born at Kittery, Me. In 1726 he was elected a representative to the Massachusetts General Court, was next year made a

member of the council, and in 1730 was appointed Chief Justice of the Court of Common Pleas. Upon the breaking out of King George's War (q.v.) he enthusiastically favored the attempt of the New England colonies to capture the French stronghold of Louisburg on Cape Breton Island, and lent £5000 toward equipping the expedition. As a result of his activity and influence he was made commander-in-chief. Aided by an English squadron under Commodore Warren, he landed his army, numbering about 4000 men, and began the siege of the fortress on the last day of April, 1745. On the 17th of the following June the place capitulated. Pepperell was in 1746 created a baronet by King George II., and he received other high honors while on a visit to England in 1749. When the French and Indian War began, he was active in raising troops, was commissioned a major-general in the English army, and commanded the forces defending the frontiers of New England. From 1756 to 1758 he was acting Governor of Massachusetts, and in February, 1759, was promoted to the rank of lieutenant-general, but died at Kittery in the following July. He published an account of the *Conference with the Penobscot Tribe* (Boston, 1753). Consult: Usher Parsons, *Life of Sir William Pepperell* (Boston, 1855); Parkman, *A Half-Century of Conflict* (Boston, 1892); and Brooks, *Sir William Pepperell* (New York, 1903), in the "Historic Lives Series."

PEPPER FAMILY. A natural order of plants. See PIPERACEÆ.

PEPPERGRASS (*Lepidium sativum*). A name synonymous with garden cress. See CRESS.

PEPPERIDGE. A North American tree. See BLACK GUM.

PEPPERMINT. A perennial herb. See MINT.

PEPPER-ROOT (*Cardamine diphylla*). A North American perennial herb, of the natural order Cruciferae, with pairs of ternate leaves, racemes of white flowers, and pungent mustard-flavored roots, used as a condiment.

PEPPER-TREE (so called from the pungent drupes), or **PEA-TREE** (*Schinus*). A genus of South American and Mexican trees and shrubs of the natural order Anacardiaceæ. The leaves abound in a resinous or turpentine-like fluid, which is discharged when the leaves become turgid. After rain they fill the air with fragrance, and if thrown into water they jump about as if alive, discharging jets of this peculiar fluid. The twigs have also a strong odor of turpentine. One species, *Schinus Molle*, has a rapidly growing tree, which attains a considerable size, has been extensively introduced into California. See Plate of POPPY AND PEPPER-TREE.

PEPSIN (Fr. *pepsine*, from Gk. *πέψις*, *pepsia*, a cooking, from *πίπτειν*, *peptein*, to cook; connected with Lat. *coquere*, Skt. *pac*, to cook). An active ferment present in the gastric juice, which has the property of converting the proteid elements of the food into peptones. Pepsin is known to be one of the albuminoids or nitrogenous organic substances, but has never been satisfactorily isolated, and its presence is known only by its effects. Pepsin requires for its action the presence of an acid and moderate warmth. As used in medicine it occurs in a fine yellowish-white amorphous powder, or in translucent grains

or scales. It is extracted from the glandular layer of the stomachs of freshly killed pigs, and should be capable of digesting not less than 3000 times its own weight of albumen. It has, however, been isolated in such a pure form as to be able to digest 25,000 times its own weight of egg albumen. The use to which it is put is to aid gastric digestion in very old or feeble persons where the gastric juice is deficient. The enzyme does not act on carbohydrates or fats, and is therefore perhaps inferior for general use to pauceatine (q.v.). See DIGESTION.

PEPTONES. See PROTEIDS.

PEPYS, pēps, pēps, or pēp'is, CHARLES CHRISTOPHER (1731-1851). An English jurist, first Earl of Cottenham and Lord Chancellor. He was born in London, was educated at Harrow and Trinity College, Cambridge, and was called to the bar in 1804. In 1830 he was appointed Solicitor-General, and in the following year was elected to Parliament. In 1836 he was made Baron Cottenham and Lord Chancellor in the Melbourne Administration, resuming the post in Lord John Russell's first Government. In 1850 he was made Viscount Crowhurst and Earl of Cottenham.

PEPYS, SAMUEL (1633-1703). A well-known English diarist. He was born February 23, 1633, the son of a London citizen, a tailor, but was well educated, first at Saint Paul's School, and afterwards at Magdalene College, Cambridge. His cousin, Sir Edward Montagu (later Earl of Sandwich, q.v.), introduced him to public employment. In 1660 he was appointed clerk of the acts of the navy, and in 1673 secretary for the affairs of the navy. He was an excellent public servant, acute, diligent, and laborious; but during the fanatical excitement of the Popish plot (see OATES, TITUS), he was committed to the Tower on an unfounded charge of aiding in the design to assassinate the King and extirpate the Protestant religion. Having been discharged without a trial, Pepys was restored to his post in the Admiralty, which he retained till the Revolution of 1688. He subsequently suffered a short imprisonment on the charge of being a Jacobite (1689-90). For two years (1684-86) he held the honorable station of president of the Royal Society. He died May 26, 1703. Pepys wrote *Memoirs of the Royal Navy* (1690), and has been credited with *The Portugal History, 1667-68*, by S. P. Esq. (1677). He left to Magdalene College his large collection of books, manuscripts, and prints, including about 2000 ancient English ballads, forming five folio volumes. This curious collection was begun, he says, by Selden, and continued down to the year 1700, when the form peculiar to the old ballads, namely, the black letter with pictures, was laid aside for the simpler modern fashion. Pepys is now remembered for his *Diary*, deciphered by the Rev. J. Smith from the original shorthand manuscript in the Pepysian Library, Cambridge, and first published in a mutilated form under the editorial care of Lord Braybrooke in 1825. It begins January 1, 1660, and is continued for about nine years, when the diarist was obliged from defective eyesight to abandon his daily task. As a picture of the Court and times of Charles II. this *Diary* is invaluable; the events, characters, follies, vices, and peculiarities of the age are presented in true and lively colors, and the work altogether is one

of the most racy, unique, and amusing books in the language. It has often been printed, but all the editions are fragmentary except the last by Wheatley in eight volumes (London, 1833-96), which is accurate and complete except for the omission of a few of the most offensive passages. The same editor has also published *Samuel Pepys and the World He lived In* (London, 1880). Some hitherto unpublished letters of Pepys are to be found in *The Academy*, vol. xxxviii. (ib., 1890), and *The Athenæum*, vol. xc. (ib., 1887). Consult also: Tanner, "Pepys and the Polish Plot," in *The English Historical Review*, vol. vii. (ib., 1892); Sturmsen, "Samuel Pepys," in *Familiar Studies* (ib., 1892).

PE'QUOT (from *Paquatanog*, destroyers). A warlike Algonquian tribe formerly occupying the coast region of eastern Connecticut from the Rhode Island border westward to beyond the Thames. They were originally a part of the Mohegan of the Connecticut River, and appear to have acquired their later name by their successful invasion of the coast country until then held by the Niantic. The two tribes continued to be one people until the succession of Sassacus about the time of the English settlement, when a younger chief, Uncas, seceded with his party, who thenceforth acted as a distinct tribe, retaining the old name of Mohegan. By his diplomatic alliance with the English against his rival, Uncas was able to secure for himself and his tribe the dominant influence. Before the collision with the English, Sassacus had successfully enforced his rule over all the various bands of Connecticut from the Narraganset country westward to about the present New Haven, together with the greater part of Long Island. At the period of their greatest strength the Pequot probably numbered at least 3000. By the murder in July, 1636, of a trader, John Oldham, who had maltreated them, the Pequot became involved in a war with the English in 1637. Through the influence of Roger Williams and Uncas, the English secured the aid, or at least the neutrality, of the neighboring tribes, and then marched against the Pequot, who were thus left to fight their battles alone. On May 26 (O. S.), 1637, their principal fort, near Mystic River, was surprised and set on fire by a company of about 90 whites, under Capt. John Mason (q.v.), aided by a small force of Indians, and probably 600 Pequot men, women and children perished in the flames or were shot down while trying to escape. The loss of the English was only two. The tribe was so crippled by the terrible slaughter that after a few desperate but unsuccessful efforts at resistance they determined to separate into small parties and abandon their country. The principal body, headed by Sassacus, attempted to escape to the Mohawk, but was intercepted and nearly every person was either killed or captured. The few who escaped to the Mohawk, including Sassacus himself, were killed by that tribe. Scattered fugitives were shot down wherever found until the few survivors at last came in and asked for mercy at the hands of the English. All prisoners taken had been sold into slavery, many to the West Indies, and those who now surrendered were distributed among the other neighboring tribes and forbidden any longer to call themselves Pequot. The Pequot given to the Indian allies of the colonists were treated so harshly by their masters that it

was finally necessary in 1655 to gather them into two villages in their old country and place them under direct control of the Colonial Government. Here they numbered about 1500 in 1674. They decreased rapidly, as did the other tribes, and in 1762 the remnant numbered only 140, who in 1832 had dwindled to 40.

PERA, pā'rā. The foreigners' quarter in Constantinople (q.v.).

PERACAMPOS, pā'rā-kām'pōs, Don JUAN VON HALEN, Count of. See HALEN, or HALEM.

PERÆ'A (Lat., from Gk. Περαια, *Peraia*, from περαιος, *peraios*, beyond, from πέραν, *peran*, on the other side). A name given to a part of Palestine, east of the River Jordan, anciently belonging to the tribes of Reuben and Gad. Josephus (*Bel. Jud.*, iii. 3, 3) bounds it on the north by Pella, east by Philadelphia, south by the castle of Machærus, and west by the Jordan. Elsewhere (*ib.*, iv. 7, 3 and 6) he names Gadara as the capital. It is probable, however, that Peræa extended as far north as the Yarmuk and south to the Arnon. The district is a high tableland, cut up by deep watercourses. It is naturally a fertile region, provides good pasturage, and the olive and the vine flourish there. In the earlier days of the Maccabees it was inhabited chiefly by 'Gentiles,' but by the beginning of the Christian Era the population had become pre-vaillingly Jewish, and Peræa sent a multitude of Jews to Jerusalem in the uprising against Sabinus. Peræa was the scene of a part of the ministries of John the Baptist and of Jesus, who, according to John x. 40, appears to have been baptized there, and from Peræa He made His last journey to Jerusalem. See BASHAN; GILEAD; PALESTINE.

PERAK, pā-rāk'. One of the Federated Malay States (q.v.), situated on the western coast of the Malay Peninsula, bounded by the British Province of Wellesley and the native State of Kedah on the north, the independent States of Petani and Kelantan and the protected State of Pahang on the east, the protected State of Selangor on the south, and the Strait of Malacca on the west (Map: Straits Settlements, D 6). Its area is estimated officially at 6500 square miles. The region is traversed from northeast to southwest by two parallel mountain ranges inclosing the valley of the Perak River. The mountains are highly mineralized; they do not exceed 7500 feet in their highest peaks. There are a number of rivers outside of the Perak and its tributaries, but they are mostly unimportant for navigation. The climate is characterized by intense humidity and is unhealthy for Europeans. The chief mineral is tin, which is mined chiefly in the districts of Kinta and Larut. The output of tin increased in value from \$12,339,909 in 1896 to \$26,032,000 in 1900, the increase being due exclusively to the rise in the price of the metal. Besides tin Perak has also deposits of gold, silver, iron, lead, copper, arsenic, zinc, manganese, bismuth, etc. According to the census of 1901 mining employed about 78,000 persons, of whom about 76,000 were Chinese. Agriculture plays only a secondary part and a large portion of the region is still covered with forests. The agricultural population numbered nearly 76,000, including over 65,000 Malays. The principal agricultural products are rice, sugar, and coffee. Perak has greatly increased in commercial im-

portance since the establishment of a British protectorate. In 1900 the total commerce of Perak (including interstate commerce) amounted to \$43,931,811, of which \$29,190,663 represented exports, principally tin, sugar, and coffee. Perak had, in 1900, 114 miles of State railways, connecting the port of Teluk Anson with the mining district of Kinta and Kuala Kangsar, the residence of the Sultan. The revenue of the State is derived principally from the export duty on tin. For the year 1900 the revenue and expenditures amounted to \$7,636,126 and \$6,144,774 respectively. Perak has increased in population for 1891-1901 from 214,254 to 329,665, or by nearly 54 per cent. The population in 1901 was composed of 150,235 Chinese, 142,168 Malays, 34,760 Tamils and other natives of India, 672 Europeans and Americans, 591 Eurasians, and 1235 belonging to other races. The number of aborigines is given as 7982. Taiping is the administrative capital. The first European settlement in Perak was established in 1650 by the Dutch, who were expelled by the British in 1795. In 1818 Perak fell under the rule of the Siamese, but it regained its independence with the assistance of the British in 1824, and was governed by its own sultans until 1874, when internal dissensions brought about British interference and the appointment of a British resident, who was soon murdered. British authority was reestablished by means of a punitive expedition and no further manifestation of resistance to British protection has occurred since then. Consult the authorities referred to under MALAY PENINSULA.

PERAMBULATION OF PARISHES. An ancient custom conducted with much ceremony before the Reformation in England. It took place on one of the Rogation days (q.v.). The clergy, the lord of the manor, and many other persons walked in procession all around the boundaries of the parishes, returning to the church for prayer. The ceremonies were much curtailed at the Reformation, but the custom continued, and, on the plea of immemorial custom, has often afforded evidence in cases of disputed boundary. The origin of the custom has been referred to the Roman festivals of Terminalia and Ambarvalia.

PER CAPITA (Lat., according to heads). A legal term borrowed from the civil law, and employed to denote the kind of succession to the property of a deceased person by which his descendants take according to their number and as individuals, i.e. each take an equal share. In most jurisdictions descendants in an equal degree of relationship, however remote, take *per capita*, that is, the estate is divided among them in equal shares. The manner of succession and descent is largely regulated by statute in the various States. See DESCENT; DISTRIBUTION; PER STIRPES; SUCCESSION.

PERCEFORÊT, pārs'fô'rā' (Fr., pierce-for-est). A French romance giving the fabled history of Britain before the days of King Arthur, and first printed in Paris in 1528. The time of its production is uncertain, but was probably the latter part of the thirteenth century. The writer hints that the romance was taken from a manuscript found in an English monastery in 1286. The hero, King Perceforêt, so called from his conquest of an enchanted forest, came to Britain with Alexander the Great, after the royal

line of Brut was extinct, and in fulfillment of an oracle was made King. Unlike most romances of chivalry, it deals with enchantments, dreams, and visions rather than with battles and tournaments. In its day it was the most popular romance of its class, and is now valuable for its descriptions of mediæval life and manners.

PERCEPTION (Lat. *perceptio*, from *perci-perc*, to perceive, from *per*, through + *capere*, to take). A term common both to epistemology and to psychology. The questions how, in general, we come to have knowledge of an 'external' world, and what is the validity of this knowledge when attained, are questions that lie outside of the psychological sphere. Psychologically regarded, perception is either a specific form of mental function or a complex of mental processes, a compound conscious content (percept).

Perception, in its functional significance, is defined by James as "the consciousness of particular material things present to sense." It is single and unitary. By a confusion of contents with function, it is often described as complex; but in the adult mind the impression comes to consciousness as perception; we are not conscious of the sum of sensations and of their assimilation and integration: we perceive. Logically, we may split up perception into the part-functions of sensation, reproduction, and integration, just as—from another point of view—we may split it up into discrimination, localization, and integral apprehension or object-intuition. Psychologically, such divisions do not assist us, while they may be dangerous as suggesting that there must be corresponding part-contents to carry the functions. "The perception is one state of mind or nothing." The problem of the psychology of perception, in this first sense, is to test the adequacy of perception to its stimuli, to trace the variation of the perceptive reaction under varying conditions of stimulation (to see, e.g. how it is that the perception of space is predominantly visual, and that of time predominantly auditory), and to follow the development of the perceptive function through the lower orders of mind up to man.

When we turn to the percept, that is, to the contents submitted to structural analysis, we find, on the other hand, an unmistakable complexity. A functionally simple intuition 'contains' a large number of sensation components. The components must not, it is true, be considered as forming a mere sum or aggregate: we do not get a percept by juxtaposing sensations. They are, on the contrary, put together on certain patterns, arranged in certain ways under the conditions laid down by the physiological organism whose sensations they are. In virtue of this arrangement they are, in some cases, intrinsically modified. (See *FUSION*.) Moreover, they do not remain constant at the different levels of mental development. Sensations that stood in the forefront of the percept at one stage of evolution have retired into the background, or dropped out altogether, at another, while the function of perception is still unchanged. We have, then, a threefold problem before us; to analyze the perceiving consciousness, and so reduce the percept to its lowest morphological terms; to trace the patterns or arrangements of the sense-constituents in perception—patterns of which we

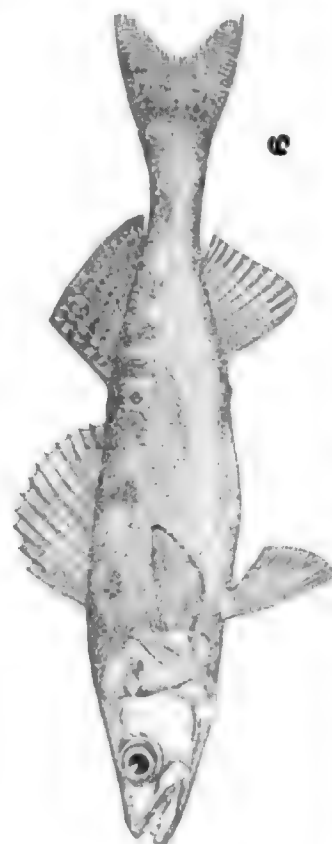
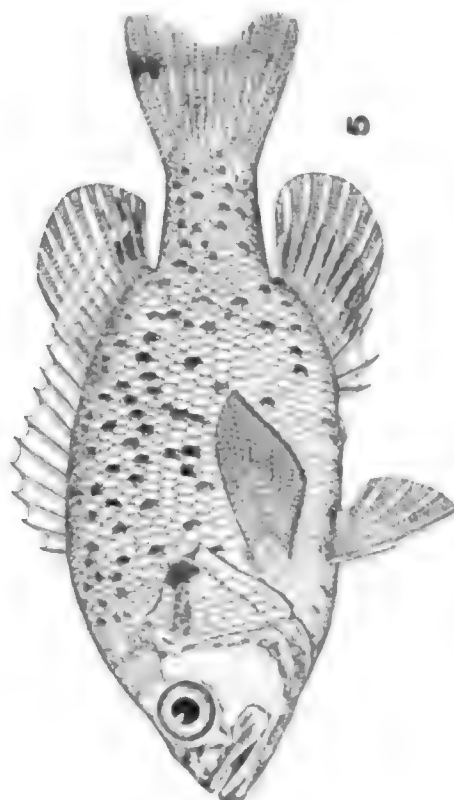
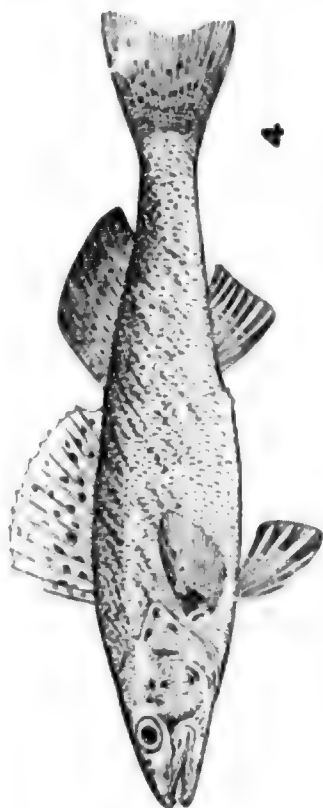
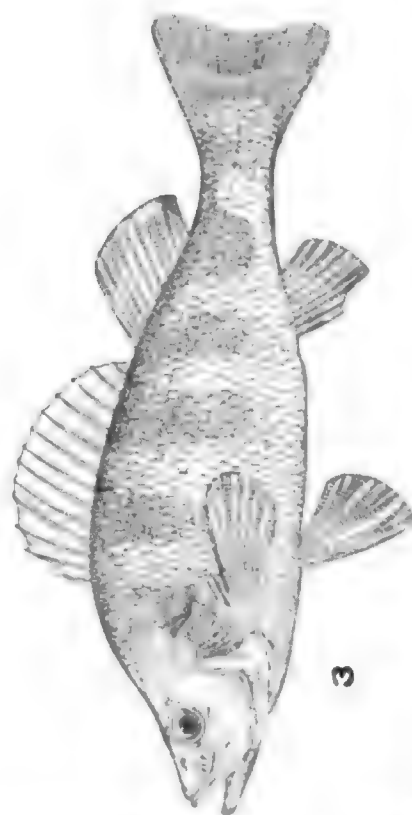
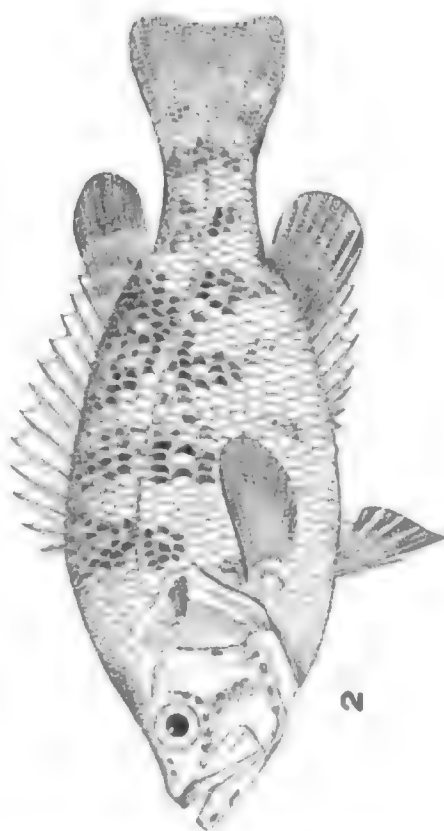
are not conscious, but a knowledge of which is necessary if our reconstruction of the percept is to be adequate; and to follow the course of development of percepts, from the simplest to the most highly evolved minds. The first two questions can be answered in the light of observable fact; the third presents greater difficulties than does the corresponding question of the development of function, and must always be answered by an hypothesis, based upon grounds of more or less probability.

Let us take as an illustration the temporal and spatial perceptions: perceptions of locality, magnitude, form, duration, time order, succession, etc. Our first question, as regards function, is: How nearly adequate are these perceptions to the time and space relations of the physical world? What is the least time or least space that we can cognize? What is the least temporal or spatial difference that we can perceive? What are the limits of our apprehension of complex form, of rhythm, etc.? Secondly, we have to explain the fitness of various qualitative and intensive contents (sights, sounds) to carry the spatial and temporal functions. Thirdly, we must trace the growth of these perceptions from childhood onward; and must, wherever possible, push our inquiry back, behind man, to the lower animals. Thus the homing instinct of bees, a localizing function, would come under investigation. On the side of structure the problems are different. In the adult mind extension and duration (qq.v.) are given as attributes of some or all sensations. All that we can do, then, is to trace out the conditions under which these aspects of sensation are turned to account for localization, form perception, perception of succession, etc. The question is one of minute and painstaking analysis. We then inquire if the spatial and temporal formations show any constant difference from (or resemblance to) other modes of perception, e.g. the qualitative; and we find that they represent a common type, the 'colligation' or external connection, sharply contrasted with the fusion of qualitative contents. We then have the genetic problem: the question whether mental process, from the very first, had a temporal and spatial attribute, or whether extension and duration themselves are not formations, constructions, which have by long use been so ingrained into the texture of mind that their mode of origin is no longer discoverable to introspection. So we arrive at the antithesis of 'nativistic' and 'genetic' theories of space and time which still divides psychologists into two distinct schools. The lines of inquiry, functional and analytical, are mutually helpful, but a confusion of their standpoints and problems can lead only to confusion of result.

BIBLIOGRAPHY. Perception is discussed at length in all works upon normal psychology. Consult: James, *Principles of Psychology* (New York, 1890); Wundt, *Physiologische Psychologie* (Leipzig, 1893); id., *Outlines of Psychology*, translated (Leipzig, 1898); Külpe, *Outlines of Psychology* (London, 1895); Titchener, *Experimental Psychology* (New York, 1901). See *ASSOCIATION OF IDEAS*; *SENSATION*; *INTELLECT*.

PERCEVAL, pĕr'st-ŭal. The hero of one of the most famous and widespread legends in the Arthurian Cycle. Speaking with the uncertainty which always attaches to any attempt to

PERCHES OF NORTH AMERICA



1. LOG PERCH (*Percina caprodes*).
2. SACRAMENTO PERCH (*Archoplites interruptus*).
3. YELLOW PERCH (*Perca flavescens*).

4. SAUGER (*Stizostedion Canadense*).
5. WARMOUTH (*Channobryttus gulosus*).
6. WALL-EYED PIKE (*Stizostedion vitreum*).

determine positively the history of these legends, it may be held that the version of the Grail story in which Percival is the hero is earlier than that in which Galahad holds this place. Those scholars who maintain the theory of a Welsh origin for the whole cycle attempt with determination to identify Percival with the Pederdur of the *Mabinogion* and other Welsh legends; but it is only by straining a possible allusion that any reference to the Grail can be found in them. This feature becomes of prime importance in the romance of *Perceval le Gallois*, begun by Chrétien de Troyes, continued by Gauquier de Dordan, and finished by Manessier in the closing years of the twelfth century. This French version was taken by the great German poet Wolfram von Eschenbach, and adapted rather than translated. In his *Parzival*, the work of his highest genius, rendered additionally famous from its selection by Wagner as the basis of a libretto, we get further away from the Arthurian legend proper into regions of Germanic mysticism. Yet, though there are defects of dramatic structure in Wolfram's treatment as a whole, and though we find ourselves in a strange country and the Grail mountain, Montsalvatsch, is altogether in fairy-land, there is in him something higher and larger and more human than in the Western versions. For the Welsh theory consult Rhys, *Studies in the Arthurian Legend* (Oxford, 1891); for Chrétien's romance, the edition by Potvin (Mons, 1866-70); for Wolfram, Hertz, *Parzival* (Stuttgart, 1898), which contains good notes and a rich bibliography, and a rendering in English verse by Weston (London, 1894). See *GRAIL*; and, for the Wagner treatment, *PARSIFAL*.

PERCEVAL, SPENCER (1762-1812). An English statesman. He was the second son of John, Earl of Egmont, and was educated at Harrow, and at Trinity College, Cambridge. He was admitted to the bar and soon gained a reputation as an able lawyer. A clever pamphlet on the abatement of the impeachment of Warren Hastings made him favorably known to Pitt. Obtaining a seat in Parliament for Northampton in 1796, he supported Pitt in his policy of war with France and of a strong rule at home. In the Addington Administration he was made Solicitor-General in 1801, and Attorney-General in 1802. In 1807 he abandoned the legal profession to accept the post of Chancellor of the Exchequer under Portland. In this position he conceived and drafted the 'Orders in Council,' which became extremely unpopular. His well-known opposition to Catholicism assured him the favor of George III. He was in fact the real head of the Government; and on the death of the Duke of Portland in 1809, Perceval himself became Prime Minister, uniting to his office of Chancellor of the Exchequer that of First Lord of the Treasury. He was retained in power by the Prince of Wales on his accession to the regency. On May 11, 1812, as Perceval was entering the lobby of the House of Commons, he was shot and killed by a Liverpool broker named Bellingham, who believed that losses he had sustained while in Russia were the fault of the Government. Consult: Walpole, *Life of Spencer Perceval*, including his correspondence (London, 1874); Williams, *Life and Administration of the Right Honorable Spencer Perceval* (ib., 1856); Alison, *History of Europe* (Edinburgh,

1843-44); Jesse, *Memoirs of the Life and Reign of George III.* (London, 1867); Napier, *History of the War in the Peninsula* (ib., 1851); Massey, *History of England During the Reign of George III.* (ib., 1855-63).

PERCH (OF., Fr. *perche*, from Lat. *perca*, from Gk. *πέρα*, *perkē*, perch; connected with *περκνός*, *perknos*, Skt. *prāni*, spotted). The name rather loosely applied to a large number of fishes having a perciform body. These often belong to very different families. The true perches belong to the family Percidæ and are all fresh-water fishes. In this family the body is elongated, either compressed or cylindrical, and covered with rather small ctenoid scales. There are two dorsals, usually quite distinct, the anterior spinous, and with six to fifteen spines, and the anal with one to two spines. The air bladder is small or entirely wanting. Perches are usually considered typical spiny rayed fishes. There are about 20 genera and 125 species. They are distributed in the cooler regions of the Northern Hemisphere, the majority of the species being confined to Eastern North America. The typical perches (genus *Perca*) contain the well-known yellow perches of Europe, Asia, and America, which closely resemble one another. The American species (*Perca flavescens*) is a fish well known to all anglers, abounding in the lakes and streams of all the eastern half of the country, as far north as the Saint Lawrence River and Nova Scotia. It reaches the length of a foot, is gamy, and admirable for eating. Its back is olivaceous in color, the sides golden yellow with six or eight broad dark bars, and the lower fins orange-red. It spawns in late winter and early spring, laying eggs in zigzag hollow strings, from two to seven feet long. These fish are carnivorous, and feed largely on smaller fishes, including the fry of some more valuable than themselves. They are extremely numerous in the Great Lakes, where they are caught near shore in seines and gill-nets in vast quantities, and shipped to interior markets to the value of about \$300,000 annually. Other local names are 'ringed' and 'raccoon' perch. Other members of this family are the great tribe (subfamily Etheostominae) of darters, the pike-perches, and log-perches (q.v.).

Various other unrelated fishes are styled perches. Thus the salt-water 'perches' of California are surf-fishes (q.v.); the 'Sacramento perch' (q.v.) is a rock-bass; the 'white perch' may be a drumfish in the East or a surf-fish in the West. See also *PIKE-PERCH*; *PIRATE-PERCH*; *TROUT-PERCH*. Consult: Gunther, *Introduction to the Study of Fishes* (Edinburgh, 1880); Jordan and Evermann, *Fishes of North and Middle America* (Washington, 1898); Goode, *American Fishes* (New York, 1888). See Plate of *PERCHES OF NORTH AMERICA*.

PERCHERON HORSE, THE. A valuable species of horse. It is a native of the Department of Perche, in the northwestern part of France, and ranges from 14¾ to 16 hands in height. It is "of a sanguine temperament mixed in variable proportions with the musculo-lymphatic," according to the description given by the French Government reports. The Percheron closely resembles the Arab type, although in a heavier and grosser form, and were it not that it has been for ages employed for draught purposes, which have imparted to it a bony frame,

an anatomical structure adapted to the work it is called upon to perform it would bear the nearest type relationship to the Arab horse.

PERCHLORIC ACID, HClO_4 . A colorless corrosive liquid that may be prepared by distilling potassium chlorate with sulphuric acid, and cautiously redistilling the distillate. When brought in contact with organic substances, such as paper or wood, perchloric acid causes almost explosive combustion. It is a monobasic acid that combines readily with bases to form a series of salts called perchlorates. Perchloric acid and the perchlorates are very stable. The acid is the only one of chlorine acids containing oxygen that can be distilled, although partial decomposition does take place. Potassium perchlorate (KClO_4) is formed when potassium chlorate is heated (as in preparing oxygen). Further heating decomposes the perchlorate into potassium chloride and free oxygen. On the other hand, when potassium perchlorate is heated alone, it decomposes with the formation first of the chlorate and chloride of potassium and of free oxygen.

PERCIER, pār'syā', CHARLES (1764-1838). A French architect and designer, born in Paris. With Fontaine, his friend and afterwards his partner, he was a pupil in the atelier of Peyre, and he also drew with Chalgrin, and studied under Alexandre Guy de Gisors. He won the Prix de Rome in 1786. After his return to Paris, he designed furniture and scenery for the Opéra, all in the antique style. He did for furniture what David was doing in painting, and fairly introduced the classic revival of the Empire. Percier and Fontaine were appointed architects for the Opéra, the Louvre, and the Tuileries. They restored the Colonnade, and finished the second story of the buildings on the court in the Louvre; built the chapel, theatre, and other portions of the Tuileries; designed the Arc de Triomphe du Carrousel; the monument to Desaix, the stairway of the Museum of the Louvre (removed by Napoleon III.), and restorations and additions at Versailles, Saint Cloud, and other palaces. Percier also built the tomb of the Countess of Albany at Santa Croce in Florence (1824). About 1814 Percier gave up his connection with Fontaine and worked constantly in his atelier, where he had established a free school of architecture. Together Percier and Fontaine wrote many books on architecture, and Percier alone wrote *Restauration de la colonne Trajane* (1788).

PERCIVAL, pār'si-val, JAMES GATES (1795-1856). An American poet, geologist, botanist, surgeon, musician, and linguist, born in Kensington, Conn. After graduating from Yale (1815) he followed his various callings in West Point, Boston, Philadelphia, Charleston, S. C., Connecticut, and Wisconsin. He did good work in geology, and his poetry is generally fluent and occasionally striking. A complete edition of it, with a biographical sketch by Erastus North, was published in 1859. Consult Ward, *The Life and Letters of James Gates Percival* (Boston, 1886).

PERCLOUSE (OF. *perclose*, *parclose*, inclosure, from ML. *perclusus*, for Lat. *præclusus*, p.p. of *præcludere*, to shut off, from *præ*, before + *cludere*, to close). A railing or other inclosure separating a tomb or chapel from the rest of a church.

PERCOIDEA, or **PERCOIDEI** (Neo-Lat., from Lat. *perca*, perch). A large group of spiny-rayed fishes, including the perches and their near relatives. It embraces the families Centrarchidæ, Percidæ, Cheilopteridæ, Centropomidæ, Serranidæ (sea-bass), and others, which are regarded by some ichthyologists as standing at the head of the fish class. The characteristics of this world-wide and important group are given under the names of its various representatives elsewhere described. See PERCH; SEA-BASS; etc. Consult: Jordan and Evermann, *Fishes of North America* (Washington, 1896); Boulenger, *Catalogue of the Perciform Fishes in the British Museum* (London, 1897).

PERCOLATION (Lat. *percolatio*, from *percolare*, to strain through, filter, from *per*, through + *colare*, to filter, from *colum*, colander). A process used chiefly in pharmacy for extracting the soluble constituents of suitable substances by the gradual descent through them of a solvent liquid, usually alcohol or alcohol and water, technically known as the menstruum. The apparatus in which the operation is performed is called a percolator, and the finished product the percolate. The method is also called the process of displacement, because the solvent, after becoming charged with the soluble portions of the drug, is displaced by fresh portions of the menstruum, which, by its own weight and the pressure of the liquid above, continues downward and is discharged below.

PERCUSSION (Lat. *percussio*, from *percutere*, to strike through, from *per*, through + *cutere*, to strike). In medicine, the method of eliciting sounds by tapping or gently striking the surface of the body, its object being to determine by the nature of the sound the comparative density of the subjacent parts. This method of diagnosis is not of recent date, for we find it mentioned by Hippocrates. It was employed by Auenbrugger in the middle of the eighteenth century and later by Corvissart in the investigation of heart disease, and by Laënnec in diseases of the chest. But as the only way of practicing percussion was by striking the surface itself with the tips of the fingers or knuckles, technically known as *direct* or *immediate* percussion, its value was limited, and it was not until Piorry introduced the *mediate method*—the stroke being made not upon the surface itself, but upon some intervening substance applied closely to it—that the practice became useful. This flat intervening body, made of wood, ivory, or gutta-percha, is called a pleximeter. It is struck either with a small hammer or *plessor*, or with one or more finger-tips. Instead of an ivory or rubber pleximeter the left index or middle finger of the examiner may be used, with its flat surface fitted accurately to the part under investigation. The force of the stroke on the pleximeter—whether the stroke be made with the fingers or the hammer—must vary according as it is desired to elicit the sound from a superficial or a deep-seated part. The surface to be percussed should be exposed, or, at most, only covered with one layer of clothing; and the blow should fall perpendicularly on the pleximeter. When percussion is made over a considerable cavity filled with air—as the stomach or intestines—a hollow, drum-like, or *tympanitic* sound is produced. When any part of the surface of the chest is struck

below which there is a considerable depth of healthy lung-tissue, consisting of small cells filled with air, a clear sound, less loud and hollow than the tympanitic sound, and termed the *pulmonary percussion note*, depending partly on the vibrations of air in the lung-cells, and partly on the vibrations of the walls of the chest, is evolved. When the subjacent substance is solid (as the heart, liver, or spleen) or fluid (as when there is effusion into a closed sac), the sound is *dull* in proportion to the density and want of elasticity of the part struck.

Auscultatory percussion is practiced when, instead of listening to the percussion sounds as transmitted through the air, the stethoscope is placed upon the chest near the point of percussion and the sound conveyed through it to the examiner's ear. See *AUSCULTATION*.

PERCUSSION, CENTRE OF. See *CENTRE OF PERCUSSION*.

PERCUSSION CAP. See *SMALL ARMS*.

PERCY, pĕr'st. The name of a noble family whose head, William de Percy, accompanied William I. to England, and obtained from him thirty knights' fees in the north of England. The representation of the house devolved in the time of Henry I. (1100-35) on Agnes, daughter of the third baron, who married Josceline of Louvain, who assumed the Percy name. The head of the family at the time was one of the chief barons who extorted Magna Charta from King John; and the ninth feudal lord in the reign of Edward I. (1272-1307) maintained, with others of the greater barons, the spiritual independence of the English Crown. This nobleman's great-grandson was a distinguished military commander under Edward III., and, acting as marshal of England at the coronation of Richard II., was created Earl of Northumberland. He subsequently, however, took up arms against Richard, and placed the crown on the head of Henry of Lancaster, who became Henry IV. Again dissatisfied with the Government, he joined in rebellion with his son, Henry Percy, surnamed Hotspur, for the purpose of transferring the crown to Mortimer, Earl of March. (See *PERCY, SIR HENRY*.) The Earl, with the other leaders of this rebellion, fell at Bramham Moor (1403), and his titles became forfeited. These, however, were revived in favor of his grandson, who became Lord High Constable of England, and who was killed at the battle of Saint Albans. This Earl's son and successor (the third Earl) met a like fate on Towton field, fighting in the van of the Lancastrian army. The fourth Earl was murdered by the populace in Northumberland, when ordered by Henry VII. to enforce a subsidy. The execution of the seventh Earl by Elizabeth is part of the history of England. The eighth Earl was committed to the Tower, on a charge of being concerned in a plot in favor of Mary Queen of Scots, and died a violent death in prison. The tenth Earl fought in the civil wars against Charles I., though he took no part with the regicides, and eventually joined in the general effort to bring about the Restoration. The eleventh Earl left an only child, who succeeded to the ancient barony of Percy, and marrying Charles, Duke of Somerset, became the mother of Algonon, Duke of Somerset, who was created Earl of Northumberland, with remainder to his son-in-law, Sir Hugh Smithson, of Stan-

wick, in the County of York, a gentleman of respectable lineage. Sir Hugh, succeeding to the earldom, obtained in 1766 his advancement to the Dukedom of Northumberland.

PERCY, FLORENCE. The pseudonym of Elizabeth Akers Allen (q.v.).

PERCY, GEORGE (1580-1632). A British colonial Governor, born at Lyon House, Northumberland. He was a younger son of the eighth Earl of Northumberland, and, when still young, served in the army in the Low Countries. He sailed for America with the first Virginia colony in 1606, and is said to have named the settlement James Fort. In 1609 he succeeded John Smith as President of the Council until the arrival of Sir Thomas Gates in 1610. In the latter year he was a member of Lord De la Warr's council, and served as Deputy Governor in charge from March, 1611, until the arrival of Sir Thomas Dale in May. He left Virginia in April, 1612, and in 1625 returned to the wars in the Low Countries, where he commanded a company in 1627. He was a bitter opponent of Capt. John Smith, and attempted to show his unworthiness in *A True Relation of the proceedings and occurrences of moments which have happened in Virginia from the time Sir Thomas Gates was shipwrecked upon the Bermudas An. 1609 untill my departure out of the Country which was in Anno 1612 (1625)*.

PERCY, Sir HENRY (known as Hotspur) (1364-1403). An English military leader, the eldest son of Henry Percy, first Earl of Northumberland. He was knighted by King Edward III. at the same time as the future kings, Richard II. and Henry IV. The next year under his father's guidance he began that service on the Scottish border in which he won his greatest fame, and in 1385 became Governor of Berwick. Here his restless activity soon made him the terror of Scottish marauders and earned him the nickname of Hotspur. As this was the period of the Hundred Years' War, young Percy was several times sent across the Channel to take part in the Continental campaigns, but, though he earned the Garter by his achievements against the French, he always came back to the northern border, where he had been made warden of the marches, and it was there that in 1388 he met a host of Scotch invaders under Douglas, March, and Moray, and fought with them the famous battle of Otterburn, which has been immortalized by the ballad of Chevy Chase. Both armies claimed the victory, but probably what advantage there was lay with the Scots, who, though they lost in Douglas the most renowned of their leaders, succeeded in capturing Percy. In 1399 he joined Henry of Lancaster in his successful rebellion against Richard II.—indeed, the Percys claimed that they made the rebellion successful—and after the coronation of the new King as Henry IV., he was rewarded by the gift of offices and lands which made the already powerful nobleman almost a rival to the King. It was not long before Henry began to feel that the Percys were too powerful for the well-being of his kingdom, and when, as a contrast to an unsuccessful campaign of his own against the Welsh, Hotspur won a brilliant victory over the Scotch at Humbledon Hill, the King began to withdraw his favor from his formidable vassal. The Percys quickly resented this, and forming an alliance with Owen Glendower, the Welsh leader,

the Douglasses, and other Scotch families, raised the standard of revolt in favor of the young Earl of March, whom they proclaimed King of England. Henry met the insurgents near Shrewsbury, and a desperate battle was fought in which Hotspur was killed and his forces defeated. Consult: Froissart, *Chronicles*; Wallon, *Richard II.*; Ramsay, *Lancaster and York*; Wylie, *History of Henry IV.*; and Percy, *Reliques of Ancient English Poetry*.

PERCY, JOHN (1817-89). An English metallurgist, born at Nottingham. He studied medicine at Paris and Edinburgh, but afterwards devoted himself to metallurgy, and in 1851 was appointed lecturer in the Metropolitan School of Science, now the Royal College of Science. He published: *Iron and Steel* (1864); *Lead* (1870); and *Silver and Gold* (1880).

PERCY, THOMAS (1729-1811). An English antiquary, editor of the *Reliques of Ancient English Poetry*, born in Bridgnorth, Shropshire, April 13, 1729. He graduated from Christ Church, Oxford, B.A., in 1750, and M.A. in 1753; and proceeded D.D. from Emmanuel College, Cambridge, in 1770. In 1753 he was given the vicarage of Easton-Maudit, Northamptonshire, where he remained twenty-nine years. In 1782 he was appointed Bishop of Dromore in Ireland, where he resided till his death, September 30, 1811. Percy published two most important works. While visiting his friend Humphrey Pitt at Shifnall in Shropshire, he found a folio manuscript (early seventeenth century) "lying dirty on the floor under a bureau in the parlour." This manuscript he made the basis of *Reliques of Ancient English Poetry* (1765), a collection of English ballads, which has been aptly called the Bible of the romantic movement. It marks the first decisive return in England to the ballad measure, afterwards to be so beautifully employed by Coleridge. The publication exerted, too, great influence in Germany. To the awakened interest in Norse mythology Percy contributed *Northern Antiquities* (1770), which was a translation of the *Introduction à l'histoire de Danemarck* (1755) of Paul Henri Mallet. He also edited *The Household Book of the Earl of Northumberland in 1512* (1768), and thus set the example for many similar publications. As a poet he was best known for *The Hermit of Warkworth*, and the ballad "O Nanny, wilt thou gang with me?" Of interest, too, as showing Percy's curiosity, is a translation of a Chinese novel from a Portuguese manuscript (1761). Percy's portrait was painted by Sir Joshua Reynolds, and he was honored by a group of scholars who gave his name to the Percy Society (1840-52), founded for the publication of old ballads. Consult: the *Reliques*, ed. by Wheatley (London, 1891); and the *Folio Manuscript*, ed. by Hales and Furnivall (ib., 1867-68). See also ROMANTICISM.

PERCY ANECDOTES. A collection of popular anecdotes which appeared in forty-four monthly parts (20 vols., 1821-23). They professed to have been written by "Sholto and Reuben Percy, brothers of the Benedictine monastery of Mount Benger." The real authors, who assumed these pen-names, were Thomas Byerley (d. 1826), editor of the *Mirror of Literature*, and Joseph Clinton Robertson (d. 1852), editor of the *Mechanics' Magazine*. The name of the

collection was taken from the Percy coffee-house in Rathbone Place, London, where Byerley and Robertson were accustomed to meet. Consult the *Percy Anecdotes*, ed. by Timbs (new ed., 4 vols., London, 1887).

PERDIC'CAS (Lat., from Gk. Περδικκας, *Perdikkas*). The name of several Macedonian kings.—**PERDICCAS I.**, the founder of the Macedonian dynasty, an Argive of the Heraclid or Temenid race, who emigrated to Macedonia about 700 B.C.—**PERDICCAS II.**, son and successor of Alexander I., reigned from probably 454 to 413. He was friendly to the Athenians in the early part of his reign, but more or less at enmity with them later on and in the course of the Peloponnesian War.—**PERDICCAS III.**, brother of Philip of Macedon, was the successor of Alexander, son of Amyntas, and reigned from 365 to 360.

PERDICCAS. A general of Alexander the Great, a prince of the Macedonian royal line, son of Orontes. He took part in nearly all the important battles fought by Alexander, and, in the distribution of honors at Susa, received for his services a crown of gold and the daughter of the Median satrap for his wife. Alexander, on his death-bed, gave to Perdikkas his signet ring, which was the symbol of royal power. Arrhidæus, the natural son of Philip, being recognized as king, Perdikkas was appointed to the chief military command under the new sovereign. He soon, however, established his influence over Arrhidæus and obtained virtual control of the government. A league was at length formed against him by Antipater, Antigonus, Craterus, and Ptolemy. He marched into Egypt to oppose Ptolemy, but was assassinated in B.C. 321, near Memphis, by his own soldiers.

PERDIDO, *Sp. pron.* pâr-dê'nô. A small river flowing through Perdido Bay into the Gulf of Mexico on the boundary between Florida and Alabama (Map: Alabama, B 5). In 1803, when the United States came into the possession of Louisiana, the Perdido was claimed by the United States as the eastern boundary. Spain protested and was supported by France. The question was finally settled in 1819 by the Treaty of Washington, when West Florida was ceded to the United States.

PERDITA. The daughter of Leontes, King of Sicily, in Shakespeare's *Winter's Tale*, brought up by a shepherd, and married to Prince Florizel.

PEREDA, pâ-râ'dâ, JOSÉ MARÍA DE (1834-). A Spanish novelist, born in the Province of Santander. He was trained to become a civil engineer, but, being a man of means, he devoted himself to literature, after the publication of his first volume of sketches of manners, the *Escenas montañosas* (1864). In his chief works Pereda gives pictures of mountaineer and sea-side life that can hardly be surpassed for detail and charm of description. The *Escenas montañosas* (consult the second series of them, entitled *Tipos y paisajes*, 1871) were long left unnoticed by the general public, yet some of the sketches in the volume, and especially that entitled *La leva*, are among his best works. There came next the *Ensayos dramáticos*, versified dialogues containing studies of manners, and the volume of sketches, *Bocetos al temple* (1876). The collection *Tipos trashumantes* (1877) ex-

hibits various common types of the Province of Santander. *El buey suelto* (1877) is an account of the life of an egotistical rake, and is interesting as first showing in a marked way the author's inclination to adopt some of the methods of naturalism in the novel. *Don Gonzalo González de la González* (1878) is a story in which the author sets forth the grotesque character of an electioneering campaign in Spain. In the *Pedro Sánchez* (1884) he portrays the Spanish capital as it was in 1834, and makes us follow his hero through a career of political intrigue and ugly married life. The *Sotileza* (1885) is often deemed his masterpiece, and it is certainly a masterly description of life at the seaside and among the fishing folk. Of Pereda's later productions there may be mentioned: *La Montañez* (1888); *La puchera* (1889); *Nubes de estío* (1891); *Al primer vuelo* (1891); *Pachín González* (2d ed. 1896). Consult the *Prólogo* of Menéndez y Pelayo, prefacing the first volume of the *Obras completas* of Pereda (Madrid, 1887 et seq.).

PÈRE DUCHESNE, pār dy'shân'. See HÉBERT, JACQUES RENÉ.

PÈRE GORIOT, pār gô'rîô', LE. A romance by Balzac (1835). The title character is an old man devoted, to the point of mania, to his unworthy daughters, who at the end forsake him on his deathbed.

PEREGRINE FALCON (OF. *peregrin*, *pele-rin*, Fr. *peregrine*, from Lat. *peregrinus*, foreign, stranger, from *perager*, being in foreign places, from *per* through + *ager*, field; ultimately connected with English *acre*). A species of falcon (*Falco peregrinus*) found in almost all parts of the Northern Hemisphere, and in Africa and South America. The female is about 18 inches long, while the male is only about 15 inches. The female is the 'falcon' of falconers, and the male the 'tercel.' The peregrine falcon of America is popularly known as the 'duck hawk,' and is regarded by ornithologists as a subspecies (*anatum*) of the European bird, although the differences are very slight; the form from the northwest coast of America is also regarded as another subspecies (*pealei*). The back, wings, and tail are bluish-gray, the feathers barred with a darker tint; the crown, neck, and a spot below the eye, nearly black; the throat white, with dark longitudinal lines; the breast, belly, and legs, whitish, with dark bars. The wings are very long, reaching almost to the tip of the tail; and the bird is remarkable for its power of flight. The peregrine falcon can easily carry through the air a bird or quadruped fully its own weight. Its ordinary prey consists of ducks, grouse, woodcocks, and rabbits. Owing to the quantity of preserved game the peregrine falcon captures, it is ruthlessly destroyed in Great Britain, so that it is in danger of extermination. The peregrine falcon makes its nest on ledges of high rocks and lays from two to four eggs. It nested on the Palisades of the Hudson as late as 1899. Numerous localities in Great Britain have long been noted as breeding places of the peregrine falcon, and some of them are regularly visited for the young birds, which are still trained in certain places for the sport of falconry. For the American bird, consult Fisher, *Hawks and Owls of the United States* (Washington, 1893). See

Plates of EAGLES AND HAWKS; FALCONS AND FALCONRY.

PEREGRINE PICKLE, THE ADVENTURES OF. A novel by Tobias Smollett (1751). The hero is a savage, coarse fellow, fond of rude practical jokes, outrageous in his behavior to Emilia, and ungrateful to his uncle, Captain Truncheon, who adopted him. The Captain and Lieutenant Hatchway supply the humor of the story.

PEREIRA, pe-râ-râ, JONATHAN (1804-53). An English pharmacologist, born in Shoreditch, London. He studied medicine and was licensed by the apothecaries in 1823; became apothecary and chemical lecturer at the Aldersgate Dispensary in the same year; fellow of the Royal College of Surgeons in 1825; professor of materia medica at the Aldersgate Street Dispensary in 1832; professor of chemistry in London Hospital in 1833; took the degree of doctor of medicine in 1840 at Erlangen; was licensed to practice in London in 1841; and became physician to the London Hospital in 1851. Pereira's attention turned early in the direction of the science of pharmacology, in which he became famous. He published many papers on the properties and adulteration of drugs, and many monographs and several text-books on chemistry. His most important work was the *Elements of Materia Medica and Therapeutics* (1839-40), a treatise remarkable for the extent of its research, variety of information, and exactness. He also published a *Treatise on Dirt* (1843) and *Lectures on Polarized Light* (1854). Among his other works are a translation of the *London Pharmacopœia* (1854) and *Manual for the Use of Students* (1874).

PEREIRA DA SILVA, pâ-râ-râ dâ sâ'n'vâ, JOÃO MANOEL (1817-—). A Brazilian historian, biographer, and literary critic, born at Rio de Janeiro. He studied law in Paris, traveled in Europe, and returned to Brazil in 1841 an ardent Liberal, but after entering politics joined the Conservative Party. He wrote the valuable historical works: *História da fundação do Império Brasileiro* (1864-68); *Segundo período do reinado de Dom Pedro I, no Brasil* (1875); and *História do Brasil durante a menoridade de Dom Pedro II, 1831-40* (1882); the biographical sketches *Plutarcho brasileiro* (1866); and in literary criticism, *La littérature portugaise, son passé, son état actuel* (1866) and *A poesia épica* (1889).

PÉREIRE, pâ-râr', EMILE (1800-75) and ISAAC (1860-80). French bankers, distinguished for having instituted schools for the deaf and dumb in France. They were born at Bordeaux. They early carried on at Paris a small brokerage business. By the construction of the railway from Paris to Saint Germain, the first in France, they established their reputation. In 1852 they founded the Société du Crédit Mobilier (see CRÉDIT MOBILIER), and at its collapse in 1867 lost a large part of the great fortune acquired in its management. Isaac published: *La Banque de France et l'organisation du crédit en France* (1864); *Questions financières* (1877); and *Politique financière* (1879).

PÈRE-LA-CHAISE, pār lâ shâz. See LA-CHAISE.

PERENNIALS (from Lat. *perennis*, lasting throughout the year, from *per*, through + *annus*,

year). Plants whose duration is more than two years, contrasted with annuals and biennials.

PEREYASLAV, pā-rā-yās'lāf. A town in the Government of Poltava, Russia, situated 176 miles west-northwest of Poltava (Map: Russia, D 4). There are some ruins of ancient fortifications. The Church of the Assumption was founded in 1010, although the present structure dates from the seventeenth century. The trade in grain is important. The town played a conspicuous part in the history of Little Russia. Population, in 1897, 14,609.

PEREZ, pā'rāth, ANTONIO (1539-1611). A Spanish statesman, minister of Philip II., born at Monreal de Ariza, in Aragon. He was a natural son of Gonzalo Perez, one of the ministers of Charles V. and of Philip, and himself entered upon administrative duties in 1567, after studying at Louvain, Venice, and Madrid. He was the trusted agent of Philip. In 1578 Juan de Escovedo arrived at Madrid to solicit aid for John of Austria, then engaged in the struggle against the revolted Netherlands. Escovedo incurred the hatred of the King and of Perez, and with the consent of Philip, Perez brought about the assassination of the obnoxious envoy (March, 1578). The family of Escovedo denounced Perez as the murderer, and all his enemies joined against him. The King at first sought to shield him, but on becoming cognizant of the relations between Perez and the Princess of Eboli, mistress of Philip, brought about his arrest in 1579. He was put to the torture and forced to confess his crime. In 1585 he was found guilty of embezzlement while in office and was condemned to a long term of imprisonment. In 1590 he succeeded in making his escape to Aragon and demanded protection in the courts of that privileged kingdom. The *justicia mayor*, or highest court of justice in Saragossa, refused to deliver him up. The King applied to the Inquisition for aid in 1591, and the Aragonese court surrendered him to its agents, but the people rose and liberated him. At last, in September, 1591, Philip II. entered Aragon with a powerful army, abolished the old constitutional privileges of the country, and caused a number of the leaders to be executed. Perez, however, made his escape, avoiding the many plots which the King laid for his assassination. He was condemned in Spain as a heretic, but was well received in Paris and London. He spent the later years of his life in Paris, and died there November 3, 1611, in great poverty. Perez wrote an account of his experiences, which was published under the title of *Relaciones* (London, 1594). He also wrote other works. Consult: Mignet, *Antoine Perez et Philippe II.* (Paris, 1845); Muro, *Vida de la princesa de Eboli* (Madrid, 1877).

PEREZ GALDÓS, gāl-dōs', BENITO (1845-). A Spanish novelist, born in the Canaries. In 1863 he went to Madrid to study law. Galdós is one of the most prolific of modern Spanish men of letters. From first to last his works are marked by out and out revolutionary tendencies. One of the most important divisions of his labors began with the composition of the collection of tales that form the *Episodios nacionales*. Of these historical romances, the first two series, embracing some twenty stories, were completed in six years (1879-93). Writing them under the inspiration of the *romans nationaux* of Erck-

mann-Chatrion, Galdós gives with historic fidelity and in great detail an account of the struggle for Spanish independence of the Napoleonic invader. The last novels of the second series bring his treatment of political events down to a period some fifteen years after the return of Ferdinand VII. In a third series he continues his epopee down to even more recent times, dealing with the Carlist War of 1833-40. Galdós ranks well in the domain of realism and psychology, having put forth a number of works generally grouped together as *Novelas de la primera época* and *Novelas españolas contemporáneas*. Of the former group are *Doña Perfecta* (1876), *Gloria* (1877), *La familia de León Roch* (1878), and *Mariandela* (1878); of the latter are such stories as *El amigo Manso* (1882), *El doctor Centeno*, *Fortunata y Jacinta* (1887), *Miau* (1888), *Angel Guerra* (1891), etc. The vogue of these novels has been even greater than that of his *Episodios nacionales*. In general, they exhibit the contrast between old and blindly conservative elements of Spanish life on the one hand and the new revolutionary ideas of the modern world on the other. The plays of Galdós are inferior to his novels. Chief among them are: *Realidad* (1892); *La loca de la casa* (1893); *La de San Quintín* (1894); *Los condenados*; *Voluntad*; *Doña Perfecta* (1900); *La Fiera*; *Electra* (1900). Consult: Alas, *B. Pérez Galdós, estudio critico-biográfico* (2d ed., Madrid, 1889); Pardo Bazán, *Polémicas y estudios literarios* (ib., 1892).

PERFALL, pēr'fāl, ANTON, Baron (1853-). A German novelist, born in Landsberg. He was educated at Munich, there married an actress, Magda Irschik, whom he accompanied on several of her tours, and settled at Schliersee, in Bavaria. Among his novels treating social-political themes, and several collections of stories, may be mentioned: *Ueber alle Gewalten* (1889); *Dämon Ruhm* (1889); *Truggeister* (1892); *Die Sünde* (3 ed. 1896); *König Erfolg* (1899); *Verkauftes Genie* (1900); *Die Uhr* (1901); and *An der Tafel des Lebens* (1902).

PERFECTIONISTS. The name adopted by John Humphrey Noyes (q.v.) and his early followers. Their first settlement was at Putney, Vermont, the native place of Noyes, whither he retired soon after beginning to preach his peculiar views in 1834, and where he gradually gathered about him a small school of believers, beginning with the members of his own family. A Bible-school was begun in the winter of 1836-37, a chapel was erected, and the members of the community spent much time in study and were active in writing and publishing in advocacy of their belief. In accordance with the teaching of Noyes, they held that Christ had actually returned to earth before the close of the Apostolic Age, that His work of saving from sin was complete, and consequently all who were willing to accept His divine reign lived "no longer under law, but under grace," and could do no wrong. The aim being to live together as one family, all possessions were held in common, and a system of complete communism was gradually worked out, involving the institution of 'complex marriage.' The community was broken up in 1847 by the opposition of their neighbors. Those of its members who held together founded the Oneida Community (q.v.).

Consult Hinds, *American Communities* (Chicago, 1902).

PERFECT NUMBER. A number equal to the sum of its aliquot parts; e.g. 6 is such a number since $6 = 1 + 2 + 3$. If the sum of the aliquot part is greater or less than the number itself, then the latter is called *redundant* or *defective* respectively ($8 > 1 + 2 + 4$; $12 < 1 + 2 + 3 + 4 + 6$). This classification is due to the Pythagorians.

PERFUMERY (from *perfume*, OF. *perfumer*, Fr. *parfumer*, to perfume, from Lat. *per*, through + *fumare*, to smoke, from *fumus*, smoke; connected with Skt. *dhūma*, smoke). A substance which is prepared for use on account of its agreeable odor. Perfumes have been used from the earliest times. Among the nations of antiquity an offering of delicate odors was regarded as a token of respect and homage. The burning of incense formed a part of the Hebrew as of pagan rituals, and hence its use is frequently referred to in the Old Testament. This practice still continues, particularly in the ceremonies of the Roman Catholic Church. The use of perfumes was common among the Greeks and Romans, and both Pliny and Seneca possessed considerable knowledge respecting perfume-drugs. Among the Athenians perfumes were used at feasts, at funerals, and in theatres, the odor of the violet being generally preferred. Both nations learned the use of the still from the Egyptians and applied it to the manufacture of perfumes. The Arabs were skilled in the preparation of fragrant waters; and it was from them, through the Crusaders, that the art was re-introduced into mediæval Europe. The discovery of the process of distillation, which seems to have been forgotten, gave, in the fifteenth century, fresh impetus to this industry, and at its close distilled oils of benzoin, cedar, cinnamon, rose, and rosemary were articles of commerce.

Perfumes may be divided into two general classes, viz. natural perfumes and the artificial or synthetic perfumes. Natural perfumes are of animal or of vegetable origin; artificial perfumes are chemical compounds which resemble natural perfumes in their odor. Artificial perfumes are also of two general classes. In one, the compounds which produce the perfume in nature have been discovered and then reproduced synthetically; this is the case with vanillin. In the other, only the odor of the natural perfume is imitated in a substance which is itself unlike the substance whose odor it possesses; this is true of artificial musk.

The four principal animal perfumes are musk, civet, ambergris, and castor. *Musk* is the dried secretion of the preputial follicles of the musk deer. A similar substance is secreted by the musk-ox, muskrat, and the Florida alligator. *Civet* is secreted by the *Viverra civetta* and *Viverra zibetha*. It is found in a double pouch under the tail, from which it is taken from the living, caged animal, two or three times a week. *Ambrogrise*, a biliary secretion of the spermacetti whale, is supposed to be produced by a diseased condition of the organs. It is found floating on the water. *Castor* is a glandular secretion of the beaver. When fresh it is in a semi-liquid condition and is prepared for commerce by drying in smoke. The animal perfumes are valuable

for the permanence which their presence imparts to the more evanescent vegetable odors.

The list of vegetable perfumes, if complete, would be very long. The odor of plants may be found in the leaves, as in sage, thyme, and mint; in the bark, as in cinnamon and cassia; in the wood, as in cedar and sandalwood; in the flower petals, as in the rose and violet; in the seeds, as in annis and caraway; in the roots, as in the orris; in the fruit-rind, as in the orange; or it may be secreted in the form of resinous gum from the tree itself, as the camphor and myrrh. Perfumes of the last named class have been used from time immemorial.

A series of patient experiments conducted during the latter half of the nineteenth century by Grimaux, Lauth, and other chemists, resulted in the discovery that natural odors could be reproduced in the laboratory by combining the substances which produce such odors in nature. The synthesis of vanillin, the active odorous ingredient of the vanilla pod, by Tiemann and Hauman, marked the beginning of the manufacture of artificial perfumes on a commercial basis. Tiemann discovered that coniferin, the glucoside found in the sap of the pine, could be split up, by means of dehydrating agents, into glucose and coniferylic alcohol, of which vanillin is the aldehyde. Later it was found that the same substance could be produced more cheaply by the oxidation of eugenol, the chief constituent of the oil of cloves, and it is from this source that artificial vanillin is manufactured. The industry has acquired considerable importance both in Europe and America. Another important perfume is ionone, or the artificial odor of violets. It is obtained by condensing citral with ordinary acetone in the presence of an alkali, the resulting product being then treated with dilute acids. Mirbane oil, the artificial oil of bitter almonds, is derived from benzene. The benzene is treated in a still with two parts of fuming nitric acid and one part of concentrated sulphuric acid. These acids are added slowly and at the end of the chemical reaction the liquor, on adding water, separates into two layers, one of which, on further purification, produces the mirbane oil. Many other synthetic perfumes have been discovered, some of which are produced as the by-products of other industries, or from what were formerly regarded as purely waste materials. The manufacture of artificial musk was introduced by Baur in 1888. A mixture of isobutyl chloride and toluene is heated with aluminum chloride ('Friedel and Crafts's reaction'). Water is added to the product of this reaction, the compound is distilled, and the distillates are collected, and treated with nitric and sulphuric acids, and the product is washed with water. When treated with alcohol, crystals having a marked odor of musk are produced.

The processes employed in obtaining natural vegetable perfumes are described under Oils (section, *Volatile or Essential Oils*).

The centre of the natural perfumery industry has for many years been in Grasse, France, in whose factories, it is said, the product of 5,500,000 pounds of orange blossoms, 4,400,000 pounds of roses, 400,000 pounds of jasmine, and 330,000 pounds each of violets, cassia, and tuberose are consumed. The culture of flowers for perfumery is carried on chiefly in Turkey, Bulgaria, Arabia, India, and Syria. In the United States,

according to the Census of 1900, there are 266 establishments engaged in the manufacture of perfumery and cosmetics. The total capital invested is reported at \$3,499,168; the total number of employees, 1768, and the total value of the product, \$7,095,713 annually. According to the United States Statistical Abstract for the same year the value of perfumeries and other toilet preparations imported was \$553,411, and ten years earlier was \$444,964.

Consult: Askinson, *Perfumes and Their Preparation* (New York, 1892); Perry, *The Chemistry of Essential Oils and Artificial Perfumes* (London and New York, 1900); Durville, *Fabrication des essences et des parfums* (Paris, 1893); Mierzinski, *Die Riechstoffe* (Weimar, 1894); Sawers, *Odorographia: A Natural History of Raw Materials and Drugs Used in the Perfume Industry, Intended for Growers, Manufacturers, etc.* (London, 1894).

PER'GAMON, or **PERGAMUS** (Lat., from Gk. Πέργαμον, *Pergamon*, Πέργamos, *Pergamos*, *Pergamos*). An ancient city of Mysia, in Asia Minor, the capital of the kingdom of the same name. The city was situated in the valley of the Caicus, about 15 miles from the coast. The Acropolis is a lofty hill, about 1000 feet in height, situated between the streams Selinus and Cetius, of which the former flowed through the later lower city, now partly covered by the modern town of Bergama. The early history of the place is lost in legend, which declared that the Greek inhabitants came from Arcadia under Telephus, son of Hercules by Auge, and that the name was derived from Pergamos, grandson of Achilles. In the fourth century B.C. it was the seat of a Greek population, but it was not till the early third century that it rose to prominence. Its impregnable Acropolis was chosen by Lysimachus as a hiding place for his treasure of 9000 talents (about \$10,000,000), which he intrusted to a certain Philetærus. In B.C. 283 a revolt of Asiatic cities against Lysimachus enabled Philetærus to become master of the place, and the defeat and death of Lysimachus, two years later, enabled him to consolidate his power at first in dependence upon the Selucidæ of Syria, but later as independent ruler of the neighboring regions of Mysia and the Troad. In B.C. 263 he was succeeded by his nephew Eumenes I. (B.C. 263-241), who maintained his power against the attacks of Antiochus I. of Syria, and developed the resources and prosperity of his little kingdom, which he ruled under the title of Dynast. His cousin and successor, Attalus I. (B.C. 241-197), really placed the new principality on a firm basis through his victories over the Gauls and Antiochus II., whereby he became master of a great part of Northwestern Asia Minor, and though later he was compelled to relinquish part of his conquests, his wise policy of allying himself with the distant power of Rome against his neighbors of Syria and Macedon, enabled him to leave a well-established kingdom to his son Eumenes II. In addition to his military and political ability, Attalus, who assumed the royal title after his defeat of the Gauls, did much to make his capital the centre of the artistic and literary life of Asia. He erected near the city a splendid temple and grove in honor of Athena Nikephoros (Bringer of Victory) and also splendid artistic monuments of his triumphs. To these groups be-

longed the bronze originals of the well-known Dying Gaul of the Capitol and the Gaul and his Wife of the Ludovisi Collection in Rome. At Athens he erected the stoa of Attalus and placed on the Acropolis a series of small bronze figures representing the battles of the Athenians with the Amazons and Persians, the Gods with the Giants, and the Pergamenes with the Gauls, possibly reduced copies of his monuments in Pergamum, and now known to us in part through a series of small marble figures in Naples, Rome, Venice, and Paris. Eumenes II. (197-159) continued the Roman policy of his father, and was rewarded after the defeat of Antiochus the Great with the greater part of Asia Minor, except Lycia and Caria. To his reign belong the great altar of Zeus and the development of the great library which seems to have been founded by Attalus I. The former was erected near the summit of the Acropolis, at the north end of the Agora. Here rose a great foundation 16 feet high and about 124 by 114 feet square, crowned with an Ionic colonnade which surrounded the altar proper, a mass of earth and ashes inclosed by a wall with cornice and architectural decorations, and ascended by steps. The platform was reached by a broad flight of steps on the west side of the basis. Around the basis was the great work of the Pergamene artists, a colossal frieze about 400 feet long and 7½ feet high, containing a representation in very high relief of the battle of the Gods and Giants, executed with amazing technical skill and full of variety and vigor of composition, though lacking the ideal dignity and nobility of the best Greek art. A small frieze representing the legend of Telephus adorned the Ionic colonnade. The library was established by the King in the halls which surrounded the Temple of Athena Polias above the Agora, and was enriched with a collection of books rivaling the foundation of Ptolemy at Alexandria. Here, too, was gathered a band of scholars about Crates of Mallos, who developed a school of grammatical study, which in opposition to the Alexandrians, emphasized the anomalies rather than the analogies of language. To Pergamum was attributed the invention of a fine parchment for use in books when the jealousy of the Egyptians endeavored to check the activity of the Pergamenes by prohibiting the export of papyrus paper. Under the brother of Eumenes II., Attalus II. (B.C. 159-138), the traditional policy of friendship with Rome was continued and the prosperity and power of the little kingdom increased by successful wars with Bithynia and Thrace. His nephew, Attalus III. (B.C. 138-133), was a student and writer, especially on agriculture, zoölogy, and botany. He left no heirs, and by his will bequeathed his kingdom freedom under Roman protection. An attempt of a pretender, Aristonicus, to seize the power, led to Roman intervention, and in B.C. 129 the Province of Asia was organized with Pergamum as its capital. The city long remained in this position, the seat of a provincial council, and an important centre of Asiatic trade. On the summit of the Acropolis was the Temple of Augustus and Rome, and later a temple to Trajan was added. It seems to have declined under Byzantine rule, though its strategical importance led to the fortification of the hill with a strong wall. Under Turkish rule this fortress was abandoned, but the unfortified town in the plain continued to exist

and is now a thriving place of some 20,000 inhabitants, bearing the name of Bergama. The recovery of Pergamum is due to Carl Humann, a German civil engineer, whose attention was attracted to the place during a visit in 1864, when he observed the destruction of the ancient remains. After much effort, he induced the Berlin Museum to begin excavations in 1878, and when the third campaign closed in 1886, the upper Acropolis had been cleared, including the site of the altar and the library. In 1901 new explorations were begun on the lower slopes of the hill, with the avowed intention of recovering so far as possible the city of Eumenes. The sculptures recovered are partly in Berlin, where the Great Altar has been set up in its old form, and partly in Constantinople. Consult: Baumeister, *Denkmäler des klassischen Altertums*, title "Pergamon" (Munich, 1887); Ussing, *Pergamon* (Berlin, 1899); Pontremoli and Collignon, *Pergame* (Paris, 1900), with plates and restorations; Humann and others, *Vorkläufige Berichte über die Ergebnisse der pergamenischen Ausgrabungen* (Berlin, 1880, 1882, 1888); *Altertümer von Pergamon*, vol. ii., iv., v. 2, viii. (Berlin, 1885-1895); Hachtmann, *Pergamon* (Gütersloh, 1900); and Dörpfeld, *Führer durch die Ruinen von Pergamon* (Berlin, 1902).

PERGOLESE, pĕr'gô-lă'zâ, GIOVANNI BATISTA (c.1710-36). An eminent composer of the Neapolitan school. Evidence regarding the date and place of his birth is conflicting; probably the correct account is that of the Marchese di Villarosa, his biographer, who states that he was born at Jesi, near Ancona. In 1717 he was admitted into the Conservatorio dei Poveri di Gesù Cristo at Naples, where he studied the violin under Domenico di Matteis, and composition under Gaetano Greco and Durante. Under the conviction that melody and taste were sacrificed to learning by most of the masters of his time, he abandoned the style of Scarlatti and Greco for that of Vinci and Hasse. His first great work was the oratorio of *San Guglielmo d'Aquitania*, composed in 1731. Two years later appeared his opera *La serva padrona*, which gained him universal fame, and which has remained one of the finest examples of its genre; strangely enough, it was practically his only stage success. In the same year he composed *Il prigioniero superbo* and *Il frate innamorato*; in 1734, *Adriano in Siria*; in 1735, *Il Flaminio* and *L'Olimpiade*. In 1734 he received the appointment of *maestro di capella* of the Church of Loretto. In consequence of delicate health, induced, it is supposed, by irregular habits, he removed to Pozzuoli, where he composed the cantata of *Orfeo* and his pathetic *Stabat Mater*. Besides the above-mentioned works, Pergolese composed a number of pieces for the Church, which were better appreciated during his lifetime than were his secular compositions; also a violin concerto, and thirty trios for violin, violoncello, and harpsichord. His works are all characterized by sweetness and freedom of style. His orchestration was particularly simple, confined chiefly to the strings, reinforced occasionally by the horns and trumpets. An undoubted reason for the contemporary failure of much of his operatic music was his innovation in style, wherein he abandoned the old contrapuntal accompaniments, and supported his melodies and voices with har-

monically written accompaniments. He died of consumption at Pozzuoli.

PERI, pâr'é (Pers. *pari*, fairy, Av. *pairikā*, female demon). In Persian folk-lore, a class of fairies, both male and female, of surpassing beauty. In the old Iranian religion, on the other hand, the Peri was a female demon or enchantress of the utmost malignancy. Such a change of concept of a godling from maleficent to beneficent as is found in this instance is a rare phenomenon in comparative religion, although the transformation of the gods of one religion into the demons of another frequently takes place.

PERIAGUA, pĕr'ă-ă'gwă. See **PIROGUE**.

PERIAN'DER (Lat., from Gk. *Περικλῆδης*, *Periklêdês*). A tyrant of Corinth from about B.C. 625 to 585. He was a son and successor of the tyrant Cypselus. He was energetic as a warrior, and distinguished as a patron of poetry and music, and is by some reckoned as one of the Seven Wise Men of Greece. He was, however, cruel and despotic. He is said to have put to death his wife, Melissa, while his son Lycophron was sent to reside at Coreyra, which was then under Periander's rule. Later, when Periander, wishing to see his son, undertook to visit Coreyra, the Coreyreans, terrified at the prospect and hoping to avert the visit, put Lycophron to death. Periander, as tyrant, had under his sway, besides Corinth, also Coreyra, Ambracia, Leucas, and Anactorium. Among other forms of literature he is said to have cultivated elegiac poetry especially. Psammetichus, son of Gordius, the last of the Cypselid dynasty, succeeded him.

PERIANTH (from Gk. *περί, peri*, around + *ἄνθος, anthos*, flower). A general name of the outer leaves of a flower. See **FLOWER**.

PERIBLEM (from Gk. *περίβλημα, periblêma*, cloak). The embryonic region in stems and roots which lies outside of the plerome (q.v.) and develops into the cortex. In seed-plants (spermatophytes) it is covered by the dermatogen, the embryonic layer which develops the epidermis; but in fern-plants (pteridophytes) it forms the outside of the stem tip. See **STEM**.

PERIBON'CA. A northern tributary of Lake Saint John (q.v.), Canada, over 400 miles long.

PERICARDITIS (Neo-Lat., from *pericardium*, from Gk. *περικάρδιον, perikardion*, membrane around the heart, neu. sg. of *περικάρδιος, perikardios*, surrounding the heart, from *περί, peri*, around + *καρδία, kardia*, heart; connected with Lat. *cor*, Lith. *szirdis*, OChurch Slav. *sridice*, Goth. *hairtô*, OHG. *herza*, Ger. *Herz*, AS. *heorte*, Eng. *heart*, and probably with Skt. *hṛdaya*, Av. *zardaya*, heart, or with Skt. *śraddhā*, Lat. *credere*, to trust). An inflammation of the membranous sac investing the heart—the pericardium. This membrane is composed of two layers, a serous one closely attached to the substance of the heart and a fibrous layer loosely enveloping the whole. The surfaces of these two layers are normally in contact and secrete a thin serous fluid which acts as a lubricant and prevents irritation from the constant movement of the surfaces upon each other. The intervening space, which exists only in pathological conditions, is called the pericardial cavity. In common with all serous membranes (q.v.), the pericardium is subject to two varieties of inflammation—the dry or plastic form and that characterized by

effusion of fluid. In the dry variety, which is most common and least dangerous, there is first a dulling of the surfaces involved, due to a fibrinous exudation; constant rubbing roughens these fibrin-coated surfaces; the plastic, sticky material is thrown into ridges or drawn out into shreds, and presents a curiously shaggy appearance—the so-called *cor villosum* or hairy heart of the older writers. This form of pericarditis may terminate by absorption of the fluid, always leaving, however, an adhesion between the two layers; or the process may go on to the 'moist' form—pericarditis with effusion. Here an extravasation of fluid occurs into the pericardial cavity amounting from a few drams to two quarts. This fluid is at first sero-fibrinous or hemorrhagic, but in some cases becomes rapidly purulent. When the amount of fluid is considerable the heart's action is mechanically interfered with, and death may take place from this cause in a few days.

Pericarditis may arise from many causes. The primary form, unassociated with any other disease, is comparatively rare, and occurs only in children. As a secondary process, it is a common affection. Rheumatism is responsible for more than 50 per cent. of the cases; septic processes in other parts of the body are frequent causes; tuberculosis, gout, Bright's disease, scurvy, diabetes, and the eruptive fevers such as scarlatina and typhoid may be complicated by it; and, lastly, it may take place by extension from neighboring structures, as in pleuropneumonia or septic endocarditis, or it may result from a wound.

The symptoms of pericarditis are pain in the situation of the heart, increased by a full inspiration, by pressure upon or between the ribs in the cardiac region, and especially by pressure upward against the diaphragm by thrusting the fingers beneath the cartilages of the false ribs; palpitations; a dry cough and hurried respiration; discomfort or pain on lying on the left side; restlessness; great anxiety of countenance; and sometimes delirium. The pulse usually beats from 110 to 120 in a minute, and is sometimes intermittent; and febrile symptoms are always present. Pericarditis is a disease which occasionally runs a very rapid course, and terminates fatally in forty-eight hours or less. In ordinary cases, however, which terminate in apparent recovery, the disease generally begins to yield in a week or ten days, and excepting that adhesion remains, the cure appears to be complete in three weeks or less. But although these patients *apparently* recover, the pericardial adhesion commonly occasions other structural changes of the heart sooner or later to develop themselves, and in those cases that the physician has the opportunity of subsequently watching, it is observed that fatal disease of the heart, primarily due to the pericarditis, almost always supervenes.

In this disease the patient must be kept absolutely quiet, so as to throw as little work upon the heart as possible. The diet should be light, dry, and nutritious. In the early stages and in robust people, leeches may be applied over the pericardial area, or ice bags may be used to limit effusion. When effusion has taken place a blister will sometimes cause it to be absorbed. In suitable cases diuretics may be given to promote the action of the kidneys, and mild purgation will be of service. When the effusion is so extensive as seriously to embarrass the heart's

action it may be drawn off by paracentesis. If the fluid be purulent, however, an incision must be made into the sac, through the chest wall, and the cavity drained.

PERICARDIUM (Neo-Lat., from Gk. *περικάρδιον*, *perikardion*, membrane around the heart). A conical membranous sac, containing the heart and the commencement of the great vessels, to the extent of about two inches from their origin. It is placed with its apex upward behind the sternum, and to its left side, in the interval between the pleuræ—the serous sacs in which the lungs are inclosed; while its base is attached to the diaphragm. It is a fibro-serous membrane, consisting of an external fibrous and an internal serous layer. The fibrous layer is a strong, dense, fibrous membrane; the serous layer invests the heart, and is then reflected on the inner surface of the fibrous layer. Like all serous membranes, it is a closed sac; its inner surface is smooth and glistening, and secretes a thin fluid which serves to facilitate the natural movements of the heart. It is inflammation of this serous sac which constitutes the disease known as pericarditis. See HEART.

PERICARP (from Gk. *περικάρπιον*, *perikarpion*, pod, from *περί*, *peri*, around + *καρπός*, *karpos*, fruit). The transformed wall of the ovary in the fruit. For example, a pea pod without the peas is the pericarp. See FRUIT.

PERICLES (Lat., from Gk. *Περικλῆς*, *Periklēs* (?B.C. 429). The greatest statesman of ancient Greece. His father was Xanthippus, victor over the Persians at Mycale in B.C. 479. His mother was Agariste, the niece of Cleisthenes, the lawgiver. He received a careful education and was especially influenced by his two teachers, Damon, a famous sophist and master of music, and the philosopher Anaxagoras of Clazomenæ, to whose teaching he undoubtedly owed the independence of thought and freedom from superstition which raised him above the multitude. Throughout his life Pericles was conspicuous for his singular dignity and aloofness. He avoided convivial gatherings and seldom walked abroad among his fellow-citizens. But his eloquence, sagacity, uprightness, and patriotism won recognition from a large part of the Athenians, and for more than thirty years he was the most influential leader in Athens. When he entered on public life, Aristides had only recently died. Themistocles was an exile, and Cimon was engaged in fighting abroad. Pericles from the first attached himself to the democratic party, and under his leadership the complete democratization of Athens was accomplished. Hitherto only the nobler and richer elements in the State had had access to the higher offices, but under his direction all offices were eventually opened to the entire body of citizens. The first step in this new course was the limitation of the functions of the Areopagus, at that time the chief court at Athens. Through the agency of his associate Ephialtes in the year 462-461 measures were passed which deprived the Areopagus of all its important political powers. To it were left jurisdiction only in cases of homicide, the care of the sacred olive trees of Athena, and a share in the supervision of the land sacred to the Eleusinian divinities. Its former functions passed to the Athenian Senate of 500, the popular assembly, and the law courts. Pay for archons was introduced, and later all

officials received a salary for their services. About 458 the third class of citizens, the Zeugitæ, were made eligible to the archonship, and it cannot have been many years before this office was open to all, even the lowest citizens. Furthermore, the members of the Senate were now chosen absolutely by lot from the entire body of Athenians. Thus in the few years after Pericles became prominent most important constitutional changes were carried through at Athens. The opposition of Cimon had been avoided by his ostracism. Pericles's foreign policy seems to have been based on a desire to extend the power and influence of Athens as widely as possible over the Greek States, and he confidently hoped to consummate an Hellenic League which should embrace all Greek States. His attempt to hold a congress for this latter purpose in 448 was unfortunately defeated.

The Athenians, elated by their victories over the Persians and fired by the splendid empire established under the name of the Confederacy of Delos, were eager for foreign conquest. As their naval empire grew, and their trade increased, they came into rivalry with Corinth and Ægina. In 480 they had seized Megara, which led to war with the Spartans, and during the next four years Athens successfully resisted the attacks of Corinthians and Spartans, and in 459-456 reduced Ægina, which was made a tributary member of the Confederacy of Delos. Athens had seized Naupactus also, which gave her a naval station by which she could command the Corinthian Gulf. She also extended her conquest to the north, and by the battle of Gnophyta (457) gained the greater part of Boeotia, only to lose it again ten years later by the battle of Coronea. The war with Persia had continued in the East under the direction of Cimon, who had been recalled at Pericles's suggestion. After Cimon's death in 449, Pericles seems to have thought the struggle against Persia too severe a tax on Athens if she was to continue her efforts against her rivals in Greece, and so in 448 a peace was concluded with the Persians. Athens was now free to attend to her cares at home. She had gradually extended her territory so that, aside from her allies on the mainland, she embraced, under the Confederacy of Delos, as equal or subject allies, nearly all the larger islands of the Ægean, and she furthermore possessed important cities in the north and in the Thracian Chersonese. In 445-445 a thirty years' peace was concluded between Athens and her allies on the one side and the Peloponnesians and their allies on the other. There was, however, strong opposition to Pericles's policy. The party opposed to him was led by Thucydides, whose ostracism in 444 left Pericles the undisputed leader. He apparently had the power to persuade the people to do whatever he thought good, and for fifteen years after his opponent's ostracism he was annually elected to the office of general. Under his direction Athens had been made supreme within her naval empire, and his purpose was to aggrandize Athens even at the expense of her subject States. With the great wealth which came to her treasury Pericles restored the temples destroyed by the Persians and erected new monuments which made Athens the most magnificent city of the ancient world. Most prominent among these monuments were the bronze statue of Athena Promachos, which was erected about 448

at the west end of the Acropolis, and a new temple to Athena Polias. The Parthenon was also built on an enlarged and more magnificent scale and was completed about 438. At the west entrance to the Acropolis a new propylæa was erected and near it the Temple of Athena Nike. The city was also adorned with many other temples and monuments. In the period of Pericles's leadership Athens became a great centre of literature as well as of the fine arts, and philosophy was also transplanted from Ionia and Italy to the soil of Athens, which was destined to be its home for a thousand years. Pericles was not only a great political leader, but was also able in the field, as was shown by his successful reduction of the revolt of Samos in 439.

Athen's prominence at length made her an object of jealousy. In 433 she formed an alliance with Coreyra, a recalcitrant colony of Corinth, and in the winter of 432-431 the Peloponnesians under the leadership of Sparta decided on war against Athens. Pericles summoned the country residents of Attica within the walls of Athens, and allowed the Peloponnesian army to harry the country at will during the summers of 431 and 430. In the latter year the plague broke out in the city and caused many deaths and great dejection. Pericles was deposed from his office, tried, and fined, but soon reinstated through a revulsion of feeling. In the following year he died after a lingering sickness. While Pericles undoubtedly contributed greatly to Athenian brilliancy, his imperialistic schemes made the Peloponnesian War inevitable. (See ASPASIA.) Consult the histories of Greece by Grote, Abbott, Holm, Busolt, and Meyer; Fillet, *Histoire du siècle de Périclès* (Paris, 1873); A. Schmidt, *Das Perikleische Zeitalter* (Jena, 1877-79); and Evelyn Abbott, *Pericles and the Golden Age of Athens* (New York, 1891).

PERICLES, PRINCE OF TYRE. A play remodeled by Shakespeare, probably from one by George Wilkins and Rowley about 1607, when it was produced and printed in 1609, but not in the folio of 1623. The earliest form of the story is Greek in the sixth century. Gower introduced it as "Apollonius of Tyre" in the *Confessio Amantis* (1332). Shakespeare's part is evidently acts iii., v., and partly iv.

PERICYCLE (from Gk. *περίκυκλος*, *perikyktos*, all around, spherical, from *περί*, *peri*, around, + *κύκλος*, *kyktos*, circle). A sheath of cells in plants forming the outer layer of the perome (q.v.). It is usually continuous, but is sometimes interrupted by projections of vascular tissue, and in a few cases is altogether lacking. The term 'pericambium' was formerly used to designate it.

PERIDIN'TUM. See RED WATER.

PERIDOT (Fr. *péridot*, of unknown etymology). A variety of chrysolite used as a gem. It is usually of an olive, pistachio, or leek-green color. It is found in abundance and of good quality in the form of small, olive-green, pitted grains or pebbles, especially in the sands of Arizona and New Mexico, where they are called locally 'Job's tears.' The best quality for gems comes from the Levant.

PERIDOTITE. An igneous rock of ultrabasic composition, essentially free from quartz and feldspar, but consisting mainly of olivine and of one or more of the following minerals: augite,

hypersthene, hornblende, magnetite, and rarely biotite. The peridotites are sometimes known as the magnesian rocks (see also PERKNITE), and as they are poorest in silica and richest in magnesia of any terrestrial rocks, they form a connecting link with celestial (meteoritic) bodies. From the family of the pyroxenites peridotites differ chiefly by containing olivine. Usually of small extent, they occur as more basic masses within areas of gabbro (q.v.) and norite. The average composition of peridotite is: silica, 41 per cent.; alumina, 4 per cent.; sesquioxide of iron, 6 per cent.; protoxide of iron, 6 per cent.; oxide of lime, 6 per cent.; magnesia, 30 per cent.; oxides of the alkalis, 1 per cent.; water, 6 per cent. By processes of weathering, of which evidence is rarely lacking in specimens, peridotites take up water and form serpentine (q.v.), so valuable as a building and ornamental stone.

PÉRIER, pâ'ryá', CASIMIR (1777-1832). A French statesman, born at Grenoble, Department of Isère, October 21, 1777. He was educated at the College of the Oratory at Lyons, and served in the Army of Italy during the campaigns of 1798-1800. Returning to Paris, he helped his father and brother to found a banking house, which soon had a large and prosperous business. In 1817, as the result of an attack on the financial policy of the Government, Casimir Perier was chosen as one of the Deputies from Paris, and being repeatedly reelected, he became one of the leading members of the Opposition under Charles X. In 1828 he was Minister of Commerce and Finance under Martignac. After the overthrow of the Bourbon monarchy, by the Revolution of July, 1830, Périer became a member of the new Government and acted as Prime Minister to Louis Philippe from March 13, 1831, until his death, May 16, 1832. During his tenure of office he repressed Republican outbreaks at Paris and at Lyons, and the Legitimist movement in the South. He also directed the foreign policy of France against Austria with sagacity and ability, and sustained ministerial responsibility against the King and in the Chamber of Deputies. In his efforts to control the cholera epidemic of 1832 he became infected with the disease and his already broken constitution rapidly succumbed. The most prominent disciple of his constitutional policy of *juste-milieu* was Guizot, who has given a picture of his predecessor in his *Mémoires*. Périer's son, Auguste, adopted the name of Casimir-Périer (q.v.).

PÉRIERS, pâ'ryá', JEAN BONAVENTURE DES (c.1500-44). A French poet and philosopher, born at Arnay-le-Duc, Bourgogne. His known literary work began in 1534 with collaboration in the first French translation of the Bible, and two years afterwards he assisted Dolet in his *Commentaries de la langue latine*. He entered into the service of Marguerite, Queen of Navarre (1536), but in the following year fell out of favor with her on the publication of his *Cymbalum Mundi*, a collection of allegorical dialogues, wherein man's philosophy and religion are ridiculed. The book, denounced by Catholic and Protestant alike, was publicly burned, its author ostracized, and it is supposed that he committed suicide. His friends published *Œuvres diverses* (1544), and the *Nouvelles récréations et joyeux devis* (1558). A later edition of his works was published in Paris (1866) and a special one of the *Cymbalum* in 1874.

PERIGEE (from Gk. *περί*, *peri*, around + *γῆ*, *gē*, earth). That point in the moon's orbit which is nearest to the earth. The opposite point is the apogee (q.v.). See MOON.

PÉRIGORD, pâ'régôr'. A former county of France, forming a part of the Province of Guienne (q.v.), and now included within the Department of Dordogne. It was divided into Upper and Lower Périgord, and the principal town was Périgueux. It was the land of the ancient Petrocorii; was overrun by the Franks in the beginning of the sixth century, and with the rest of Guienne came into the possession of England by the marriage of Henry II. and Eleanor of Aquitaine. In 1454 it was acquired by the House of Albret, and upon the accession of Henry IV. in 1589 was united to France.

PÉRIGUEUX, pâ'régē'. The capital of the Department of Dordogne, France, on the Isle, 42 miles southeast of Angoulême (Map: France G 6). It consists of the ancient city of Périgueux, along the river bank—gloomy of aspect, with narrow streets, but large and solidly built houses—and the Puy Saint Front on rising ground, which until 1240 was a separate town. In the old town there are many curious remains of mediæval architecture. The ramparts have been demolished and replaced by boulevards. The Cathedral of Saint Front, dating from the eleventh century, a majestic edifice of Byzantine design in the form of a Greek cross, largely rebuilt since 1853, resembles Saint Mark's at Venice. Other interesting features are the old cathedral of Saint Etienne, the remains of a sixth-century basilica, and the ruins of Roman origin of a vast amphitheatre, of ancient aqueducts, baths, temples, and the remarkable *Tour de Vesone*. The city has a museum of antiquities, a library with over 30,000 volumes, and a handsome seminary. Quarries of building stone are worked in the vicinity, and many hands are employed in cutting and polishing marble. Paper, woolen cloths, silk, cutlery, tools, and tobacco are manufactured and there is a trade in wine, grain, swine, and oxen. The celebrated *pâtés de Périgueux*, made of partridges and truffles, are largely made and exported. Population, in 1891, 31,439; in 1901, 31,976. Périgueux, the *Vesuna* and capital of the Petrocorii, mentioned by Cæsar, was a city of much importance in ancient times. See PÉRIGORD.

PERIGYNY, pēr-ij'i-nī (from Gk. *περί*, *peri*, around + *γυνή*, *gynē*, woman, pistil). A condition in flowers in which the sepals, petals, and stamens are borne upon the margin of a cup-like outgrowth around the pistil, as is well shown in the flower of the common cherry. Perigynous flowers are specially characteristic of certain genera of the rose family. See FLOWER.

PERIHELION (Neo-Lat., from Gk. *περί*, *peri*, around + *ἥλιος*, *hēlios*, sun). That point in its orbit at which a planet is nearest the sun. The point of the orbit opposite to it is called the aphelion (q.v.). The position of the perihelion, i.e. its longitude east or west of the vernal equinox, is one of the seven elements of a planet's orbit. See ELEMENTS; ORBIT.

PERIM, pâ-rēm'. An island in the Arabian Sea about 2 miles from the southwestern coast of Arabia, in the Strait of Bab-el-Mandeb (Map: Asia, D 7). Area, about 7 square miles. It is

under British control and has a small garrison and a lighthouse.

PERIMETER (Lat. *perimetros*, from Gk. *περίμετρος*, circumference, from *περί*, peri, around + *μέτρος*, metron, measure). The length of the boundary of a plane figure. See ISOPERMETRIC FIGURES.

PERINEUM (Neo-Lat., from Lat. *perineum*, *perineon*, from Gk. *περίνεος*, *perineion*, *περίνεος*, *perineon*, *περί*, peri, around + *μέτρος*, metron, measure). The part of the human body which forms the floor of the true pelvis is by anatomists divided into two portions. Of these, the anterior one, situated in front of the anus, is called the *true perineum*, or urethral (or, in the female, the vaginal) portion of the perineum; the posterior portion, which contains the anus or termination of the rectum, is called the rectal or anal portion of the perineum. The anterior portion, or true perineum, is triangular in form, the apex being in front; the sides, about three inches in length, are formed by the rami of the pubes and ischium, and the base by an imaginary line joining the tuberosities of the ischium, and passing about half an inch in front of the anus. Through this space the urethra passes through a layer of strong fascia—the deep perineal fascia—to communicate with the bladder, and in this space the opening is made in the operation of lithotomy.

In the female the space usually referred to as the perineum lies between the vagina in front and the anal orifice behind. Its most important constituent is the anterior portion of the levator ani muscle. The perineum, including a greater or less extent of this muscle and sometimes also the sphincter ani muscle, is often torn during parturition, and requires suturing for its repair.

PERIOD (Lat. *periodus*, from Gk. *περίοδος*, a going round, circumference, circuit, cycle, sentence, period, from *περί*, peri, around + *ὁδός*, *hodos*, road). A term used in chronology in the same sense as cycle, to denote an interval of time after which the astronomical phenomena to which it refers recur in the same order. It is also employed to signify a cycle of cycles.

The Chaldeans invented the *Chaldaic period* or *Saros*, from observing that, after a certain number of revolutions of the moon round the earth, her eclipses recurred in the same order and of the same magnitude. This period consists of 223 lunations, or 6585.32 days, and corresponds almost exactly to 19 'eclipse years.' The eclipse year is the time required for the sun, in his apparent motion among the stars, to complete a circuit from one of the nodes (q.v.) of the lunar orbit back again to the same node. On account of the motion of the lunar nodes, the eclipse year contains only 346.62 days, and 19 such years contain 6585.78 days. The error of the *Saros* is thus only 0.46 day (about 11 hours in 223 lunations, or 19 eclipse years).

Various important periods or cycles are used in the calendar (q.v.) for predicting the dates of new and full moon. These phases recur on the same dates every nineteen years (except that leap years may change the dates one day), which fact was discovered by Meton, an Athenian, who invented (B.C. 432) a lunar period of 6940 days, or 19 years, called the *Metonic cycle* (q.v.), also the *lunar cycle*. The *calippic period* consists of 76 years, or four Metonic periods, and is thus able to take account of leap years. The period

of the *heliocal or solar cycle*, after which the same day of the month falls upon the same day of the week, consists of 28 Julian years of 365¼ days each. If the year had regularly consisted of 365 days, that is, one day more than an exact number of weeks, it is evident that at the end of seven years the days of the month and week would again correspond; but the introduction of an intercalary day into every fourth year causes this coincidence to recur at irregular periods. (To ascertain when the same days of the week and month will recur in the Gregorian calendar, see CALENDAR, section on *Perpetual Calendar*.) The Julian period is a cycle of cycles, and consists of 7980 (28·19·15) years, after the lapse of which the solar cycle, lunar cycle, and the indiction (q.v.) commence together. The time of its commencement was arranged so that it will expire at the same time as the other three periods from which it is derived. The year B.C. 4713 is taken as the first year of the period, consequently A.D. 1 is the 4714th year of it. (See CHRONOLOGY; CALENDAR; CYCLE.) Astronomers also use the term period to designate the quantity of time required by a planet or other celestial body to complete a revolution in its orbit. (See ELEMENTS.) In this sense there may be different periods for the same body, according to the point selected as the beginning and end of the periodic orbital motion. The location of the position from which the motion is supposed to be viewed may also change the period materially.

PERIODICAL. In a wide sense, a publication issued, at more or less regular intervals, in successive numbers, which are not related to one another as volumes or parts of a single book or series of books. The word, however, is commonly employed—and is here considered—in a narrower sense which excludes on the one hand newspapers (see NEWSPAPER), or periodical summaries of current, and especially of political, events, and on the other such periodical publications as the transactions of learned societies, year-books, almanacs, and so on. Even within these limits the term includes a great variety of publications which differ so much in object and character that concise description of them is impossible; but it may be said of them in general that they are designed to furnish either information about matters of more than ephemeral interest, or entertainment, or both. They deal either with a single subject—such as literature, or a particular science or industry—or with a group of allied subjects, or with material of the most heterogeneous character. The most important special groups of them are reviews, or periodicals devoted especially to the criticism of books, and magazines, which are designed to furnish miscellaneous and entertaining reading. In the most popular of the latter class fiction forms an important part of the contents, and pictorial illustrations, often of fine artistic quality, are frequently employed.

EARLY FORMS. The periodical, as thus defined, originated in France in the seventeenth century, and in the form of the critical literary journal. The first example of it is also one of the most famous and the longest lived, for its publication has continued, though with many interruptions, until the present day—namely the *Journal des Savants*. The idea which it embodied was conceived about 1663 by the historian Mézeray, who

proposed to establish a weekly journal in which should be "made known what was happening in the republic of letters." His project came to nothing; but in 1664 Denis de Sallo, Sieur de la Coudraye, under the name of Sieur de Hédouville, obtained the privilege of issuing a periodical of this kind, and the first number of the *Journal des Savants* appeared on January 5, 1665. Its plan included reviews of new books, reports of scientific discoveries, obituary notices, and general information of interest to the learned world. Sallo associated with himself a number of scholars, among them the Abbé Gallois, who succeeded him as editor. The freedom or—as it appeared to an age not accustomed to the ways of the reviewer, arrogance—with which the new journal criticised both books and (what was more serious) ecclesiastical affairs promptly brought it into trouble, and after the appearance of the thirteenth number it was suppressed. Colbert, however, who recognized its value, decided to reestablish it, and on Sallo's refusal to consent to the demanded abridgment of his freedom, placed it (1666) in the hands of the Abbé Gallois, who conducted it negligently, issued it very irregularly, and practically abandoned it in 1674. In 1675 publication was resumed under the editorship of the Abbé de la Roque, who was succeeded in 1687 by L. Cousin. In 1701 it passed under the editorial control of a commission of literary men and was conducted in this way until 1723. After a year of suspended animation it was reissued under the auspices of the Abbé Bignon and the Abbé Desfontaines. Another interruption of publication was caused by the Revolution in 1792, and an attempt to revive it in 1796 was a failure. It was finally reestablished (April 15, 1816) under the Restoration and placed under the supervision of a commission representing the different classes of the Institute. Seven years after the appearance of the *Journal des Savants* was founded the second French literary periodical, the *Mercurie Galant* of Jean Donneau de Vizé, which, under a variety of titles, continued—with interruptions—to exist until 1825; in 1717 it received the name of *Mercur de France*, by which it is commonly known. In addition to criticism, poetry, and other literary material, it dealt with topics of the most diverse kinds, including current news, and it has, accordingly, a place in the history of journalism. Among its editors were Thomas Corneille, whom Vizé associated with himself in 1690, and Marmontel. In the same year (1672) with the *Mercur Galant*, Claude Blondeau and Gabriel Guéret began the first legal periodical, the *Journal du Palais*; in 1679 appeared the *Nouvelles découvertes sur toutes les parties de la médecine* (3 vols.) of Nicholas de Blegny—memoirs published by an 'academy' at whose head Blegny had placed himself—which may be regarded as the first medical journal; and in 1680 was issued by the Abbé Jean-Paul de la Roque the first prospectus of a religious periodical—the *Journal ecclésiastique*. The publication of the last named was forbidden, and in 1690 La Roque began the *Mémoires sur l'histoire ecclésiastique*, of which however, only one volume was issued. A medical journal—*Les Journeaux de Médecine, etc.*—which he started in 1683 was equally unfortunate. Other notable periodicals of French origin (but printed in Holland) dating from the seventeenth century are the *Nouvelles de la république des*

lettres, founded by the celebrated Pierre Bayle in 1684, and conducted by him for three years (it survived until 1718); the *Histoire des ouvrages des savants* of Henri Basnage de Beauval, begun in 1687 and continued until the middle of 1709; and the *Bibliothèque universelle et historique* of Jean Leclerc, the noted critic, which was issued in 1686-93.

BEGINNINGS IN ENGLAND. The last quarter of the same century saw the beginnings of the literary and of the scientific periodical in England also. As the first example of the former is commonly reckoned the *Mercurius Librarius; or a Faithful Account of All Books and Pamphlets*, the first number of which appeared in April, 1680. It was announced as a 'catalogue' to be published "weekly, or one in fourteen days at least," and it was in fact nothing more; it contained advertisements, or paid notices of new books, and possessed nothing of the literary character. Of greater importance was the *Weekly Memorials for the Ingenious*, issued 1681-83, which obtained much of its material from the *Journal des Savants*. Between 1685 and 1700 appeared for brief periods several learned publications of the periodical type, derived chiefly from Continental sources. Of a more strictly English character was the *Athenian Gazette* (later called the *Athenian Mercury*)—a kind of 'Notes and Queries'—published weekly from March, 1689-90, to February, 1695-96, by the bookseller John Dunton, with the assistance of Richard Sault and others. The *Gentleman's Journal, or the Monthly Miscellany*, of Peter Anthony Motteux, a forerunner of the modern literary magazine, was issued 1692-93 (2 vols.); it contained verses by Prior, Sedley, Mrs. Behn, Oldmixon, D'Urfey, and others, and miscellaneous prose. The *History of the Works of the Learned*, a review dealing mainly with Continental books, was issued from 1699 to 1712. Its publication was resumed in 1737 and was continued until 1743.

EARLY GERMAN PERIODICALS. In Germany a beginning was made in 1663 with the *Erbauliche Monatsunterredungen* of Johann Rist, which was followed in 1670 by the first scientific annual, the *Miscellanea Curiosa Medico-Physica* of the Academia Leopoldina. But the most celebrated of all the periodicals which date from this period is the first German literary journal, the *Acta Eruditorum Lipsiensium* (written in Latin), founded by Prof. Otto Meneke in Leipzig, the first number of which appeared in 1682. It was modeled after the *Journal des Savants* and the Italian *Giornale de' Letterati* (see below), and included extracts from new books, reviews, and independent articles. Meneke associated with himself in this work many of the most learned men of the time, among them Leibnitz, Seekendorff, and Thomasius, and the *Acta* became the supreme critical authority in German literature. On Meneke's death in 1707 he was succeeded in the editorship by his son, J. B. Meneke; and in 1732 his grandson, F. O. Meneke, began a new series under the title *Nova Acta Eruditorum*. The *Acta* came to an end in 1782, when the belated volume for 1776 appeared. Outside of the countries above mentioned, Italy alone has possessed learned periodicals dating from this period—the *Giornale de' Letterati* of Francesco Nazzari, founded in 1668 and published until 1679, another with a similar title issued from 1686 to 1697 by Bacchini and Ro-

berti, and the *Biblioteca volante* of Cinelli and Sancassini (1676-1718 and 1733-47).

MODERN BRITISH PERIODICALS. From the beginning of the eighteenth century new periodicals have appeared in these and in other countries in ever increasing numbers and diversity. In England, Daniel Defoe began in 1704 *A Review of the Affairs of France and of All Europe, as Influenced by That Nation*, issued at first weekly, then twice, and later thrice a week. It came to an end, in its original form, in 1712, but was carried on in a new series, called simply *The Review*, until June, 1713. One feature of this review—the contributions of an imaginary ‘Scandal Club’—doubtless suggested the periodical essay which became important in the history of English literature. Of these essay-periodicals the most noted are *The Tatler* (1709-10-11) written chiefly by Steele and Addison; *The Spectator* (1710-11-14) of Addison, Steele, Budgell, and others; *The Rambler* (1750-52) of Dr. Johnson. A French Protestant refugee, Michael de la Roche, a friend of Bayle, started in 1710 the *Memoirs of Literature*, a review, independent of foreign sources for its material, though modeled after French works of the kind, which he issued until the end of 1714. In 1725 he began another review, the *New Memoirs of Literature*, which lived for two years, and in 1730 *A Literary Journal*, a continuation of the *Memoirs of Literature*, which came to an end in about half that time. A classical periodical, entitled *Bibliotheca Literaria, Being a Collection of Inscriptions, Medals, Dissertations, etc.*, was brought out in 1722 by Samuel Jebb and ran through ten numbers, ending in 1724. La Roche’s work was taken up by Andrew Reid, who issued (1728-36) *The Present State of the Republick of Letters*, a review of considerable merit; and by Archibald Bower, whose *Historia Literaria* appeared monthly (1730-34). At this time (January, 1730-31) was published the first and one of the most famous of English magazines, the *Gentleman’s Magazine, or Traders’ Monthly Intelligencer* . . . by Sylvanus Urban, Gent, founded by the printer Edward Cave. His original plan, afterwards much widened, was that of a collection or ‘magazine’ (the first use of the word in this sense) of the essays and news which appeared in the London papers: the title was in other points suggested by Motteux’s periodical mentioned above. The magazine met with great success—due chiefly to Cave’s energy and practical (not literary) ability—its circulation rising within a few years to over ten thousand copies. In it, in 1732, was begun the publication of Parliamentary debates (of both Houses), under the—necessary—disguise of “Reports of the Debates of the Senate of Lilliput;” Johnson was employed during several years in writing out (largely from his own imagination) the speeches reported. His association with Cave and the Magazine is the chief title of both to fame. After Cave’s death, in 1754, it was conducted by his brother-in-law, and later by John Nichols and his son. In 1868 it became a magazine of light literature. It soon had numerous imitators and rivals, the most successful of which was the *London Magazine* (1732-81), established by leading London publishers. Among the most important of the other magazines established during the eighteenth century are: *The Scots Magazine* (1739-1817, from that date to 1826, the

Edinburgh Magazine); the *Royal Magazine* (1759-71); the *Oxford Magazine* (1768-82); the *European Magazine* (1782-1826); the *Monthly Magazine* (1796-1843); and the *Philosophical Magazine* (1798—). To return to reviews: the *History of the Works of the Learned* found a successor in *A Literary Journal* (Dublin, 1744-49), the first review published in Ireland. *The Museum*, projected by the poet and bookseller Robert Dodsley, appeared in March, 1746, and was issued fortnightly until September, 1747. It was as much a magazine as a review, comprising besides notices of books, essays, mainly upon historical and social topics, by writers of repute, including Spence, Warburton, Horace Walpole, Akenside, and Campbell. From this time on the distinctive characteristics of the modern literary review became more and more prominent and before the end of the century were firmly established.

A notable advance in this direction was made in the *Monthly Review*, founded by Ralph Griffiths (1749) and conducted by him until his death in 1803. It included scientific and literary material as well as criticism, and among its writers (1757-58) was Oliver Goldsmith. The Review was carried on after Griffiths’s death by his son (until 1825) and others until 1845. The Whig politics and non-conformity of Griffiths led to the founding of the *Tory Critical Review* (1756-1817) by Archibald Hamilton, to which Smollett, Johnson, and Robertson contributed; and this was followed by a number of others, including *The London Review* (1775-80); *A New Review* (1782-86); the *English Review* (1783-96), combined in 1797 with the *Analytical Review* (1788-99); *The Antijacobin Review and Magazine* (1798-1821); and the *High Church British Critic* (1793-1843), begun by Nares and Beloe. An epoch in the history of the English review was made by the establishment of the *Edinburgh Review or Critical Journal*—‘to be continued quarterly’—the first number of which appeared in October, 1802. It was designed to be the organ not only of literary, but also of political (Whig) opinion, and was planned so broadly and edited so ably that it almost immediately attained a position of authority which soon became, as Carlyle said, that of “a kind of Delphic oracle and voice of the inspired for great majorities of what is called the ‘intelligent public.’” The first of the really great English reviews, it established a standard of reviewing which (though its literary criticism, especially in the early days, has often been inferior) its rivals during the century and more of its existence have not been able to surpass. In it the English review became for the first time a really potent influence in the formation of literary taste and the shaping of political views. Its original projector was Sydney Smith, and he also edited the first number; with the second the editorship was transferred to Francis Jeffrey (later Lord Jeffrey), who retained it until 1829, when he resigned on his election as Dean of the Faculty of Advocates. Among the other earlier contributors were Brougham, who largely determined its political opinions, Scott (during the first few years), Carlyle, Hazlitt, and (from 1825) Macaulay, whose influence upon its character was probably second only to that of Jeffrey. After Jeffrey’s retirement the editorship was held successively by Macvey Napier (1829-47), William

Empson (—1852), George Cornewall Lewis (—1855), Henry Reeve (—1895), and Arthur S. Elliot (1895—). In 1902 the *Review* celebrated its centennial.

The great success and rapidly growing influence of this champion of Whiggism caused the Tories to bestir themselves, and in February, 1809, appeared the first number of *The Quarterly Review*, which soon attained a position hardly second to that of its great rival. Its first editor was William Gifford, and among its first contributors were Scott, Southey, Dr. Young, Canning, John Wilson Croker, and Heber. Gifford resigned in 1824, and was succeeded by John Taylor Coleridge, who gave place in 1826 to John Gibson Lockhart, who retained the editorial control of the *Review* until 1853; he was followed by the Rev. Whitwell Elwin (—1860), William Macpherson (—1867), Sir William Smith (—1893), Rowland Prothero (1894-99), and George W. Prothero (1899—). The *Westminster Review* (styled from 1836, when it was combined with the *London Review*, until 1851 the *London and Westminster Review*) was founded in 1824 to promulgate the views of the Utilitarians, Bentham and the Mills. The great quarterlies above mentioned were partisan in their origin and in their principles of editorial management: they were designed to promulgate definite views, literary and political, with which the opinions of their contributors must be in harmony; their articles were accordingly anonymous (though the *Westminster* has not been consistent in the matter). This policy was abandoned by the *Fortnightly Review*, established in 1865 (issued monthly from 1866), which was designed to allow the freest expression of individual opinion with individual responsibility. Its first editor was George Henry Lewes, who was followed in 1867 by John Morley, who resigned in 1882. Among its early supporters were Bagehot, George Eliot, Sir John Herschel, Mill, Huxley, and Spencer. The policy of the *Fortnightly* in these particulars has been followed by other monthly reviews—the *Contemporary Review*, established in 1866, the *Nineteenth Century* in 1877, and the *National Review* in 1883.

Weekly journals dealing wholly or partly with literature, science, and art have existed by the side of the quarterlies and monthlies, among them *The Examiner* (1808-81), *The Literary Gazette* (1817-62), *The Athenæum* (1828—), *The Spectator* (1828—), *The Saturday Review* (1855—), *The Academy* (1869—), and *The Speaker* (1890—).

Hardly less notable than the development of the review during the nineteenth century was that of the magazine. *The New Monthly Magazine* (1814) numbered Campbell, Theodore Hook, and Bulwer Lytton among its editors. A brilliant production was *Blackwood's Edinburgh Magazine* (1817—), which "created a sensation unparalleled in magazine history," due to the wit and audacity of its anonymous contributors, among whom were Lockhart, Hogg, Scott, and John Wilson, the editor. Its most important feature, in those early days, was the famous *Noctes Ambrosianæ*, "in which the leading contributors discoursed with irresponsible wit and incisiveness upon the books, the people, and the events of importance in their day." *Fraser's Magazine* (1830-82, when it became *Longman's Magazine*) is associated with the names of Car-

lyle and Thackeray. Others of note are *The British Magazine* (1832-49), *The Dublin University Magazine* (1833—), *Tait's Edinburgh Magazine* (1832-61), *Bentley's Miscellany* (1837-68), *Notes and Queries* (1849—), *Macmillan's Magazine* (1859—), *The Cornhill Magazine* (1860—), *Saint James Magazine* (1861—), *The English Illustrated Magazine* (1883—), *Cassell's Magazine* (1877—), *Temple Bar* (1860—), *Review of Reviews* (1890—), *The Strand Magazine* (1891), and *The Pall Mall Magazine* (1893—). These are only a selection from a long list.

PERIODICALS IN THE UNITED STATES. The history of the periodical in the United States begins in colonial times with *The American Magazine*, issued at Philadelphia, February 13, 1741, by the printer Andrew Bradford, a business rival of Franklin's, and edited by John Webbe. The idea was due to Franklin, who had planned an imitation of *The Gentleman's Magazine*, and had incautiously divulged his scheme to Webbe. Franklin's own periodical, *The General Magazine*, was issued on February 16, 1741, its projector thus losing by three days the honor of having edited and published the first monthly in America. Both publications were short-lived, Webbe's perishing with its second number and Franklin's with its sixth. Throughout the entire subsequent development of periodical literature in this country the magazine has taken the first place, reviews having been comparatively few in number and decidedly inferior in quality. The magazines published down to the Revolution number sixteen. Among them were *The American Magazine and Historical Chronicle* (Boston, 1743-46), *The Boston Weekly Magazine* (1743), *The Christian History* (Boston, 1743-44), *The Independent Reflector* (New York, 1752-53), *The New England Magazine of Knowledge and Pleasure* (Boston, 1758), *The American Magazine and Monthly Chronicle* (Philadelphia, 1757-58), *The New American Magazine* (Woodbridge, N. J., 1758-60), *The American Magazine* (Philadelphia, 1769), *The Royal American Magazine* (Boston, 1774-75), and *The Pennsylvania Magazine, or American Monthly Museum* (1775-76). Between the close of the war and the end of the century about forty others appeared, among them *The Columbian Magazine, or Monthly Miscellany* (Philadelphia, 1786-92; from March, 1790, entitled *The Universal Asylum and Columbian Magazine*), *The American Museum, or Repository* (1787-92), of considerable value as a source of historical information; *The Massachusetts Magazine* (Boston, 1789-96), *The New York Magazine* (1790-97), *The Political Censor, or Monthly Review* (Philadelphia, 1796-97), edited by William Cobbett, and *The Farmer's Weekly Museum* (Walpole, N. H., 1790-99). The last was edited from 1795 by Joseph Dennie, the founder, in 1801, of *The Port Folio*. Charles Brockden Brown established in 1799, in New York, *The Monthly Magazine and American Review*, which, with a change of name to *The American Review and Literary Journal*, survived until 1802. He later edited *The Literary Magazine and American Register* (Philadelphia, 1803-08).

At the end of the first decade of the nineteenth century the periodicals published in the United States amounted to nearly thirty in number. Only two of them, however, were in any way notable: *The Port Folio* (Philadelphia) above mentioned, which survived until 1827—up to that

time a phenomenally long life for an American magazine; and *The Anthology and Boston Review* (Boston, 1803-11), which included Ticknor, John Quincy Adams, and Everett among its contributors. From this time on the number of literary periodicals—to say nothing of religious and other special publications—increased rapidly, with a corresponding improvement in quality. The following are perhaps the most noteworthy: *The Analectic Magazine* (Philadelphia, 1813-20), founded by Moses Thomas, with Irving (its editor, 1813-14), Paulding, and Wilson the ornithologist among its contributors; *The Atlantic Magazine* (New York, 1824-25; continued until 1827 as *The New York Monthly Review*), which was edited by Robert C. Sands and had the support of Bryant; *The New York Mirror* (1823-42), of which N. P. Willis was one of the editors; *The Illinois Monthly Magazine* (Vandalia, 1830-32), the first publication of the kind in the West; *The American Monthly Magazine* (New York, 1833-38), edited 1837-38 by Park Benjamin; *Graham's Magazine* (1840-50), a widely and deservedly popular periodical; *The Dial* (Boston, 1840-44), the organ of the New England Transcendentalists, edited by Ripley and Margaret Fuller, and then by Emerson; *The International Magazine* (New York, 1850-52), edited by R. W. Griswold; *The Knickerbocker Magazine* (New York, 1833-60), founded by the novelist Charles Fenno Hoffman, and edited for some time by Louis Gaylord Clark; *Putnam's Monthly Magazine* (New York, 1853-57, and 1867-69); *The Atlantic Monthly* (Boston, 1857—), perhaps the foremost of American periodicals from a literary point of view, having as editors Lowell, Fields, Howells, Aldrich, Scudder, Page, and Perry, and among its contributors Holmes, Longfellow, Whittier, and most of the notable American men of letters; *Harper's New Monthly Magazine* (New York, 1850), an illustrated monthly of high standing and wide popularity; *Scribner's Monthly* (New York), an illustrated monthly founded in 1870 by Dr. J. G. Holland (as editor), Roswell Smith, and Charles Scribner, and from 1881 published with Richard Watson Gilder as editor, as *The Century Magazine*; *The Galaxy*, incorporated with the *Atlantic Monthly* in 1878 (New York, 1866—); *Lippincott's Magazine* (Philadelphia, 1868—); *Scribner's Magazine* (New York, 1887—), an illustrated monthly; *The New England Magazine*, illustrated (1889—); *The Cosmopolitan*, illustrated (New York, 1886—); and *McClure's Magazine*, illustrated (New York, 1893—). In the periodicals just mentioned, beginning with *The Atlantic*, the popular literary magazine has reached its highest point of development, not only in the United States, but in the world. Especially important has been the impetus given to developing the art of illustration, and the support given to the obsolescent art of wood-engraving by *The Century* and *Harper's*; it may almost be said that the art was revived by these periodicals.

Of American reviews less need be said. Although some of these are excellent, they do not, as a whole, compare favorably with those that have been published in England and on the Continent. Their history begins with *The American Review of History and Politics* (Philadelphia, 1811-13), a quarterly founded by Robert Walsh. This was soon followed by *The North American Review*

(Boston, 1815), which has continued until the present day; among its editors have been many eminent men—A. P. Peabody, H. Adams, Dana, Edward Everett, Sparks, Bowen, Lowell, and Norton. Among later publications of the kind—overlooking those that were merely ephemeral—are: *The Southern Quarterly Review*, first published 1828-32 (Charleston, revived 1842-55); *The United States Magazine and Democratic Review* (New York, 1837-52), later *The United States Review* (1853-55); *The New Englander* (New Haven, 1843-92); *The International Review* (New York, 1874-83); *The Forum* (1886—); *The Arena* (1890).

MODERN FRENCH PERIODICALS. In France the periodicals originating in the eighteenth century begin with *Mémoires pour servir à l'histoire des Sciences et des Arts* (1701-67), founded by the Jesuits Michel le Tellier and Philippe Lalleman at Trévoux (whence it is known as the *Journal de Trévoux*); it gained a high and well-deserved reputation as a critical authority. In 1703 Jean Leclerc began, in continuation of his *Bibliothèque universelle et historique* (see above), a review entitled *Bibliothèque choisie*, which was issued until 1713 and was followed by his *Bibliothèque ancienne et moderne* (1714-27). These, as well as various other periodicals edited by Frenchmen in this period, were printed in Holland. Among them are to be noted reviews of particular foreign literatures, as the *Bibliothèque anglaise* (1717-19), and the *Mémoires littéraires de la Grande Bretagne* (1720-24) of Michel de la Roche (see above), and the *Bibliothèque germanique* (1720-40) of Jacques Lenfant. About this time the English periodical essay found imitators in France; Marivaux published in 1722 the *Spectateur français*, which was followed by a number of other publications of a similar character. Other literary journals were the *Mémoires secrets de la république des lettres* (1744-48); the *Observations sur les écrits modernes* (1735-43) of Desfontaines; the *Lettres sur quelques écrits de ce temps* (1749-54) and *L'année littéraire* (1754-90) of Fréron; and the *Observations sur la littérature moderne* (1749-52) and *L'observateur littéraire* (1758-61) of the Abbé de la Porte. In 1754 a review, the *Journal étranger*, designed to deal with foreign literature in general, was founded by Fréron, Grimm, Prévost, and others; it ceased to appear in 1762. This was followed by the *Gazette littéraire* (1764-66), in the editing of which Voltaire and Diderot had a hand. The *Mémoires secrets pour servir à l'histoire de la république des lettres* (1762-87), also called *Mémoires de Bachaumont*, from its founder, are an important record of contemporary social and literary conditions; the same is true of the *Correspondance littéraire secrète* (1774-93). Of a more general character were the magazines *Décade philosophique*—later the *Revue philosophique*—(1795-1807), of P. L. Ginguené, the most important French periodical of its time, and the *Magasin encyclopédique*, founded in 1792 and continued from 1817 as the *Annales encyclopédiques* and the *Revue encyclopédique*, until 1832. During the second half of this century appeared a number of periodicals dealing with special subjects, such as agriculture, commerce, political economy, military and naval affairs, and so on. In the early part of the nineteenth century, under both the Empire and the Restoration, the periodical as well as the newspaper press was ham-

pered by many restrictions and but little progress was made. In 1828 Guizot, Rémusat, and others started the *Revue française*, in imitation of the English reviews; it lived, however, only two years. In 1829 appeared the *Revue de Paris*, which was issued until 1848. The same year (1829) saw the founding of the *Revue des Deux Mondes*, by Ségur-Dupeyron and Mauroy; during 1830 it was not published, but in 1831 it reappeared, and ever since has maintained the high reputation which it at once attained. Pierre Leroux and George Sand started the *Revue Indépendante* in 1841; it ceased to appear in 1848. Many others, equally short-lived, followed it. Among the later literary periodicals are the *Nouvelle Revue* (1879—); *Le Livre* (1880—); the *Revue de Paris* (1894—); and the *Revue Britannique* (1825-1901).

MODERN GERMAN PERIODICALS. In Germany since the beginning of the eighteenth century development has been mainly in the direction of the learned, and, especially in recent times, of the scientific periodical. An extraordinary number of these have been published, many of them of great value. Literature, however, has also been well represented. Only a few of these journals can be mentioned. One of the earliest and most important was the *Neue Zeitungen von gelehrten Sachen*, founded by J. G. Krause in 1715 and carried on until 1797. "It was the first attempt to apply the form of the weekly political journal to learned subjects." Still more notable is the *Göttinger gelehrte Anzeigen*, founded 1739 as the *Zeitung von gelehrten Sachen*, and conducted from that time until the present by members of the faculty of the University of Göttingen, among whom have been Haller, Heyne, and Eichhorn. In 1766 the publisher Nicolai founded the *Allgemeine deutsche Bibliothek*, which was issued until 1806. Lessing and Mendelssohn aided in conducting the *Briefe die neueste Litteratur betreffend* (1759-65), also founded by Nicolai. Wieland founded *Der deutsche Merkur* (1773-89; revived 1790-1810). The *Allgemeine Literaturzeitung*, established by Bertuch in 1785 and issued until 1848, was one of the most important of German literary periodicals; the same may be said of the *Jenaische allgemeine Literaturzeitung* (1804-48), founded by Eichstädt. The *Wiener Jahrbücher der Litteratur* (1818-48) enjoyed a high reputation, as did, for its learning, *Hermes* (1810-31), founded by W. T. Krug. The *Jahrbücher für wissenschaftliche Kritik* (1827-46), published by Cotta, and the *Heidelberger Jahrbücher der Litteratur* (1808) should also be mentioned. Of more recent date are the *Deutsche Vierteljahrsschrift* (1838-70); *Die Grenzboten* (1841—); *Unsere Zeit* (1857—); *Preussische Jahrbücher* (1858—); *Die Gegenwart* (1872—); the *Literaturzeitung* (Jena, 1874—); *Deutsche Rundschau* (1874—); *Die Neue Zeit* (1872—); *Nord und Süd* (1878—); *Die Nation* (1888—); *Die Zukunft* (1892—).

PERIODICALS IN OTHER COUNTRIES. The development in other European countries has been similar, though less extensive. Italy, in which, as was stated above, the history of periodical literature dates back to the seventeenth century, exhibits a long list of notable literary journals. Among them are the *Frusta letteraria* (1763-65) of Giuseppe Baretti; the *Novella letteraria* (1740-70) of Giovanni Lami; the *Biblioteca italiana* (Milan, 1816-40); the *Progresso delle*

scienze (Naples, 1832-45); the *Rivista contemporanea* (Turin, 1853—); the *Giornale degli eruditi* (1883—); the *Rivista internazionale* (1869-83); and the *Giornale storico della letteratura italiana* (1883—). Spain and Portugal, Belgium, Holland, the Scandinavian countries, Russia, Greece, and the Slavic countries, are all represented by literary periodicals of prominence.

In all the countries mentioned above, periodicals dealing with theology or the interests and practical work of the various religious denominations; with science, either in general or in one or more of its special branches; with the arts or trades, or with other special themes (including periodicals of humor), multiplied greatly during the nineteenth century. Their history cannot be given here even in the briefest summary.

PERIODIC FUNCTION. See FUNCTION.

PERIODIC LAW. The generally accepted embodiment of the relations existing between the various properties of the chemical elements, so far as they can be compared with one another. It may be stated as follows: *If the elements are arranged in the order of their atomic weights, each of their properties varies as a periodic function of the atomic weight.*

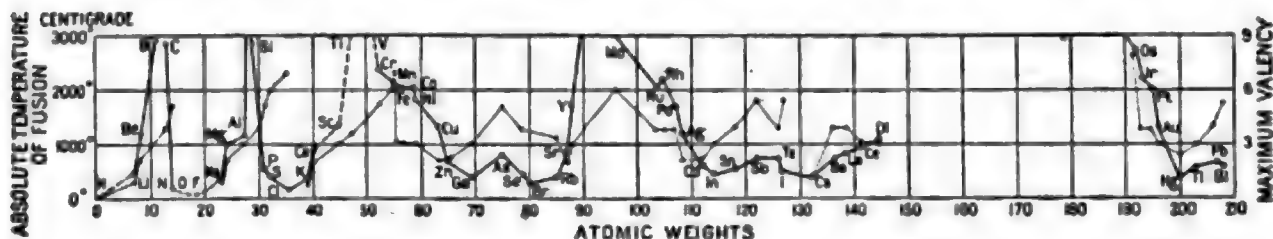
Ever since the work of Richter, Proust, and Dalton had established the idea of fixed numerical values attaching to the ingredients of compounds, an idea which was deduced by Dalton from the hypothetical existence of individual atoms, identical in size, mass and other properties for any one element, chemists sought to deduce a closer relationship between the various elements from a comparison of the masses of their respective atoms. (See CHEMISTRY and ATOMIC WEIGHTS.) The first attempt was that made by Dr. Proust in 1815 to prove that all the atomic weights were even multiples of the atomic weight of hydrogen, and that the latter was the only primitive element, from which the others were derived by processes of condensation. It was soon found that very few elements possessed atomic weights that could be expressed by integers, when the atomic weight of hydrogen was set at unity, and Proust's law was gradually modified to state that one-half the atomic weight of hydrogen, then that one-quarter, should be taken as the real standard. Refinements of investigation have since established the relative atomic weights to the second place of decimals, and it can now be asserted that the number of exact coincidences with Proust's law, as compared with that of deviations from it, is not much greater than what would be expected by the theory of chances. Proust's law has, therefore, been practically abandoned. On the other hand, interesting relations were found to exist between the atomic weights of similar elements. Thus Dobereiner established, in 1829, his so-called triads, sets of three closely related elements whose atomic weights were approximately in arithmetical progression, as lithium (7), sodium (23), and potassium (39); calcium (40), strontium (88), and barium (136); sulphur (32), selenium (79), and tellurium (127); chlorine (35.5), bromine (80), and iodine (127); iron (56), nickel (57), and cobalt (58). These triads were later extended to include longer sets, and it was also pointed out that the constant differences were in many cases multiples of 16, the atomic weight of oxygen, whence it was assumed that the heavier elements of a group might

be oxides of the lightest, thus reducing the number of primordial elements considerably. The idea of connecting all the atomic weights in a single progression wherein similar elements recurred at regular intervals seems to have first struck de Chaucourtois, and shortly afterwards Newlands; but the law in its complete form is due to Mendeléeff and Lothar Meyer, who reached the same conclusion independently in 1869. As Mendeléeff's exposition was by far the most convincing, he has been given the greater share of the credit.

A good idea of the fundamental principle can be obtained from the accompanying figure, in which the maximum valencies of the elements and their melting-points are shown to be periodically related to the atomic weights. The latter are laid off as abscissas, and the valencies and melting-points as ordinates, on perfectly arbitrary scales. It will be seen that the two curves connecting

other. In the eighth group occur triplets of closely analogous elements to be discussed below. Arrangements into fifteen or more individual groups, in place of the twin and triple groups here shown, have been suggested, but not generally adopted. Mention should also be made of the fact that this table can be constructed by writing the elements in the order of their atomic weights along a screw-line of slight pitch upon the surface of a cylinder, and then, as it were, unrolling the cylinder. Various efforts have been made to connect all the atomic weights by a graphic equation, which would provide for an arrangement on some other kind of a spiral curve, either on a plane or in space, but they have been only moderately successful.

Before proceeding with a discussion of the details of the table, it may be well to inquire what significance can be attached to this periodic variability of properties as functions of the atomic



the respective points are undulatory, with well-defined maxima and minima, which occur at regular intervals. The curves for most of the other properties which are capable of precise measurement are found to have a similar character; the maxima and minima, of course, do not always coincide with the same elements in one curve as in another, but the elements which occupy similar positions on one curve are also found to be similarly located on another. It is especially noticeable, moreover, that such curves indicate a relationship between the groups of elements, as well as between the elements themselves of each single group. Thus the properties of the alkaline-earth metals are always found to be intermediate between those of the alkalis and those of the aluminum group. Breaks in the continuity of the curves indicate lack of sufficient experimental data.

The arrangement of the elements, as shown in the accompanying table, is the one generally adopted at present, and includes all the well-known elements. An asterisk marks the elements discovered since 1869. Hydrogen occupies a unique position, and is generally omitted from the classification. Argon, helium, neon, and krypton cannot be properly included as yet, because their chemical behavior is still unknown. The vertical columns include the elements most closely associated with one another, and are known as *Groups I., II., etc.*; horizontally we have the *Series 1, 2, 3, etc.*, in which the similarities are not great, excepting that a parallelism exists between the elements of one series as compared with those of another. The elements in odd-numbered series bear a closer resemblance to one another than they do to the elements of the intervening even-numbered series, and vice versa, so that it has been found expedient to make two divisions of each group, as will be seen in the table, the odd-numbered series being set to one side, the even-numbered to the

weight. The many attempts to connect the atomic masses themselves in arithmetical relations would indicate a widespread opinion that the substances now called elements are really compounds of simpler substances, whose particles have a finite mass and represent individuals of distinct chemical properties, so that the chemical elements in each of the periodic groups might be likened to one of the 'homologous series' of organic compounds. (See, for example, HYDROCARBONS.) This view really antedates the periodic law, but fails in large measure to account for the resemblance existing between adjacent members of different groups. Others, especially Sir William Crookes, have held that the atoms are really fortuitous agglomerates of an indifferent primordial element, and that atoms of approximately the same mass behave similarly because they vibrate similarly, while atoms of greater mass might vibrate harmoniously with the smaller ones. It is difficult to explain, according to this hypothesis of the 'genesis of the elements,' why their number should be as limited as it is. But some facts are known vaguely pointing to the idea that the atoms of elements within the same periodic group are capable of vibrating at harmonically related rates, and that the great majority of chemical and physical properties depend upon atomic vibrations. It may, however, be argued that just as violin-strings may be composed of different materials and yet vibrate together according to common laws, so may the elements be composed of as many individual materials and still exhibit a periodic recurrence of properties, if the latter depend upon the harmonic vibrations of the atoms. Until much additional proof has been brought, the periodic law, while furnishing a vague indication, cannot be taken as positive evidence of the qualitative unity of matter.

In the table it will be found that the first group contains the univalent elements, the second group those which are divalent, and so on up

PERIODIC ARRANGEMENT OF THE ELEMENTS ACCORDING TO INCREASING ATOMIC WEIGHTS.

Relative Atomic Weight	I	II	III	IV	V	VI	VII	VIII
1	Group I Hydrogen 1.008							
2	Lithium 7.00	Bertholium 9.1	Boron 11.	Carbon 12.	Nitrogen 14.04	Oxygen 16.	Fluorine 19.	
3	Sodium 23.00	Magnesium 24.3	Aluminum 27.1	Silicon 28.4	Phosphorus 31.	Sulphur 32.07	Chlorine 35.45	
4	Potassium 39.1	Calcium 40.	Scandium* 44.1	Titanium 48.1	Vanadium 51.4	Chromium 52.1	Manganese 55.	Iron, 56.
5	Copper 63.6	Zinc 65.5	Gallium* 69.9	Germanium* 72.5	Arsenic 75.	Selenium 79.2	Bromine 79.90	Nickel, 58.7
6	Rubidium 85.4	Strontium 87.6	Yttrium* 89.9	Zirconium 90.4	Columbium 93.7	Molybdenum 96.		Cobalt, 59.
7	Silver 107.92	Cadmium 112.4	Indium 113.6	Tin 119.	Antimony 120.4	Tellurium 127.57	Iodine 126.90	Ruthenium, Rhodium, Palladium, Silver 101.7, 102.9, 106.4, 107.92
8	Cesium 132.9	Barium 137.4	Lanthanum 138.6	Cerium 139.4	Praseodymium* 140.5	Neodymium* 143.6		
9								
10			Erbium 160.3		Tantalum 182.8	Tungsten 184.8		Osmium, 191.
11	(Gold) 197.2	Mercury 200.	Thallium 204.1	Lead 206.9	Bismuth 208.1			Iridium, Platinum, Gold 193.1, 194.9, 197.2
12				Thorium 232.6	Uranium 238.6			

to the seventh, where the maximum valency is seven. The maximum valency of the elements of the eighth group may be set at eight, but their compounds rarely exhibit so high a valency, and in many other respects this eighth group is rather anomalous and is taken as a transition group between the seventh and the first. Thus the three elements copper, silver, and gold belong, with respect to many of their properties, especially when uncombined, in the eighth group; but their valency is usually low, and many of their salts are so similar to those of sodium that it is often found expedient to place them in the first group, in the positions occupied in the table by their names inclosed in parentheses. These valencies refer especially to the stable oxides. Stable compounds of hydrogen occur only in the fourth, fifth, sixth, and seventh groups, four atoms of hydrogen combining with one of each element of the fourth group, and this amount decreasing until we find the halogens in the seventh group univalent toward hydrogen. The first group includes the most electro-positive elements, and there is a steady transition toward the electro-negative end of the series in the seventh group, while the eighth group shows a rather sudden return toward the electro-positive side. The majority of the compounds derived from elements at the left end of the table are soluble, colorless, and volatile, whereas these properties change from left to right until we find the maximum of insolubility, color, and resistance to heat in the lower right hand of the table. It is also possible to select analogous compounds of the different elements and find those of similar properties fall within a well-marked zone upon the chart. Mendeléeff, in his original essay, added the following: (1) The elements which have the lowest atomic weights are those most widely distributed in nature, and also represent the most typical characteristics found in the second series of the table; (2) the atomic weight determines the character of an element; (3) from a consideration of their position in the system new analogies can be discovered between elements; (4) it may be expected that new elements should be discovered to fill blank spaces within the table, and their properties can be predicted from a consideration of those of the adjacent elements; (5) errors in the assumed atomic weights may be detected through an irregularity in the position of the element in the periodic system.

All of these statements have been verified, and the immediate acceptance of Mendeléeff's views was facilitated especially by the sensational discovery of a number of elements whose properties agreed accurately with those predicted by Mendeléeff. Thus gallium, germanium, and scandium had been completely described with respect to their own properties and those of their compounds before they were actually discovered. Success has also attended the attempts to correct atomic weights in several cases where the elements appeared misplaced in the original tables and were assigned to positions more in accordance with their properties, but necessitating the assignment of new atomic weights. (See ATOMIC WEIGHTS.) The weakest point of the table lies in the position of tellurium, which should fall in the sixth group, but is found to have a higher atomic weight than iodine, which undoubtedly belongs to the same series in the seventh group.

Efforts to explain this discrepancy have been so far unavailing. There are also a number of elements derived from the so-called rare earths whose place in the system is not readily assignable. In the latter case, however, it may be said, as well as in that of the atmospheric gases, argon, helium, neon, and krypton, that their properties and atomic weights are not so well established as to cast doubt upon the theory through their failure to coincide with it. One interesting result of the theory is that of limiting the probable number of chemical elements to about 120, since the actual number of blank spaces is limited, and since it is extremely unlikely that any elements remain to be discovered with an atomic weight less than that of hydrogen or greater than that of uranium.

Among the *physical properties* which appear as periodic functions of the atomic weight may be mentioned the densities of the uncombined elements and of their oxides, fusibility, atomic volume, crystalline structure of the compounds, coefficient of expansion, refractive index, conductivity for heat and electricity, color, and velocity as ions.

As an indication of some purely *chemical periodicities* the following conspectus has been arranged, in which the elements are indicated by their positions in the above table, and are generally enumerated in such order that the one which shows the property in the most marked degree has precedence. The maximum valency of the elements toward oxygen is indicated throughout by the Roman numeral of each group, omitting the 'peroxides,' in which the oxygen appears to be linked in a different manner.

Maximum valency toward hydrogen in stable volatile compounds:

Univalent: VII.; 2, 3, 5, 7; powerfully acid hydrogen compounds.

Divalent: VI.; 2, 3, 5, 7; faintly acid hydrogen compounds.

Trivalent: V.; 2, 3, 5, 7; basic acid hydrogen compounds.

Quadrivalent: IV.; 2, 3, 5; neutral acid hydrogen compounds.

Maximum number of hydroxyls in basic compounds:

One: I.; 1, 2, 3, 6, 8. III.; 11. VIII.; 6 (c and d).

Two: II.; 2, 4, 6, 8, 3, 5, 7, 11. IV.; 11. VIII.; 4 (bcd).

Three: III.; 3, 4, 5, 6, 7, 8, 10, 12. V.; 11. VII.; 4. VIII.; 4a.

Minimum valency in oxygen acids:

One: VII.; 3, 5, 7.

Three: V.; 2, 3, 5, 7. VI.; 3, 5, 7.

Four: IV.; 2, 4, 3, 5, 7, 11.

Five: V.; 4, 6, 10.

Six: VI.; 4, 6, 10. VII.; 4. VIII.; 4a.

Tendency to liberate hydrogen from water below red heat:

I.; 2, 3, 4, 6, 8. II.; 2, 3, 4, 6, 8. VIII.; 4a.

Tendency to liberate oxygen from water:

VII.; 2, 3, 5.

Elements whose chlorides are unstable toward water:

V.; 3, 5, 7, 11, 4, 6, 10, 12. VI.; 10, 6, 4.

Elements whose sulphides can be precipitated from dilute acid solution:

VIII.; 4d, 6 (abcd), 10 (abcd). II.; 11, 7.

III.; 11, 7. IV.; 11, 7, 5. V.; 11, 7, 5.

VI.; 12, 10, 6.

Ability to form alums with the sulphates of I.; 2, 4, 6, 8:

III.; 2, 4, 6, 10. VI.; 4. VII.; 4. VIII.; 4a.

Ability to form volatile compounds with organic radicles:

With one methyl group: I.; 3. vii.; 2, 3, 5, 7.

With two methyl groups: II.; 3, 5, 7, 11. VI.; 2, 3, 5, 7.

With three methyl groups: III.; 2, 3, 5, 7, 11. V.; 2, 3, 5, 7, 11.

With four methyl groups: IV.; 2, 3, 5, 7, 11.

Ability to form complex bases with ammonia:

VIII.; 4 (cd), 6 (abcd), 10 (abcd). VI.; 4. II.; 3, 11.

Consult: Newlands, *On the Discovery of the Periodic Law and on Relations Among the Atomic Weights* (London, 1884); Huth, *Das periodische Gesetz der Atomgewichte und das natürliche System der Elemente* (Frankfurt a. O., 1884); Belaar, *Das periodische Gesetz und das natürliche System der Elemente* (Laibach, 1897); Mendeléeff, "The Principles of Chemistry," in *A Library of Universal Literature* (New York, 1901); Venable, *A Bibliography of the Periodic Law* (Easton, Pa., 1896).

PER'ICE'CI (Lat., from Gk. Περιωικοι, *Perioikoi*, dwellers round, i.e. round about some particular locality or city, from περιοικεῖν, *perioikein*, to dwell around, from περί, *peri*, around + οἰκεῖν, *oikein*, to dwell, from οἶκος, *oikos*, house). The subject population of Laconia and the Spartan territory. They were not slaves like the Helots (q.v.), and seem to have been allowed to govern their own towns, under Spartan oversight; but they could hold none of the higher offices of State, had no share in the general government, and, we are told, could be put to death by the ephors without a trial. They paid a contribution to the kings, but otherwise seem to have been only taxed, like the Spartans, in time of war. As the choicest lands belonged to Spartans, the Perioeci seem to have devoted themselves largely to manufacture and trade, which were forbidden to the Spartans. Their work in metal, especially armor, wool, and leather, was celebrated and found a ready sale in foreign parts, and their coast towns seem to have enjoyed a flourishing commerce. Their numbers must have been considerable, even though the hundred cities of Strabo were probably most of them of no great size. They were always more numerous than their superiors, the Spartans, and this disparity increased greatly during the fourth century B.C.; but, though chafing under their inferiority, the Perioeci remained loyal till the Theban invasion after the battle of Leuctra (B.C. 371), when many of them joined the victors. They were evidently trusted by the Spartans, for they not only served as light-armed troops, but formed no small part of the heavy-armed forces, while the Spartan fleet must have been almost wholly dependent upon them, and in some cases we find one of their number in command of a squadron or an allied fleet. As the acquisition of the Spartan territory was a gradual conquest, it is not likely that all the Perioeci had the same position. It may also be regarded as certain that while there may have been an Achaean element in some communities, the bulk of the Perioeci were Dorian. They are called Lacedaemonians, but not Spartans.

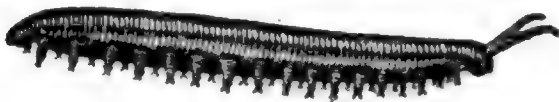
PER'IOS'TEUM Neo-Lat., from Lat. *periostion*, from Gk. περιόστεος, *periosteos*, surrounding the bones, from περί, *peri*, around + ὀστέον, *osteon*, bone). A tough fibrous membrane which surrounds each bone. It is highly vascular, and is the means by which the outer layers of the shafts and the greater part of the spongy portions of the bones are supplied with blood. It consists of an outer or fibrous layer and an inner or osteogenetic layer. The inner layer is very vascular and contains many protoplasmic cells called *osteoblasts*. Numerous experiments show that the formation of bone is essentially due to the action of the periosteum; and that, by transplanting detached portions of periosteum into muscular or other tissues, bony tissue is generated in those parts. In most cases in which this membrane has become detached in consequence of a wound or of disease, the exposed bone (except in the instance of the skull, which derives most of its nutrient matter from the dura mater, which is really the periosteum of the inner surface of the skull) perishes; but this is not invariably the case. Among its other offices, it serves, by isolating the bone from the surrounding tissues, to prevent the spread of disease from them to it. The shin-bone, or tibia, is thus indebted to the periosteum for its ordinary immunity in cases of ulcer in that region.

PER'IOSTI'TIS (Neo-Lat., from *periosteum*). An inflammation of the periosteum (q.v.). It occurs generally on the surface of thinly covered bones, such as the tibia, clavicle, or cranial bones. It may be caused by injury, and is part of acute osteomyelitis (q.v.); and like this disease, it is often brought on in boys and young men by bathing in cold water after violent exercise, or by similar forms of exposure. When the affection is caused by syphilis, oval swellings called nodes (q.v.) are produced, and there is considerable nocturnal pain. Rheumatism and tuberculosis are also causes. The acute form of periostitis must be treated with poultices and antiphlogistic remedies, and opiates given to relieve the severe pain. Severe cases must be incised freely in order to relieve pressure and allow of drainage if pus has formed. The treatment of the chronic forms of this affection must be mainly directed to the diseases which originated them.

PERIPATETIC PHILOSOPHY (Lat. *peripateticus*, from Gk. περιπατητικός, *peripatētikos*, given to walking about, from περιπατέω, *peripatein*, to walk about, from περί, *peri*, around + πάτεω, *patein*, to walk, from πάτος, *patos*, path). A name applied to the philosophy of the school of Aristotle, derived, according to some, from the name of the building in which Aristotle lectured. As a school, the Peripatetics had comparatively little interest in metaphysical problems, and spent most of their effort on the study of nature and on an attempt to popularize the study of ethics. Some of them modified to a great extent the teaching of Aristotle, chiefly in a naturalistic direction. The later members of the school were in general faithful to his teachings, and derived much of their importance from their careful work in the arrangement and explanation of his writings. The two most prominent leaders, after Aristotle's death, were Theophrastus of Lesbos and Eudemus of Rhodes, who developed his syllogistic methods of reasoning, and in the main did little more than supplement his work. Theophrastus was suc-

ceeded as head of the school in B.C. 288 or 287 by Strato of Lampsacus, who held the position for eighteen years, and whose teaching was in the direction of a consistent naturalism. Andronicus of Rhodes, about 70 B.C., did much for the study of Aristotle; and to him is probably due the received arrangement of his works, beginning with the Logic as a necessary foundation. The Peripatetics of the period following this, while they did much for exegesis, showed a leaning toward Stoicism, and by their eclectic tendency prepared the way for the combination of various systems characteristic of Neo-Platonism.

PERIPATUS (Neo-Lat., from Gk. *περιπατος*, a walking around, from *περιπατεῖν*, *peripatein*, to walk around). This strange creature stands alone, with no animals intermediate between itself and the worms on the one hand, and the true Arthropoda on the other. Originally supposed to be a worm, it is now referred to a class by itself, the Malacopoda of Blainville, or Protracheata of Haeckel. It lives in the tropics, in damp places under decaying wood. In general appearance it somewhat resembles a caterpillar, but the head is soft and worm-like, though it bears a pair of antenna-like tentacles. It may be said rather to resemble superficially a leech with clawed legs, the skin and its wrinkles being like those of a leech. There is a pair of horny jaws in the mouth, but these are more like the pharyngeal teeth of worms than the jaws of arthropods. The numerous legs end each in a pair of claws. The ladder-like nervous system is unlike that of annelid worms or arthropods, but rather recalls that of certain mollusks, as well as that of certain flatworms and nemertine



PERIPATUS.

worms. Its annelid features are the large number of segmentally arranged true nephridia, and the nature of the integument. Its arthropodan features, which appear to take it out of the group of worms, are the presence of tracheæ, of true salivary and slime glands, of a pair of coxal glands, as well as of claws at the end of the legs. The heart is arthropodan, being a dorsal tube lying in a pericardial sinus with many openings. This assemblage of characters is not to be found in any marine or terrestrial worm.

The tracheæ are fine unbranched tubes, without a spiral thread, and are arranged in tufts, in *Peripatus Edicardsii*, opening by simple orifices or pores (stigmata), scattered irregularly over the surface of the body; but in another species (*Peripatus Capensis*) some of the stigmata are arranged more definitely in longitudinal rows on each side, two dorsally and one ventrally. The stigmata in a longitudinal row are, however, more numerous than the pairs of legs.

The salivary glands, opening by a short common duct into the under side of the mouth, in the same general position as in insects, are evidently, as the embryology of the animal proves, transformed nephridia, and, being of the arthropodan type, explain the origin and morphology of those of insects. It is so with the slime glands, these, with the coxal glands, being transformed and very large dermal glands. Those of insects arose

in the same manner, and are evidently their homologues, while those of Peripatus were probably originally derived from the setiparous glands in the appendages (parapodia) of annelid worms.

The genital glands and ducts are paired, but it is to be observed that the outlets are single and situated at the end of the body. In the male the ejaculatory duct is single; in its base a spermatophore is found. It will be seen, then, that Peripatus is not only a composite type, and a connecting link between worms and tracheate arthropods, but that it may reasonably be regarded, if not itself the ancestor, as resembling the probable progenitor of chilopods, myriapods, and insects, though of course there is a very wide gap between Peripatus and the other antennate, air-breathing Arthropoda.

Consult: Moseley, "On the Structure and Development of Peripatus Capensis," in *Philosophical Transactions of the Royal Society* (London, 1874); A. Sedgwick, "The Development of Peripatus Capensis," parts i., ii., iii., in *Quarterly Journal of Microscopical Science* (London, 1885-87); Packard, *Text-Book of Entomology* (New York, 1898).

PERIPLUS (Lat., from Gk. *περίπλους*, *periploos*, *περίπλους*, *periplous*, voyage round, from *περίπλεω*, *periplein*, to sail round, from *περί*, *peri*, around + *πλεῖν*, *plein*, to sail). A name for various ancient maritime itineraries, as that of Hanno (q.v.).

PERIPNEUMONIA (Neo-Lat., from Gk. *περιπνευμονία*, inflammation of the lungs). An old term for pneumonia (q.v.).

PERIPTERAL (from Lat. *peripteros*, from Gk. *γερύπτερος*, with a single row of columns around, from *περί*, *peri*, around + *πτερόν*, *pteron*, wing, row of columns). A term applied to temples or like buildings entirely encircled by a row of free-standing columns. The Greek temples were nearly always peripteral, while the Roman temples were not.

PERISPERM (from Gk. *περί*, *peri*, around + *σπέρμα*, *sperma*, seed). The nutritive tissue in seeds outside of the embryo-sac. It is derived from the tissue of the nucellus which has not been destroyed by the encroachment of the sac. The ordinary nutritive tissue of seeds is developed within the embryo-sac, and is known as 'endosperm.' See SEED.

PERISODACTYLA (Neo-Lat. nom. pl., from MGk. *περισσοδάκτυλος*, *perissodaktylos*, having an odd number of toes, from Gk. *περισσός*, *perissos*, beyond the regular number or size, odd + *δάκτυλος*, *daktylos*, finger, toe). A suborder of the Ungulata, containing all those forms which have an odd number of toes, as distinguished from the even-toed ungulates, Artiodactyla. The third digit is always the largest and sometimes the only functional one. The carpal, metacarpal, tarsal, and metatarsal bones are correspondingly modified. The stomach is simple and non-ruminant. In all living forms the horns, if present, are median and not lateral. Many fossil forms are known, but the living species are comparatively few, and are naturally and easily grouped in three families—the tapirs, rhinoceroses, and horses. See UNGULATA.

PERISTALTIC MOTION (from Gk. *περισταλτικός*, *peristaltikos*, compressive, from *περιστέλλειν*,

peristellein, to wrap around, from *περί*, *peri*, around + *στέλλειν*, *stellein*, to place, to compress). The terms *peristaltic* and *vermicular* are applied to the peculiar wave-like motion or action of the stomach and intestines by which the food is regularly moved onward. Peristalsis takes place from one end of the intestinal tract to the other, but it is seen at its best in the small intestine. Peristaltic movements are effected by the alternate contraction and dilatation of successive portions of the muscular coats. These coats are two in number, an external longitudinal and an internal circular layer of fibres, under the control of the sympathetic nervous system through the agency of the *ganglionic plexus* situated in the intestinal walls. In peristalsis the longitudinal fibres contract first, and draw the intestine backward over the substance to be propelled, shortening and dilating the tube at this point, while the circular fibres of the same part contract in succession from above downward, forcing the substance into the next portion of the intestine, where the same process is repeated.

Under ordinary circumstances peristalsis gives rise to no sensation, the presence of food being just sufficient stimulus for a gentle and normal action. In the presence of irritating substances, however, peristalsis becomes painful, violent, and spasmodic. When the intestinal canal is empty there is probably little or no movement. See DIGESTION.

PERISTOME (from Gk. *περί*, *peri*, around + *στόμα*, *stoma*, mouth). The fringe of teeth around the mouth of a moss capsule. See MUSCI.

PERISTYLE (from Lat. *peristylum*, Gk. *περίστυλον*, *peristylon*, a building with columns around). In architecture, a line of columns about a building or a court.

PERTT, PELATIAH (1785-1864). An American merchant and philanthropist, born in Norwich, Conn., of Huguenot ancestry, and educated at Yale College, where he graduated in 1802. After acting as a clerk in a Philadelphia importing house (1805-09), he went to New York City, where he entered the firm of Goodhue & Co., shipping merchants, in 1817. From 1853 to 1863 he was president of the Chamber of Commerce, and in the latter year retired from business. Perit was prominent in many charities, especially in behalf of seamen, as a member of various boards of the Presbyterian Church, and as an officer of the American Bible Society. In 1857, during the war between the New York 'municipal' and 'metropolitan' police, he was police commissioner and did much to restore order. His projected history of American commerce, begun after his retirement from business, was not completed.

PERITONEUM (Lat. *peritoneum*, *peritonæum*, from Gk. *περιτόναιον*, *peritonaion*, neu. sg. of *περιτόναιος*, *peritonaïos*, stretched around, from *περιτείνειν*, *periteincin*, to stretch around, from *περί*, *peri*, around + *τείνειν*, *teincin*, to stretch). A serous membrane which more or less completely invests all the viscera lying in the abdominal and pelvic cavities, and is then reflected upon the walls of the abdomen, so that there is a visceral and a parietal layer. Numerous folds are formed by the visceral layer as it passes from one organ to another. They serve to hold the parts in position, and at the same time inclose vessels and nerves. Some of these folds

are termed *ligaments*, from their serving to support the organs. Thus we have ligaments of the liver, spleen, bladder, and uterus formed by peritoneal folds. Others are termed *mesenteries*, and connect the intestines with the vertebral column. They are the mesentery proper (q.v.), which has been already described, the ascending, transverse, and descending meso-colon, and the meso-rectum. Lastly, there are folds called *omenta*, which proceed from one viscus to another. They are three in number—viz. the *lesser* or *gastro-hepatic omentum*, which extends from the under surface of the liver to the lesser curvature of the stomach; the *gastro-splenic omentum*; and the *great* (or *gastro-colic*) *omentum*, which consists of four layers of peritoneum, the two which descend from the stomach, and the same two returning upon themselves, and ascending as high as the transverse colon, where they separate, and inclose that organ. These separate layers may be easily seen in the young subject, but in the adult they are more or less blended. The great omentum always contains some adipose tissue, which in corpulent persons often accumulates to an enormous extent. Its use appears to be (1) to protect the intestines from cold and from injury by covering them anteriorly as with an apron, and (2) to facilitate their movement upon each other during their vermicular action. In the female the peritoneal cavity is not completely closed, as the Fallopian tubes open into it by their free extremities. Inflammation of the peritoneum is termed *peritonitis* (q.v.).

PERITONITIS (Neo-Lat., from Lat. *peritoncum*, *peritonæum*, peritoneum). An inflammation of the peritoneum (q.v.).

Peritonitis may be acute or chronic, primary or secondary. Primary or idiopathic inflammation of the peritoneum occurs after exposure to cold or wet, and is sometimes known as rheumatic peritonitis. Its rarity is rather remarkable, considering how frequently the pleura, pericardium, and similar structures are affected. Secondary peritonitis is due to an extension of inflammation from or perforation of one of the abdominal viscera. By extension it may follow an inflammation of the stomach or intestines, or extensive ulcerations of these parts, abscess of any of the solid organs, or of the retro-peritoneal tissues. Perforative peritonitis commonly arises from penetrating wounds, ulcer of the stomach, or bowels. An important cause is perforating appendicitis, which is responsible more often than any other single cause, and especially in young adult males. A more liberal blood supply renders the appendix of the female less liable to damage, but, on the other hand, the generative organs are a frequent means of introducing an infection into the peritoneal cavity.

Acute peritonitis generally presents well-marked symptoms. It commences with a chill, or severe pain in the abdomen may be the first symptom. The pain is at first confined to particular spots (usually in the lower part of the abdomen), but it soon extends over the whole abdominal region. It is increased, on pressure, to such an extent that the patient cannot even bear the weight of the bedclothes; and to avoid, as far as possible, internal pressure upon the peritoneum, he lies perfectly still, on his back, with the legs drawn up, and breathes by means of the ribs, in consequence of the pain occasioned by the descent of

the diaphragm in inspiration. The breathing is shallow, and, less air being admitted at each movement of respiration, the number of those movements is increased. There are 40 or even 60 respirations a minute, instead of 18 or 20. The pulse is very frequent, often 120 or more in the minute, and small and tense, though occasionally strong and full at the commencement of the attack. The temperature may rise rapidly after the chill to 104° or 105°, but is subsequently lower. Some very severe cases have no fever throughout the attack. Vomiting is an early and prominent symptom and causes great pain. After the disease has continued for a certain time, the belly becomes tense and swollen, the enlargement being caused at first by flatus, and afterwards also by the effusion of fluid.

The appearance of the patient when at the height of the disease is very characteristic. The 'Hippocratic countenance' is more often observed in peritonitis than in any other disease except cholera—"a sharp nose, hollow eyes, collapsed temples; the ears cold, contracted, and their lobes turned out; the skin about the forehead being rough, distended, and parched; the color of the whole face being brown, black, livid, or lead-colored." Acute diffuse peritonitis is usually fatal in from two to ten days. Often death occurs with great suddenness, due to cardiac paralysis.

Chronic peritonitis may result from an attack of the acute form, producing adhesions, either local or general, between the peritoneal surfaces. The intestines may be matted together or compressed at particular points by fibrous bands. Often there are no symptoms, but if the intestine is constricted colicky pains will be felt. Tuberculosis may cause either acute or chronic peritonitis, but usually the latter. It occurs at all ages and presents symptoms of extraordinary complexity and diversity. Sometimes the condition is discovered by accident, during an operation for some other trouble. Caseous masses form, the mesenteric glands are enlarged, and the omentum is irregularly thickened. These masses can be felt through the abdominal walls. Cancerous peritonitis is usually an extension from some other organ.

The treatment of acute peritonitis must be prompt, vigorous, and persistent. In the earliest stage it may be aborted or limited by the use of ice bags locally, and a saline or calomel purge. Complete rest is demanded at all stages of the disease. The intestinal movements may be quieted and pain allayed by the administration of opium, and in the height of the disease this is the only drug worth considering. Tolerance to opium in peritoneal inflammation is great, and comparatively large doses must be given. When due to perforation, as in appendicitis, prompt operation will often prevent the spread of the infection. Tubercular peritonitis is often cured by simply opening the abdomen, exposing the tuberculous masses to the air, and flushing out the cavity with saline or antiseptic solutions. General treatment is unsatisfactory, but fresh air, tonics, cod-liver oil, and creosote may effect a cure.

PERITYPHLITIS (Neo-Lat., from Gk. *peri*, around + *typhlos*, typhlos, blind, with allusion to the cæcum). An inflammation of the peritoneal covering and the loose connective

tissue attaching the cæcum and ascending colon to the iliac fascia. Formerly what is now known as appendicitis was thought to be due to inflammation of the cæcum, or typhlitis, and of the peritoneum covering it, or perityphlitis; but these conditions are now believed to exist independently of appendicitis only in exceptional cases. See CÆCUM; COLON; VERMIFORM APPENDIX.

PERIWINKLE (AS. *pervinea*, *pervince*, *per-vinke*, from Lat. *pervinea*, periwinkle, from *per*, through + *vinca*, twist, from *vincire*, to bind), *Vinca*. A genus of plants of the natural order Apocynaceæ, having a five-cleft calyx and a salver-shaped corolla, bearded at the throat, with five obliquely truncated segments, opposite evergreen leaves, and flowers which grow singly or in pairs from the axils of the leaves. The lesser periwinkle (*Vinca minor*), growing in woods and thickets of Europe, is a half-shrubby plant with trailing stems, which root at their extremities, ovate-lanceolate leaves, and pale-blue or sometimes white or reddish-purple flowers. The

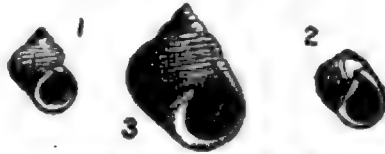


GREATER PERIWINKLE.

greater periwinkle (*Vinca major*), which has much larger flowers and ovate-cordate ciliated leaves, is a native of the south of Europe. These species are commonly planted in shrubberies and gardens because they rapidly cover unsightly objects with pleasing green foliage, and produce beautiful flowers at almost all seasons of the year, even in mild winters. They have escaped in the United States. The former is very commonly found and the latter, which is less hardy, occasionally. The herbaceous periwinkle (*Vinca herbacea*), an Hungarian species, is remarkable for the abundance of its flowers. The rose-colored periwinkle (*Vinca rosea*), a native of Madagascar, is a favorite greenhouse plant.

PERIWINKLE. A small gastropod mollusk of the genus *Littorina*, characterized by the shell being top-shaped, solid, the columella thickened, the lip of the aperture simple, not toothed, and the round aperture closed by a horny operculum. The animal has long tentacles, with an eye at the base of each tentacle. Periwinkles

either lay eggs or are ovoviviparous. They abound in vast numbers on the rocky shores of the North Atlantic between tide-marks, and especially near low-water mark. They feed on seaweeds. Our two native species are *Littorina rudis*, rather elongated with a high spire, and *Littorina palliata*, which has a low spire, with



AMERICAN PERIWINKLES.

1. *Littorina rudis*. 2. *Littorina littorea*. 3. *Littorina palliata*.

the body-whirl rather swollen. The latter varies greatly in color from pure olive green to yellow or even bright red, with revolving black lines, the colors more or less simulating that of the seaweeds among which it lives.

A much larger species, and now more abundant on the coast north of New York than any other, is *Littorina littorea*, which in 1857 was introduced from Europe into Nova Scotia and now abounds in vast numbers all along the coast. It lives nearer low tide than the native species, and frequents exposed rocks not covered by seaweeds. It is a much larger and heavier shell than the others, and varies much in the height of the spire. Bumpus has shown that since its introduction into America, where it has been subjected to a new environment, this shell differs from those of England in being more elongated, lighter in weight, more bulky, while the color-markings are less pronounced. It also appears that there are already many local races on the New England coast. These mollusks are able to live for days and even weeks out of the sea, in one case four months. The power of resisting dryness seems to be still greater with tropical species. In Jamaica *Littorina muricata* lives among grass and herbage at the top of low cliffs. At Panama three large species were found on trees at and above high-water mark. The eggs of those *Littorinæ* which are not ovoviviparous are deposited on seaweeds, rocks, etc., enveloped in a glairy mass just firm enough to retain its shape.

The name 'periwinkle' is given popularly to almost any small spiral shell, especially along the shores of the Great Lakes to the turret-shaped pulmonates of the genus *Melania*. In the shortened form 'winkle' it is applied by the oystermen in the neighborhood of New York to the conchs (*Fulgur*) which feed upon the oyster beds.

PERJURY (Lat. *perjurium*, false oath, from *perjurus*, one who swears falsely, from *perjurare*, to swear falsely, from *per*, through + *jurare*, to swear, from *jus*, right, law). The crime of knowingly and willfully giving false testimony, which is material to the questions in issue in a judicial proceeding. The offense is committed whether the testimony is given under an oath or affirmation, provided either is administered by a competent authority. If a witness makes a misstatement through inadvertence or mistake he is not guilty of the crime. If he recklessly and knowingly makes a statement as to the truth or falsity of which he has no knowledge, it has been held to constitute perjury. A witness may be convicted of perjury under such circumstances even though the facts he testifies to subsequently

prove to be true. It is not essential to constitute the offense that the testimony be believed, or that it cause a perversion of justice in the cause in which it is given. Where a witness honestly states his opinion as to a fact, if it is not correct, he is not liable; but if the fact is material to the issue, and he makes a willfully false statement as to it, he is guilty of perjury.

In most jurisdictions a voluntary oath, taken outside a judicial proceeding, cannot be made the basis of a charge of perjury, as the law does not punish criminally prevarication in private matters. An exception to this exists under the laws of the United States. See OATH.

At the early common law the testimony of two witnesses was necessary to convict a witness of perjury. However, to-day in most jurisdictions the testimony of one witness and proof of corroborating circumstances is sufficient, if credible.

Perjury has always been severely punished, as it tends to the perversion and obstruction of justice. In ancient times in England the penalty was death; subsequently banishment or cutting out the tongue; after the Norman era, forfeiture of goods and imprisonment; and at present in England and the United States it is punished by fine or imprisonment, or both. In a few States a person so convicted is thereafter incompetent to give testimony in judicial proceedings.

Subornation of perjury consists in inciting or procuring another to commit perjury. The witness must have actually committed perjury in order to render the person who incited him to do so guilty of the crime. An attorney calling a witness who he believes will not tell the truth does not thereby become liable if the witness does in fact commit perjury, if he did not actually connive at it, or solicit him to do so. Subornation of perjury is usually punished with as much severity as perjury itself. See OATH; WITNESS. Consult the authorities referred to under CRIMINAL LAW and EVIDENCE.

PERKINS, CHARLES CALLAHAN (1822-86). An American art-historian, born in Boston. After graduating from Harvard he lived for a time in Rome, then studied painting in Paris under Ary Scheffer, and on a subsequent visit in 1865 took up etching under Bracquemont and Lalauze. He was one of the founders and honorary director of the Boston Museum of Fine Arts, and in 1868 became a corresponding member of the French Institute. He also cultivated music, was president of the Handel and Haydn Society in 1870-83, and occasionally conducted its performances. Through his writings and lectures he contributed much to the promotion of art in this country, and enjoyed wide reputation as a critic. He published: *Tuscan Sculptors* (1864), *Italian Sculptors* (1868), both with etchings by the author; *Art in Education* (1870); *Raphael and Michelangelo* (1878), a biographical and critical essay; *Sepulchral Monuments in Italy* (1883); and *Ghiberti et son école* (1885). *The Historical Handbook of Italian Sculpture* (1883) is practically a new edition of *Tuscan Sculptors* and *Italian Sculptors*. He was also critical editor of the *Cyclopædia of Painters and Painting*, edited by Champlin (1885-87).

PERKINS, ELISHA (1741-99). An American physician, born in Norwich, Conn. He is chiefly known for the invention in 1796 of Perkins's

metallic tractors, pins or bars of iron and brass, supposed to possess curative virtues, which were drawn in a certain way over the affected parts in rheumatism, gout, neuralgia, and local inflammations. This method of treatment was called Perkinism and for a time it enjoyed a certain vogue both in Europe and America. Perkins afterwards invented a medicine for fevers, whose efficacy he undertook to prove during the yellow-fever epidemic in New York in 1799, but he himself fell a victim to the disease.

PERKINS, FREDERIC BEECHER (1828-99). An American librarian and author, born at Hartford, Conn. He left Yale before graduation to study law, and was admitted to the bar in 1851. For three years he was associate editor of *Barnard's American Journal of Education*. After some experience as secretary of the Boston Public Library, he was librarian of the free library at San Francisco from 1880 to 1887. His publications include: *Scope, or the Lost Library*, a novel (1874); *Check List of American Local History* (1876); *Devil Puzzlers, and Other Studies* (1877); *My Three Conversations with Miss Chester* (1877); and a *Life of Dickens* (1877).

PERKINS, GEORGE HENRY (1844-). An American naturalist, born at Cambridge, Mass. He was educated at the Knox Academy, Galesburg, Ill., and at Yale (1867). In 1869 he was appointed professor of natural history in the University of Vermont, and in 1898 dean of the natural science department. He served as State entomologist from 1880 until 1895, when he was made State geologist. His publications include State reports *On the Injurious Insects of Vermont* (3 vols., 1876-78); *Parasites Infesting Man and the Lower Animals* (1880); *The Flora of Vermont* (1888); and *The Marble, Slate, and Granite Industries of Vermont* (1898).

PERKINS, JACOB (1766-1849). An American inventor, born at Newburyport, Mass. While still a boy serving his apprenticeship to a goldsmith, he invented a process of plating shoe-buckles. In 1787 the Massachusetts State Government engaged him to cut dies for its mint. Later he improved bank-note engraving by substituting steel plates for copper, and in 1800 he invented a machine by which nails could be cut and headed at the same time. When 52 years of age, he went to London, where he secured remunerative contracts. He supplied plates to the Bank of Ireland, built steam-engines, and completed a number of inventions, among which were a process for transferring engravings from one steel plate to another; the pleometer, an instrument to measure the speed of ships; the bathometer, an instrument to measure the depth of water; and a rapid-firing gun, which could discharge nearly 1,000 rounds per minute.

PERKINS, JAMES BRECK (1847-). An American historian and politician, born at Saint Croix, Wis. He graduated at the University of Rochester in 1867, was City Attorney there from 1874 to 1878, and became a member of the New York Assembly in 1898, and of the United States House of Representatives in 1901. His publications include: *France Under Richelieu and Mazarin* (1887); *France Under the Regency* (1892); *France Under Louis XV.* (1897); and *Richelieu* (1900), in the "Heroes of the Nations" series.

PERKINS, JUSTIN (1805-69). An American missionary. He was born at West Spring-

field, Mass.; graduated at Amherst College in 1829; studied theology at Andover; embarked at Boston, 1833, as a missionary of the American Board; and established the Nestorian mission at Urumiah, Persia, in 1834. He was joined by Dr. Asahel Grant (q.v.) in 1835. In 1842 he visited the United States, accompanied by Mar Yohannan, the Nestorian bishop. Besides a translation of the Bible into modern Syriac (2 vols., 1846-52), and commentaries on Genesis and Daniel (1869), Dr. Perkins published *Eight Years in Persia* (1843); *Missionary Life in Persia* (1861).

PERKINS, THOMAS HANDASYD (1764-1854). An American merchant and philanthropist; born in Boston. In 1785 he entered into partnership with his brother James in Santo Domingo, and was later representative of the firm in the United States. In 1789 he went to Batavia and Canton, to familiarize himself with the Chinese and East Indian trade, and after his return settled in Boston, where he became very successful. He was one of the originators of the Quincy Railroad, the first in the United States, founded the Perkins Asylum for the Blind, contributed liberally toward the erecting of the Bunker Hill Monument, and was one of the chief benefactors of the Boston Athenæum and the Massachusetts General Hospital. Consult Cary, *Memoirs of Thomas Handasyd Perkins* (Boston, 1856).

PERKIN WARBECK. A pretender to the throne in the reign of Henry VII. of England. See WARBECK, PERKIN.

PERKIN WARBECK, THE CHRONICLE HISTORY OF. A tragedy by John Ford (1634), on the career of the pretender of that name, and the most faultless of Ford's plays. The source was probably Bacon's *Life of Henry VII.*

PERKNITE (from Gk. *περκνός*, *perknos*, dark; connected with Skt. *prāni*, spotted). An igneous rock of granitic texture, composed essentially of augite or hornblende. The term is applied rather to a family of rocks than to an individual species. Perknites are rich in lime and magnesia and low in silica, alumina, and the alkalies. They have generally been included under the family name pyroxenite (q.v.), which has a wider scope of meaning, and includes magnesian as well as lime-magnesian rocks.

PERLES, pēr'lēs, JOSEPH (1835-94). A German rabbi and Orientalist. He was born at Baja, in Southern Hungary, and studied there and at Breslau, where he graduated, having already contributed to the *Monatsschrift für Geschichte und Wissenschaft des Judenthums*, a valuable thesis, "Meletemata Peschitthoniana" (1859). This monograph advanced the theory that the Peshitto version, though preserved only by the Christian Church, is Jewish in tone and influence. In 1862 he became rabbi at Posen, whence he went to Munich in 1871. Besides the dissertation already mentioned, Perles published valuable papers on the history of the Jews during the Middle Ages, and on Hebrew etymology and philology.

PERM, pĕrm. A government of Eastern Russia, bounded by the Government of Vologda on the north, Tobolsk on the east, Orenburg and Ufa on the south, and Vyatka on the west (Map: Russia, J 2). Area, about 128,300 square miles. While politically a government of European Russia, geographically Perm belongs partly to Asia. The centre of the region is occupied by the Ural

Mountains (q.v.), which traverse the district from north to south. They hardly exceed 5000 feet in their highest points. The eastern part of the government is lower than the western. (For geology, see PERMIAN SYSTEM.) Perm is watered by the Kama, Petchora, and Sosva, with their tributaries. The largest of these streams are navigable.

The climate is continental and harsh, especially in the mountainous districts of the centre. In regard to its mineral deposits Perm exceeds every other government of European Russia. The chief minerals are gold, silver, iron, copper, platinum, nickel, zinc, coal, and salt. Precious stones, such as sapphires, jacinths, topazes, and many others, are also found in considerable quantities. The mining of iron and copper employs over 190,000 persons. The value of the annual output is estimated at over \$28,000,000. The annual output of gold exceeds \$2,500,000, while the output of coal is as yet slight.

Agriculture is carried on all over the district, but only in the black-soil region of the south is the supply equal to the demand. Stock-raising is especially developed among the Bashkirs. Perm has extensive forests which cover over 80 per cent. of the total area. Lumbering and ship-building are carried on to some extent. The house industry is favored by the abundance of natural resources. The products of that industry include hardware, pottery, wooden articles, yarns, coarse cloth, ropes, trunks, etc. The manufacturing industries are chiefly in connection with the mineral industries, namely, the manufacturing of steel, iron, etc. The fairs of Irbit (q.v.) are of considerable importance in the trade with the eastern possessions of Russia, but since the construction of the Trans-Siberian Railway the commerce has fallen off to a perceptible extent. Population, in 1897, 3,003,208, including a considerable number of Bashkirs, Permiaks, Tatars, Tcheremisses, and Voguls. The exploitation of the mining resources of the region was begun by the Stroganoffs in the sixteenth century. Capital, Perm.

PERM. The capital of the government of the same name in Eastern Russia, on the Kama, 300 miles northeast of Kazan (Map: Russia, J 3). It is regularly laid out; the houses are mostly of wood. Its educational institutions comprise two gymnasia, a realschule, a museum, a meteorological station, and a number of scientific societies. There are several machine works, tanneries, etc., and the port carries on an extensive transit trade during the navigable season. Population, in 1897, 45,403. The town was founded on the site of a mining settlement in 1781.

PERMANGANIC ACID. See MANGANIC AND PERMANGANIC ACIDS.

PERMEABILITY, MAGNETIC. See MAGNETISM.

PERMIAN SYSTEM. A name first applied by Murchison in 1841 to a group of rocks occurring in the Province of Perm, Russia. The strata which he included under this name had up to that time been considered as a division of the Triassic. In Russia the Permian strata occupy an area twice the size of France, and they are also largely developed in Germany and in England. In Germany, where the strata are naturally divided into two great series, the name Dyas is

commonly applied to the system. Equivalents of the Russian deposits have been described from West Virginia, Kansas, Utah, and Nebraska. While attempts have been made to consider the Permian as coequal with the Carboniferous, still the more common custom is to look upon it as the upper division of the Carboniferous. Consult: Williams, "Correlation Papers—Devonian and Carboniferous," *Bulletin 80 of the United States Geological Survey* (Washington, 1891). See CARBONIFEROUS SYSTEM.

PERMIT (corruption of Sp. *palometa*). A West Indian fish, the great pompano (*Trachinotus Goodii*), also called palometa. See POMFANO.

PERMOSER, pĕr'mô-zĕr, BALTHASAR (1650-1732). A German sculptor, born at Kammer, Bavaria. He was a pupil of Weisskirchner at Salzburg, and of Knacker in Vienna. Afterwards he lived many years in Florence. On his return from Italy in 1704 he lived principally in Berlin and Dresden. His work is able, though tinged by the artificial style of the time. He executed several groups and statues, which were destroyed in the Seven Years' War. His remaining works include a fine pulpit, an "Ecce Homo," and a statue of John the Baptist, in the Catholic church at Dresden, and the monument to Prince Eugene of Savoy in the Vienna Belvedere.

PERMUTATIONS AND COMBINATIONS

(Lat. *permutatio*, from *permutare*, to change entirely, from *per*, through + *mutare*, to change, frequentative of *movere*, to move, Skt. *mir*, to push). The different groups of r things which can be selected from a collection of n different things, without reference to their arrangement, are called the *combinations* of n things taken r at a time. For example, the combinations of the four letters a, b, c, d , taken 3 at a time, are abc, abd, acd, bcd ; taken 2 at a time, ab, ac, ad, bc, bd, cd . The different groups of r things which can be selected from n different things, varying the arrangement in every possible manner, are called the *permutations* of n things taken r at a time. E.g. the permutations of the letters a, b, c , taken 2 at a time are ab, ba, ac, ca, bc, cb . The number of combinations of n things taken r at a time is indicated by the symbol C_n^r . The number of permutations of n things taken r at a time is indicated by the symbol P_n^r . The chief properties of permutations and combinations are: (1) The number of permutations of n different things taken r at a time is $n(n-1)(n-2) \dots (n-r+1)$. E.g. the number of permutations of the letters of the word *courage* taken three at a time is $7 \cdot 6 \cdot 5 = 210$. (2) The number of permutations of n things taken all together is $n(n-1) \dots 3 \cdot 2 \cdot 1 = n!$. (3) The number of permutations of n different things taken r at a time, when each of the n things may be repeated, is n^r ; e.g. the number of ways of selecting 3 numbers from 50 on a combination lock, repetitions being allowed, is $50^3 = 125,000$. (4) The number of combinations of n different things taken r at a

time is
$$\frac{n(n-1)(n-2) \dots (n-r+1)}{r!},$$

or
$$\frac{n!}{r!(n-r)!}$$

e.g. 3 persons can be selected from a class of 20

$$\frac{20 \cdot 19 \cdot 18}{3!} = 1140 \text{ different ways.}$$

The formulas of permutations and combinations express many relations of both algebra and geometry and possess a peculiar interest in mathematics. E.g. the coefficients in the binomial expansion for a positive integral exponent may be expressed by formulas of combinations thus, $(a+b)^n = a^n + C_1^n a^{n-1}b + C_2^n a^{n-2}b^2 + C_3^n a^{n-3}b^3 + \dots$. The maximum number of vertices of a general polygon of n sides is expressed by C_2^n . Also, such problems as those of combination locks, of the number of signals with a given system of signs, and of forming all possible numbers from given digits, are solved with unusual brevity by means of the formulas of permutation and combination. This subject was known to the Hindus, particularly to Bhaskara (b.1114), and is related to the subject of probability (q.v.). Its principles are often explained in text-books under the title *Choice*. By *cyclic* permutation is meant the interchange of the elements of a function in cyclic order. E.g. $(a-b) + (b-c) + (c-a)$ becomes $(b-c) + (c-a) + (a-b)$ by the cyclic interchange of a for b , b for c , and c for a .

PERNAMBUCO, pĕr'nām-bŏŏ'kô. An eastern State of Brazil, bounded by Parahyba and Ceará on the north, Piahy on the west, Bahia and Alagoas on the south, and the Atlantic Ocean on the east (Map: Brazil, K 5). The area is 49,560 square miles. The coast region is low and the interior is occupied by barren plateaus known as *sertões*, which pass into mountain ranges near the western frontier. A long reef of sandstone extends along the coast and forms a great hindrance to navigation. The rivers are mostly short and flow toward the São Francisco, which forms the southern boundary of the State. The low strip of coastland is covered with fine forests and is the centre of population as well as of agricultural activity. In that region are cultivated sugar, cotton, coffee, tobacco, beans, mandioca, and grain. Cattle are raised in the interior. Agriculture in Pernambuco has suffered greatly with the abolition of slavery and the Government has spent large sums in loans and subsidies in order to improve the agricultural conditions of the State. The exports in 1899 were valued at the sum of \$12,330,000, and consisted chiefly of cotton, sugar, and coffee. Sugar-refining is the principal industry. Pernambuco has good railway facilities on the coast, where a number of lines lead to the capital and chief seaport of the State, Pernambuco (q.v.). The population was estimated in 1894 at 1,254,159.

PERNAMBUCO, or **RECIFE**. The capital of the State of Pernambuco, Brazil, situated on the Atlantic coast at the easternmost point of the continent (Map: Brazil, L 5). It consists of three parts connected by bridges and causeways; the oldest, or Recife proper, is built on an outlying peninsula, connected with the mainland by an isthmus, and is the principal commercial section; the central part, called São Antonio, stands on an island between a reef and the mainland, and contains most of the public buildings; the third portion, Boa Vista, is built on the mainland, and is the new residential section, with broad streets and beautiful gardens. There are several street-car lines, one of which runs to the suburb of Olinda (q.v.), the former capital of the State. Pernambuco has some of the finest churches and public buildings of the country, and numerous charitable and educational institutions,

the latter including a celebrated law school and an excellent secondary college. The harbor proper is inclosed by a reef cut by several navigable passages, but the largest ships have to anchor in an open roadstead. Yet, since Pernambuco is the nearest to Europe of the important ports of Brazil, and owing to its extreme eastern position in the path of nearly all South Atlantic commerce, it has a very considerable shipping, amounting to over 1,000,000 tons annually. It is a station for several lines of Atlantic steamers, and is the outlet for the products of the State, the chief of which are sugar, cotton, rum, skins, and various forest and colonial products. It is the seat of a United States consul. The population by the census of 1890 was 111,556, and in 1898 it was estimated at 190,000, including the suburbs. Recife was founded in 1504. It was held by the Dutch from 1630 to 1654, but it was then a mere village and did not acquire much importance until it superseded Olinda as capital.

PERNAMBUCO WOOD. See **BRAZIL WOOD**.

PERNAU, pĕr'nou (Russ. *Pernov*). A town in the Government of Livonia, Russia, on both banks of the River of Pernau, a short distance from the Gulf of Riga, and 100 miles north by east of Riga (Map: Russia, B 3). It is a well-built town with public gardens, a gymnasium, and a number of benevolent institutions. The trade in grain is still considerable, but the commercial importance of the port has decreased owing to the competition of the other Baltic ports. The town was founded in 1255 by the Bishop of Oesel, and was a flourishing centre in the Middle Ages. It was taken by the Russians in 1710; its fortifications have since been demolished. Population, in 1897, 12,856.

PÉRONNE, pâ'rôn'. A fortified town and the capital of an arrondissement in the Department of Somme, France, on the Somme, 94 miles northeast of Paris (Map: France, J 2). It is historically important; Charles the Simple and Louis XI. were imprisoned here. It was unsuccessfully besieged by the Imperialists under the Count of Nassau in 1536, and acquired the name of La Pucelle, or the 'impregnable,' but in 1815 it surrendered to the English under Wellington. The town was almost destroyed by the Germans, to whom it surrendered, in 1871; it has since been rebuilt. Population, in 1901, 4661.

PERONOSPORACEÆ (Neo-Lat. nom. pl., from *Peronospora*, from Gk. *περὼν*, *peronē*, brooch, pin + *σπόρος*, *sporos*, seed), **DOWNY MILDEWS**. An order of 6 or 7 genera of oöphytic fungi parasitic upon higher plants such as tomato, potato, grape, lettuce, etc., which from the abundance of their aerial conidia give an appearance of frost on the under sides of the attacked leaves. Hence the popular name. Their mycelium penetrates every part of the host, and warm moist weather favors their growth. The principal genera are *Phyophthora*, *Plasmopara*, *Bremia*, and *Peronospora*.

PEROSI, pâ-rô'zê, **DON LORENZO** (1872—). An Italian composer of sacred music, born in Tortona. The greater part of his musical education was obtained at the Milan Conservatory, though he went subsequently to Haberl's *Domchorschule* at Regensburg. Meanwhile he had studied for the priesthood and was admitted to the order. In 1897 he produced a sacred trilogy,

La passione di Cristo, which made him famous throughout Italy. His music is the exact opposite of the English and German oratorio style, which undoubtedly accounts for his lack of success in the musical cities of those nations. In 1898 he became honorary maestro of the Papal Choir. Other compositions include: *La Trasfigurazione del nostro Signore Gesù Cristo* (1898); *La risurrezione di Lazaro* (1898); *Il natale del Redentore* (1899); and many important masses.

PÉROUSE, pâ'rōōz', LA. A French navigator. See LAPÉROUSE.

PEROWNE, pe-rōun', JOHN JAMES STEWART (1823—). An English prelate and author, born at Burdwan, Bengal, where his father was a missionary of the Church Missionary Society. He was educated at Corpus Christi College, Cambridge, and graduated (1848) as Tyrwhitt Hebrew scholar, and in the same year became a priest in the Church of England. He lectured on divinity at King's College, London, and in 1875 was appointed honorary chaplain to the Queen and Hulsean professor of divinity. A member of the Old Testament Revision Committee (1870-84) and Bishop of Worcester (1890-1901), he edited the *Cambridge Bible* (and *Greek Testament*) for Schools and Rogers on the *Thirty-Nine Articles*, and wrote: *The Book of Psalms, a new Translation* (1864); *Immortality* (1868), the Hulsean Lectures; and an elementary Arabic grammar, *Al Adjrumiieh*.

PEROXIDE OF HYDROGEN. See HYDROGEN DIOXIDE; HYDROGEN.

PERPENDICULAR (Lat. *perpendicularis*, vertical, from *perpendicularum*, plumb-line, from *per*, through + *pendere*, to hang). A line is said to be perpendicular to another line when it makes a right angle with it. A line is said to be perpendicular to a plane when it makes a right angle with every line in the plane passing through the point of intersection. One plane is said to be perpendicular to another when their dihedral angle (see **ANGLE**) is a right angle. See **NORMAL**.

PERPENDICULAR. The name given to the style of Gothic architecture in England which succeeded the Decorated style. It prevailed from the last quarter of the fourteenth century to the middle of the sixteenth century, and was thus contemporary with the Flamboyant style in France. These styles have much in common, but they derive their names from the features peculiar to each. Thus the Flamboyant (q.v.) is distinguished by the flowing lines of its tracery, while the Perpendicular is remarkable for the stiff and rectilinear lines from which its name was derived. The lines of the window-tracery are chiefly vertical, and the mullions are frequently crossed by horizontal bars. The moldings are usually thin and hard. The same feeling pervades the other features of the style; the buttresses, piers, towers, etc., are attenuated, and present in their shallow recesses and meagre lines a great contrast to the deep shadows and bold moldings of the earlier styles. The art of masonry was well understood during the Perpendicular period, and the vaulting was admirably built. Fan-tracery vaulting (q.v.) belongs to this style. The depressed or four-centre arch is another of its peculiar features. This arch, over doorways, has the moldings generally arranged in

a square form over the arch, with spandrels containing shields, quatrefoils, etc. Paneling was also much used, the walls being frequently almost entirely covered with it, as in Henry VII.'s chapel at Westminster. There are many well-known buildings of this style. Most of the colleges at Oxford and Cambridge belong to it, and in almost every cathedral and church of importance there are some specimens of it. Open timber roofs are very common in the Perpendicular style, and are among the peculiar and beautiful features of the architecture of this country. The roof of Westminster Hall, built by Richard II., was the largest example ever erected. Consult the authorities referred to under **EARLY ENGLISH**.

PERPETUA, SAINT. See **FELICITAS**, SAINT.

PERPETUAL MOTION (Lat. *perpetualis*, permanent, universal, from *perpetuus*, continuous, universal, from *per*, through + *peterē*, to seek). Under the name of perpetual motion is understood a mechanism which of and for itself, without outside aid, would continue to operate until it wore out. A water-wheel under Niagara is not such a machine, because it is the sun which makes the wheel go, by raising the water. Such a machine is incompatible with the principle of the conservation of energy, for some energy would always be converted into heat by friction and this would ultimately stop the machine unless its equivalent were supplied from somewhere. The most varied attempts have been made to disregard this principle and construct such a machine. A large class is that which includes all possible combinations of levers and wheels and worms and pumps, and which invariably reduces to the possibility of a man lifting himself by his bootstraps. Many have tried to employ magnetism in some way, and would have succeeded "if they could find a substance through which magnetism would not act," but an insulator for magnetism is not known, nor will it be as long as energy is conserved. The forces of capillarity and gravitation have been harnessed in the most roundabout ways, but whatever means or agents are employed the aspect of the situation cannot be changed. See **ENERGETICS**.

PERPETUITY (Lat. *perpetuitas*, continuity, from *perpetuus*, continuous, universal). In a general and inexact sense, a perpetuity is such a limitation of property as suspends the ordinary full ownership and power of disposition beyond the period allowed by law. Properly the 'rule against perpetuities' is a common-law rule against the creation of future interests in real or personal property, subject to such contingencies that they may not become vested within a reasonable limited time, arbitrarily fixed by law. It is, therefore, a rule against remoteness of vesting, designed to prevent indefinite control of property by a present owner, by means of provisions in a will or deed to take effect after his death. However, through a misconception of the original object of the rule, the same name has also been applied, though inaccurately, to laws prohibiting the suspension of the absolute power of alienation of property for a prescribed period.

The historical legal conditions under which the rule was developed bear out the conclusion that it was devised by the courts to prevent a present owner from dictating the disposition and extent and method of enjoyment of his property by future generations. By the early English law, a

man might create future interests in his property to vest at any period after his death, and the influence of the feudal system and the doctrine of primogeniture (q.v.) tended to induce the proprietors of the great landed estates to regulate the disposition of their property to remote periods. This practice was gratifying to family pride and was favored by the King and Parliament, as the traditions of a long line of ancestors made loyal subjects of the landed gentry. However, besides making the absolute ownership of land impossible in many cases, thus affecting all classes of people, the practice created great dissatisfaction among younger sons and spendthrift older ones, and as a consequence there were frequent attempts to set aside wills and deeds making such dispositions, which finally resulted in the establishment of the above rule.

The first important case on the point was known as the 'Duke of Norfolk's Case,' in 1685, and it established the limitation that while a future interest might be limited to commence on any contingency, yet the latter must happen within a life or lives in being at the time of the creation of the estate. The period within which springing or shifting uses or executory devises must take effect was later extended to include a gross term of 21 years, in addition to a life or lives in being. For example, if A devises property to his son B for life, remainder to his grandson C for life, and that the property then go to the eldest son of C when he shall attain the age of 21 years, the devise will be held good if C is born prior to the death of A, the testator, as the will takes effect then, and the estate will finally vest absolutely within the period prescribed by the rule, that is, lives in being and 21 years. However, if the property is devised to B for life, and after his death to his eldest son when the latter shall marry, assuming that B has no son at the death of A, the devise is bad, because if a son is born to B, he may not marry within 21 years after the death of B, and as B is the only life in being at the time of A's death, the estate must vest within 21 years after B's death. The possibility that B's eldest son may marry within 21 years will not save the devise, as its validity is determined by the possibilities which may happen under its terms, tending to make it bad, and not by the fact that in the course of actual events the estate may become vested within the prescribed period. The same principle applies also to personal property.

The attempt of an English gentleman, Mr. Thellusson, to create an enormous fortune by directing the accumulation of the income of his property during the lives of his children, grandchildren, and great-grandchildren, led to a statute, known as the 'Thellusson Act' (39 and 40 George III., c.98), which forbids the accumulation of income for a longer time than the life of the grantor or settler, or 21 years from his death.

The English common-law rule against perpetuities above stated is still the law there, and in most of the United States. However, in several States the common-law rule has been radically altered by statute, in that their statutes forbid a suspension of the absolute power of alienation for a longer period than two lives in being and 21 years. In New York the statute fixes the period at two lives in being and a period of a minority, as distinguished from a gross term of 21 years. For a more comprehensive treatment of the sub-

ject, see Gray, *Rules Against Perpetuities* (Boston, 1886); also consult the authorities referred to under REAL PROPERTY.

PERPIGNAN, pār'pé'nyän'. The capital of the Department of Pyrénées-Orientales, France, and a fortress of the first rank, on the Têt, five miles from the Mediterranean, and 35 miles south by west of Narbonne (Map: France J 9). It commands the passage by the Eastern Pyrenees from Spain into France, and is defended on the south by a citadel and by ramparts flanked with bastions, and protected by raised works. The houses are of semi-Moresque construction, and there are many evidences of Spanish influence. The Spanish Cathedral of Saint Jean, a massive building, begun in the thirteenth century, has elaborately decorated altars, and a large nave. The belfry of Saint Jacques and the Castiller (now used as a military prison), with its battlements and machicolations, are interesting. The old university building contains a museum and a city library of over 20,000 volumes. Perpignan has a college and is the see of a bishop. There are vineyards, olive groves, orchards, and gardens in the vicinity; manufactures of woollen clothes, paper, chocolate, corks, bells, and furs are carried on. Population, in 1891, 33,878; in 1901, 36,157. Perpignan is first heard of in the tenth century. As capital of the former County of Roussillon, it remained long in the hands of the kings of Aragon and of Spain. The town was taken by the French in 1642, and united to France in 1659.

PERRAUD, pār'rô', JEAN JOSEPH (1819-76). A French sculptor, born at Monay, in the Jura. He was a pupil of the Ecole des Beaux-Arts in Lyons, and of the Ecole des Beaux-Arts in Paris under Ramey and Dumont, and won the Prix de Rome in 1847. His work is classic, but mannered. His sculpture includes "Adam;" "Adieux;" "Justice," in the Palais de Justice, Paris; "Caryatides," in the National Library, Paris; "Lyric Drama," on the façade of the Opera House, Paris; "Despair" and "The Infancy of Bacchus," in the Louvre. He received a first-class medal in 1855, and was made officer of the Legion of Honor in 1867.

PERRAULT, pār'rô', CHARLES (1628-1703). A French critic best known for his *Mother Goose Stories*, the classic nursery tales of France. He was born January 12, 1628, in Paris, and was prepared for the bar, but soon forsook the bar for letters, winning distinction and an election to the Academy through his verses and the patronage of Colbert, who made him head of the Royal Bureau of Architecture. He achieved notoriety in 1687 by a poem on *Le siècle de Louis le Grand*, which praised new writers at the expense of the old and so brought on the controversy between the Ancients and Moderns. Attacked by Boileau (q.v.), he defended his position in a series of dialogues, *Parallèle des anciens et des modernes* (1688-96), of more ingenuity than critical value. Better are his 200 studies of *Les hommes illustrés qui ont paru en France pendant ce siècle* (1696-1701). But all these, with his *Mémoires* (1749) and two comedies, are insignificant beside the *Mother Goose Stories* (1697), through which the literary world first learned to know the *Sleeping Beauty*, *Little Red Riding-Hood*, *Blue-Beard*, *Puss in Boots*, *Cinderella*, and *Tom Thumb*, which, with Madame d'Aulnoy's

Goldilocks and *Madame de Beaumont's Beauty and the Beast* and *Prince Durling*, form a large and indispensable part of the nursery stock of the world. Perrault published these stories under the name of his son, Pierre Perrault d'Armancoeur, and called them *Histoires ou contes du temps passé*, with the subtitle *Contes de ma mère l'oisie*. Perrault no more invented his stories outright than the Grimm Brothers did theirs; nor did he intend to make a contribution to the knowledge of folk-lore. He drew on oral tradition, but he treated his matter in French fashion, and set off fairy fancies with touches of playful realism.

There are many editions of Perrault's *Contes*. The best is probably that of Andrew Lang (London, 1888), with a careful introduction of 115 pages. Consult, also, Deulin, *Contes de ma mère l'Oye avant Charles Perrault* (Paris, 1879).

PERRENOT, pār'nô', ANTOINE. A Spanish statesman. See GRANVELLA.

PERRENS, pār'rân', FRANÇOIS TOMMY (1822-1901). A French historian, born at Bordeaux. He received his early education in his native place and was a pupil at the Ecole Normale from 1843 until 1846, when he went to teach at Bourges, then at Lyons (1847), and at Montpellier (1850). From 1853 he was professor at the Bonaparte Lyceum, Paris, and he was inspector of the Academy from 1873 until his retirement in 1891. The thesis *Jérôme Savonarole* (1854), which he wrote for his degree (Doctor of Letters), was crowned by the Academy, and he published also *Etienne Marcel et le gouvernement de la bourgeoisie au XIV^{ème} siècle* (1880); *Les mariages espagnols sous le règne de Henri IV.* (1869); *La démocratie en France au moyen âge* (1873); *Histoire de Florence jusqu'à la domination des Médicis* (1877-84); *Histoire de Florence depuis la domination des Médicis jusqu'à la chute de la république* (1888-90); *La civilisation florentine du XIII^{ème} au XVI^{ème} siècle* (1893), and *La littérature française au XIX^{ème} siècle* (1899).

PERRERS, pār'ërz, ALICE (called also DE WINDSOR) (?-1400). The mistress of Edward III. of England. She is said to have been the daughter of Sir Richard Perrers, of Hertfordshire, and probably married William de Windsor in 1376. She acquired her influence over the King during the lifetime of Queen Philippa, to whom she was lady of honor. The King made her valuable presents, but she became engaged in constant disputes with the courts in her endeavors to acquire maintenance and landed property, and she also used her influence politically to overthrow her enemies or uphold her favorites. She was sentenced to banishment by Parliament, but the decree was not enforced. After Edward's death her sentence of banishment was confirmed by Richard II.'s first Parliament, but was revoked in the following year, and she subsequently regained favor at Court. Her quarrels with the Abbey of Saint Albans led to scurrilous attacks on her character by the monastic chroniclers, but she is praised by the historians Barnes, Carte, and Cotton, and has never lacked defenders. See EDWARD III.

PERRET, pār'râ', AIMÉ (1847-). A French genre and portrait painter, born at Lyons. He was the pupil of the Lyons School of Fine Arts, and of Vollon in Paris, and first exhibited in 1872. He paints subjects similar to those of

Millet, but his brush shows the brighter side of peasant life. His works, which are very numerous, include "Noce bourguignonne au XVIII^{ème} siècle" (1876); "Baptême bressan" (1877), in the Lyons Museum; "Le saint viatique," in the Luxembourg; "La cinquantaine" (1888); "Noël des vieux;" and "L'heure de l'angélus." He received a second-class medal in 1888, and the cross of the Legion of Honor in 1894.

PERRIER, pār'ryâ', FRANÇOIS (called LE BOURGUIGNON) (c.1584-1656). A French painter and engraver, born probably at Saint Jean de Losne (Burgundy). He went to Rome, and there became a pupil of Lanfranco. In 1630 he returned to France and painted some pictures for the Carthusian monks at Lyons. During a second visit to Rome in 1635 he engraved several antique statues and bas-reliefs. These are included in the collections *Statuæ Antiquæ Centum Edente Francisco Perrier* (1638) and *Icones et Segmenta Illustrium e Marmore Tabularum quæ Roma adhuc Exstant* (1645). He also engraved plates after the old masters. He was one of the twelve founders of the Académie Royale de Peinture et de Sculpture, in 1648. His oil paintings include "Orpheus Before Pluto" and "Æneas and Warriors Fighting the Harpies" in the Louvre). He was an indifferent colorist.

PERRIER, JEAN OCTAVE EDMOND (1844-). A French zoölogist. In 1867 he became professor in the Lycée d'Agen, in 1872 maître de conférence at the Ecole Normale in Paris, and in 1876 professor of zoölogy at the Museum of Natural History. He was elected to the Académie des Sciences in 1892. He has published *Les colonies animales et la formation des organismes* (1881, 1898); *Les principaux types des êtres vivants* (1882); *La philosophie zoölogique avant Darwin* (1884); *L'intelligence des animaux* (1887); *Éléments d'anatomie et de physiologie animales* (1888).

PER'RIN, BERNADOTTE (1847-). An American classical scholar, born at Goshen, Conn. He graduated at Yale in 1869 and was a student at the universities of Leipzig and Berlin (1876-79). From 1881 to 1893 he held the position of professor of Greek in Western Reserve University, Cleveland, Ohio. In 1893 he became professor of Greek in Yale University. His published works include an edition of *Cæsar's Civil War* (New York, 1882); *Homer's Odyssey* (i. iv., Boston, 1889; v.-viii., Boston, 1894); *Plutarch's Lives of Themistocles and Aristides*, trans. with introduction and commentary (New York, 1901). He is also joint editor of the "Twentieth Century Series of Text-Books."

PERRON, pār'rôn', ANQUETIL DU. See ANQUETIL DUPERRON.

PERRONE, pār-rô'nâ, GIOVANNI (1794-1876). An Italian theologian. He was born at Chieri, in Piedmont, and, after completing his education with the doctor's degree in theology at the University of Turin, he was (in 1815) one of the first to enter the Society of Jesus after its re-establishment. He was professor of dogmatics at Orvieto, and from 1833 to 1848 at the Roman College. At the outbreak of the Revolution in the latter year he took refuge in England, but returned to his professorship when order had been restored, and became rector of the college in 1853. He acquired a reputation for great theological learning, was theologian to several of the Roman

congregations, and had an important share in the condemnation of Hermesism (see HERMES, GEORG), and in formulating the doctrine of the Immaculate Conception. His most famous work, *Prælectiones Theologicae* (9 vols., 1835-42), has gone through some 50 editions and been used as a text-book all over the world. Other important works are: *De Immaculato B. V. Mariae Conceptu* (1847); *Il protestantismo e la regola di fede* (1853); *De Domini Nostri Jesu Christi Divinitate* (1870); *De Romani Pontificis Infallibilitate* (1874).

PERRONET, EDWARD (1721-92). An English hymn-writer. He was born at Sundridge, Kent, a son of Vincent Perronet (q.v.). He became an itinerant preacher under the Wesleys in 1749, but joined Lady Huntingdon's connection in 1771. He left it shortly after and became minister of a small independent chapel at Canterbury, where he died. He is remembered as the author of the hymn "All hail the power of Jesus' name," which first appeared anonymously in *The Gospel Magazine* (1780). Collections of his hymns and poems have been published, including a satire on the Church of England called *The Mitre* (1757). Consult the article by Grosart in *Julian's Dictionary of Hymnology* (London, 1892).

PERRONET, VINCENT (1693-1785). An English clergyman. He was born in London, of Swiss-French descent; was educated at a school in the north of England and at Christ College, Oxford, where he graduated in 1718; he took orders in the Church of England and became curate in the Parish of Sundridge, Kent. Nine years later he received the vicarage of Shoreham, which he retained for over half a century. In 1744 he became acquainted with John Wesley and later identified himself with the Methodist movement to such an extent that Charles Wesley called him "the Archbishop of Methodism." Perronet wrote several works in defense of the Methodists, also two in vindication of John Locke. His other works deal with the opinions of Hobbes, the Quakers, the subjects of infant baptism, original sin, and recreations.

PERROT, PÂRRÔ', GEORGES (1832-). A French archaeologist, born in Villeneuve-Saint-Georges (Seine-et-Oise), and educated at the normal school and the French school at Athens. In 1861 he went on an archaeological expedition to Asia Minor; in 1863 became a professor in the lyceum Louis-le-Grand, in Paris; in 1877, professor of archaeology in the university; and in 1883, director of the higher normal school. The most important fruit of his first journal in Asia Minor was the reconstruction of the text of the *Monumentum Ancyranum*. With Chipiez he wrote the valuable *Histoire de l'art dans l'antiquité* (1882 sq.). Alone he wrote, apart from contributions to reviews, and especially to the *Revue archéologique*, of which he became an editor, *Essai sur le droit public et privé de la république athénienne* (1867), *Les peintures du Palatin* (1872), and *Mémoires d'archéologie, d'épigraphie et d'histoire* (1875).

PERR'OT, SIR JOHN (c.1527-92). An English general, Lord Deputy of Ireland. He was born Harroldston and was probably a natural son of Henry VII. A bold, powerful young fellow, he was made a Knight of the Bath by Edward VI., and under Mary was imprisoned for his Protestant sympathies. Elizabeth, in 1570,

made him president of Munster, and with much bravery and energy, but little prudence or tact, he attempted to establish the English Crown in Munster. For a time he was held to have accomplished the task, and in 1584 he was appointed Lord Deputy to carry out the work throughout all Ireland. Under his rule, the western province was pacified, but in the north he was quite unsuccessful. In 1588 he was removed from office, charged with treasonable offers to Philip of Spain, and with contemptuous speech in regard to the Queen. The first charge was entirely groundless, but on the latter count he was clearly guilty, and, although it seems that the Queen purposed to pardon him, he was condemned. He died in the Tower before the sentence could be carried out. His son JAMES (1571-1637) was a prominent member of the Added Parliament.

PERRY. A city and the county-seat of Noble County, Okla., 30 miles north northeast of Guthrie; on the Atchison, Topeka and Santa Fe Railroad (Map: Oklahoma, F 2). It is important principally as a commercial centre, being the distributing and shipping point for an extensive farming and stock-raising district. A United States land office is situated here. There are public parks. Population, in 1900, 3351.

PERRY, ARTHUR LATHAM (1830-). An American economist, born at Lyme, N. H. He graduated at Williams College in 1852 and was professor of history and political economy there from 1853 to 1891, when he became professor emeritus. He advocated free trade, and in 1869-69 publicly debated this question with Horace Greeley in Boston and New York. Among his publications are *Political Economy* (1865, 20 editions); *International Commerce* (1866); *Introduction to Political Economy* (1877, 5 editions); *Principles of Political Economy* (1891), and *Williamstown and Williams College* (1900).

PERRY, BLISS (1860-). An American educator, author, and editor, born at Williamstown, Mass. He graduated at Williams College in 1881, was an instructor there in 1881-86, studied in Germany at Berlin and Strassburg universities, and became professor of English at Williams in 1888. From 1893 to 1899 he occupied the chair of English at Princeton University, and in the latter year was appointed editor-in-chief of the *Atlantic Monthly* of Boston. He prepared editions of selections from Burke, and Scott's *Ivanhoe* and *Woodstock*, and edited also a handy selection of representative extracts from the works of English and American writers, entitled *Little Masterpieces*. In addition to addresses on educational topics, he published a series of works of fiction, *The Broughton House* (1890), *Salem Kittredge* (1894), *The Plated City* (1896), and *The Powers at Play* (1899); the chapter on poetry in *Counsel upon the Reading of Books* (1900), a collaborative volume; and *A Study of Prose Fiction*, an essay in literary criticism (1902).

PERRY, EDWARD DELAVAN (1854-). An American scholar and educator, born in Troy, N. Y. He graduated at Columbia in 1875, and studied at Leipzig and Tübingen. Between 1880 and 1895 he was successively tutor in Greek and instructor and professor of Sanskrit at Columbia. In the latter year he became professor of Greek there, and in 1897 he was chosen president of the New York Branch of the American Archaeological

Institute, and a member of the managing committee of the American Classical School in Athens. In 1902 he became dean of the School of Philosophy at Columbia. An authority on the subject of Greek dialects and inscriptions, he is also known as the author of a *Sanskrit Primer* (3d ed. 1902) based on Bühler's *Leitfaden*.

PERRY, JOHN (1850—). An English physicist and engineer. He was born in Ulster, Ireland, and was educated at Queen's College, Belfast. He was appointed professor of engineering in the Imperial College, Tokio, Japan, in 1875, and, two years after his return to England, professor of engineering and mathematics in the Finsbury Technical College. This position he left after fifteen years, in 1896, and was appointed professor of mechanics and mathematics in South Kensington Royal College of Science. Perry wrote *The Steam Engine* (1874), *Practical Mechanics* (1883), *Spinning Tops* (1890), *Hydraulics* (1892, the Cantor Lectures), *Calculus* (1897), *Applied Mechanics* (1897), *Steam* (1899), *Practical Mathematics* (1899), and *England's Neglect of Science* (1901), besides many contributions to English scientific periodicals.

PERRY, MATTHEW CALBRAITH (1794-1858). An American naval officer, brother of Oliver Hazard Perry (q.v.). He was born at Newport, R. I., entered the navy as a midshipman in 1809, and early in the War of 1812 was one of the officers of the frigate *President*. In 1813 he was transferred to the *United States*, which was blockaded in the harbor of New London until the conclusion of peace. He was then for several years engaged in the merchant service, but having reentered the navy, he was in 1819 appointed executive officer of the *Cyane*, which convoyed the *Elizabeth* with her band of pioneers to Liberia. Two years later he was again on the African coast as commander of the *Shark*, and recommended the removal of the Liberian colonists from Sherbro to Monrovia. On his return from this voyage, and again in 1822, he took an active part in extirpating piracy in the West Indies. In 1824 he was appointed executive officer of the *North Carolina*, Commodore Rodgers's flagship on the Mediterranean station. He was promoted to the rank of commander in 1826, and in 1832 was again sent to the Mediterranean as captain of the *Concord*. From 1833 to 1843 he was stationed at the Brooklyn navy yard. Under his superintendence was built the *Fulton*, a 'steam battery' designed for the defense of New York Harbor, and the first steam vessel in the United States Navy. When she was completed in 1837 he took command of her, organized her personnel, and so thoroughly demonstrated the practical utility of steam as a motive power for war vessels that he earned the title of "Father of the Steam Navy." In this same year he was commissioned captain and in 1839 was sent abroad to study the latest English and French steam warships. In 1841 he was promoted to be commodore and two years later was assigned to the command of the squadron on the African coast maintained by the United States for the suppression of the slave trade. During the early part of the Mexican War he served under Commodore Conner in the Gulf, but on Conner's recall in 1847 Perry succeeded him in the command of what was then the largest fleet of warships ever assembled under the American flag. In 1852 he was sent by President Fillmore with a squadron of warships to

Japan to induce that country to enter into relations with the nations of the West. His flagship, the *Mississippi*, was the first United States steam war vessel to circumnavigate the globe. He arrived in Kurihama, in the Bay of Yedo, on July 7, 1853, and on the 14th delivered to representatives of the Shogun the letter addressed to the ruler of Japan, which declared the nature of his mission. He then went to China, and returning in February, 1854, concluded a treaty with the Japanese by which they agreed to receive an American consul at one of their ports. This treaty, which was followed by one between Japan and Great Britain, inaugurated a new era in the history of Japan. Perry's report was printed by the Government in three volumes, under the title *The Report of Commodore Perry's Expedition to Japan* (1856). He died in New York City. A monument to his memory was unveiled at Perry Park, Kurihama, Japan, on July 14, 1901. Consult Griffis, *Matthew Calbraith Perry, a Typical American Naval Officer* (Boston, 1887).

PERRY, NOBAH (1832-96). An American poet, journalist, and writer of juvenile stories, for some years Boston correspondent of *The Chicago Tribune*. She was born in Dudley, Mass. Her verse is collected in *After the Ball* (1875), *Her Lover's Friend* (1879), *New Songs and Ballads* (1886), *Legends and Lyrics* (1890). Her fiction, chiefly juvenile, includes *The Tragedy of the Unexpected* (stories, 1880), *For a Woman*, a novel (1885), *A Book of Love Stories* (1881), *A Flock of Girls and Their Friends* (1887), and many other volumes. These are briskly told and, like her verses, appeal to the sentiment of the broader reading public.

PERRY, OLIVER HAZARD (1785-1819). A distinguished American naval officer. He was born at South Kingston, R. I., and received his education partly from his mother and partly in private schools in Newport and elsewhere. He entered the navy as a midshipman in 1799, served in the war against Tripoli, and in 1807 was commissioned lieutenant. In 1811, as commander of the schooner *Revenge*, he had the misfortune to lose his vessel off Watch Hill, R. I., but a court of inquiry, which at his request investigated the circumstances connected with the wreck, reported him guiltless of any neglect of duty. During the first few months of the War of 1812 Perry commanded a flotilla of gunboats in Newport Harbor, but was later transferred to Sackett's Harbor, N. Y., and thence was soon ordered to Presque Isle (now Erie) to take charge of the construction of a fleet, with which the Americans hoped to wrest from the British the control of Lake Erie. By great exertions he succeeded by the end of the summer of 1813 in building and manning a squadron of nine vessels, with which, on the 10th of September, he won the celebrated battle of Lake Erie. (See *ERIE, BATTLE OF LAKE*.) He was then able very materially to assist General Harrison in the operations culminating in the battle of the Thames. As a reward for Perry's brilliant victory, he received from Congress a vote of thanks, a gold medal, and the rank of captain. By the people he was regarded as one of the chief heroes of the war, and his laconic despatch announcing his success is to-day known to every American. Later a very bitter controversy arose between Perry and El-

liott, the commander of the *Niagara*, one of Perry's vessels, over the question of whether Elliott did his duty in supporting the flagship. A court of inquiry, called at Elliott's request, made a somewhat ambiguous report. Subsequently Perry preferred charges against Elliott, but no action was ever taken upon them by the Navy Department. After the close of the war Perry was placed in command of the frigate *Java*, and cruised with Decatur's squadron in the Mediterranean. In 1819 he was sent with a small squadron to the West Indies to protect American commerce against pirates. While performing this duty, he was seized with yellow fever, and died on his birthday, the 23d of August, 1819. He was buried with military honors at Port of Spain, Trinidad, but in 1826 his body was, by order of Congress, removed in the sloop-of-war *Lexington* to Newport, where it was re-interred with great honors. The State of Rhode Island later erected a granite monument to his memory, and there are also statues of him at Newport, and at Cleveland, Ohio. His life has been written by Niles (Hartford, 1820), by Mackenzie (New York, 1843), by James Fenimore Cooper (in *Lives of Distinguished American Naval Officers*, Auburn, N. Y.), and by Barnes (New York, 1898).

PERRY, STEPHEN JOSEPH (1833-89). An English astronomer, born in London. He studied theology at Douai and Rome, entered the Society of Jesus in 1853, and studied mathematics at Stonyhurst, at the University of London, and at that of Paris. In 1868 he began a magnetic survey of France. Two years afterwards, as fellow of the Royal Society, he was stationed at San Antonio, Cadiz, to observe the total eclipse of that year; in 1874 he directed the observations of the transit of Venus on Kerguelen Island; and in 1882 was sent to Southwestern Madagascar with another transit of Venus expedition. Perry died in the Salut Islands, where he caught a severe cold in attempting to photograph the total eclipse of December 22, 1889. His generosity fitted the Stonyhurst Observatory. Perry was an able and popular lecturer. In 1881 he discovered, independently of Trouvelot, the veiled sun spots. Consult Cortie, *Father Perry, the Jesuit Astronomer* (London, 1890).

PERRY, THOMAS SARGENT (1845-). An American educator and critical historian of literature, born in Newport, R. I. Perry graduated at Harvard (1866), and after studying in Berlin and Paris taught, at Harvard, German (1868-72) and English (1877-81). In the interval he was for two years editor of the *North American Review*. He afterwards wrote *Life and Letters of Francis Lieber* (1882), *English Literature in the Eighteenth Century* (1882), *A History of Greek Literature* (1883), *From Opitz to Lessing* (1885), and *The Evolution of the Snob* (1887).

PERRY, WILLIAM STEVENS (1832-98). An American clergyman, second Protestant Episcopal Bishop of Iowa. He was born at Providence, R. I., studied at Brown University, but took his degree from Harvard in 1854. He studied theology at Virginia Seminary and continued his studies with the Rev. Alexander Hamilton Vinton (q. v.). He was ordained priest at St. Paul's, Boston, in 1858, where he spent the first year of his ministry. His succeeding charges were Saint Luke's, Nash-

ua, N. H.; Saint Steven's, Portland, Me.; Saint Michael's, Litchfield, Conn.; and Trinity, Geneva, N. Y. He taught history at Hobart College for several years and served the institution as president from April to September, 1876, when he was consecrated Bishop of Iowa. He did much for the cause of education in his diocese; reopened Griswold College in its academic, theological, and preparatory departments, founded St. Katharine's Hall for girls, Kemper Hall for boys, and Lee Hall for training candidates for orders. He also founded St. Luke's Hospital at Des Moines. Among his writings are *Documentary History of the Protestant Episcopal Church in the United States of America* (with Dr. F. L. Hawks, 1863-64), *Historical Collections of the American Colonial Church* (5 vols., 1871-78), *Historical Notes and Documents Illustrating the Organization of the Protestant Episcopal Church in America* (1874), *Historical Sketch of the Protestant Episcopal Church, 1784-1884* (1884). Consult sketch and bibliography in his *Episcopate in America* (New York, 1895).

PERRYVILLE, BATTLE OF. A battle fought at Perryville, Ky., about 40 miles south of Frankfort, on October 8, 1862, during the Civil War, between a Federal force of about 22,000 men, actually engaged, under General Buell, and a Confederate force of about 17,000 men under General Bragg. The Confederates opened the engagement at about 2 o'clock in the afternoon by an attack upon the Federal left under McCook, and for a time drove it back, but were finally forced back themselves through the town of Perryville. During the night the Confederates retired from the field. By many the engagement has been considered a drawn battle, though strategically it is generally regarded as a victory for the Federals. General Buell's forces in the vicinity of Perryville numbered about 58,000 men, less than half of whom were actually engaged in the battle. The Confederates lost, in killed, wounded, and missing, 3396; the Federals, 4211. Consult Johnson and Buel (eds.), *Battles and Leaders of the Civil War*, vol. iii. (New York, 1887).

PERSÆ (Lat., from Gk. *πέρσαι*, Persians). A play of Æschylus, produced at Athens in B.C. 472, with three other dramas, *Phineus*, *Glaucus*, and *Prometheus*. It is notable as being the only extant ancient drama the subject of which is not mythological. Its subject is the defeat of the Persians, with a fine description of the battle of Salamis. The scene is laid at Susa. The actors are Atossa, the mother of Xerxes; Xerxes himself, a messenger, and the Shade of Darius. The chorus consists of aged Persian nobles.

PERSECUTIONS OF THE CHRISTIANS, THE TEN. A phrase that has been in very general use since the fifth century. The number, however, has no basis in fact, and was suggested by the ten plagues of Egypt, and the ten horns of the beast in the Book of Revelation (xvii. 3 sqq.), interpreted, in accordance with the allegorizing spirit of the time, as types of ten emperors. There were only two persecutions coterminous with the Roman Empire, and directly prompted by Imperial action, that under Decius in 250, and that under Diocletian and his associates, 303-313. On the other hand, if provincial and local persecutions be taken into account, the number is far too small. So far as known, Claudius (41-54) was the first Roman Emperor to attempt

any sort of persecution of the Christians. Suetonius states that he expelled the *Jews* from Rome. The reason is not altogether clear, but a very plausible interpretation is that, at this early date Christian converts being mainly Jews, the Government regarded the former merely as a sect of the latter, and the decree was occasioned by disorders arising in the city because of conflicts between non-Christian and Christian Jews, leading to the expulsion of both. The date is uncertain; it has been placed in 52, but may have been earlier (cf. Acts xviii. 2). The ten persecutions as commonly given, with the date fixing approximately either the beginning or period of greatest severity, are: That under Nero, 64; under Domitian, 95; under Trajan, 112-113; under Marcus Aurelius, 177; under Septimius Severus, 202; under Maximinus, 235; under Decius, 250; under Valerian, 257; under Aurelian, 274; under Diocletian and his successors, 303-313. Consult, besides the Church histories: Gibbon, *Decline and Fall of the Roman Empire*, chaps. xiii., xiv., and xvi.; Renan, *Les origines du christianisme* (Paris, 1863-82); Allard, *Histoire des persécutions* (Paris, 1884-94); id., *Le christianisme et l'empire romain* (Paris, 1897); Ramsay, *The Church in the Roman Empire Before 170 A.D.* (London, 1894); Weis, *Christenverfolgungen* (Marburg, 1901); Hardy, *Christianity and the Roman Government* (London, 1894). For the sources, consult Preuschen, *Analecta* (Freiburg, 1893); *Translations and Reprints published by the Department of History of the University of Pennsylvania*, vol. iv., No. 1 (Philadelphia, 1897). See MARTYR.

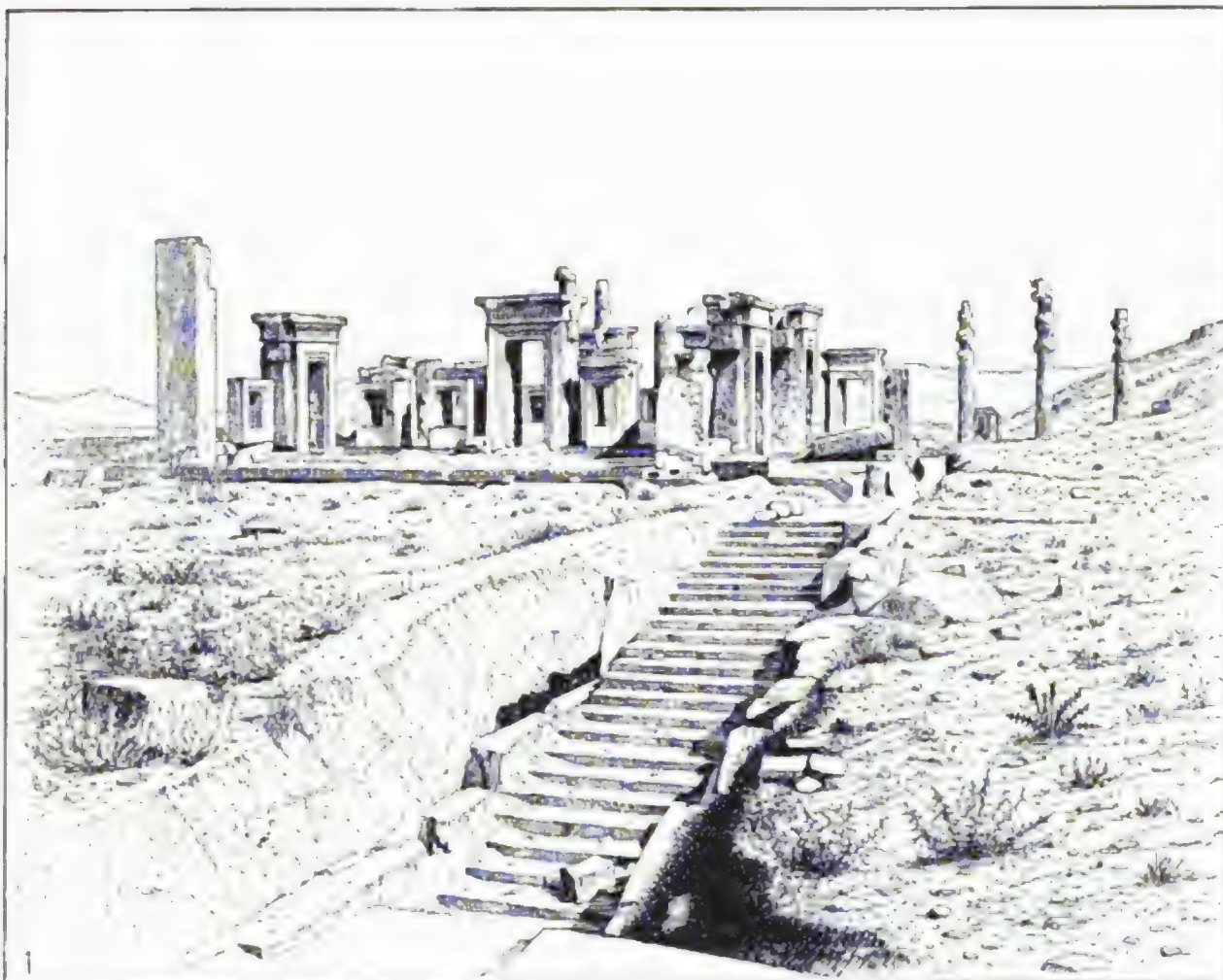
PERSEPH'ONE. See PROSERPINA.

PERSEP'OLIS (Lat., from Gk. Περσέπολις, Περσάπολις, City of the Persians). The Greek name of the capital of the Persian Empire under Darius I. and his successors. The native name is unknown. The locality is identified with the principal group of ruins, the Takhti Jemshed or Throne of Jemshed, the traditional founder of Persepolis, and is called also Tchil Minar or Forty Pillars. The city is supposed to have extended throughout the whole valley of the Medus above its confluence with the Araxes (now the Polvar and the Bendemer respectively), overlooking the beautiful mountain-girt and fertile plain of Murghab, north of Lake Tashk or Nargis. Part of the site was occupied later by the important Sassanian city of Istakhr. The only remains of Persepolis are the ruins of buildings erected by Darius Hystaspis, Xerxes, Artaxerxes, and other Achæmenians, which are scattered throughout the valley of the Polvar, about 30 miles northeast of Shiraz on the road to Ispahan. The ruins comprise three principal groups: (1) Takhti Jemshed, already referred to, situated at the foot of a lofty mountain range, in which, at a considerable elevation, hewn out of the solid rock, are three finely sculptured sepulchres; (2) Nakshi Rustem—the picture of Rustem, so called from the relief adornments—consisting of four similar rock-hewn sepulchres cut in a perpendicular cliff at a considerable height, about six miles to the northeast on the opposite bank of the Polvar; (3) the remains at Haji Abad on the Polvar, about four miles north of Takhti Jemshed, of an ancient fire temple, which was in a perfect state of preservation in the tenth century A.D., and then served as the mosque of the city of

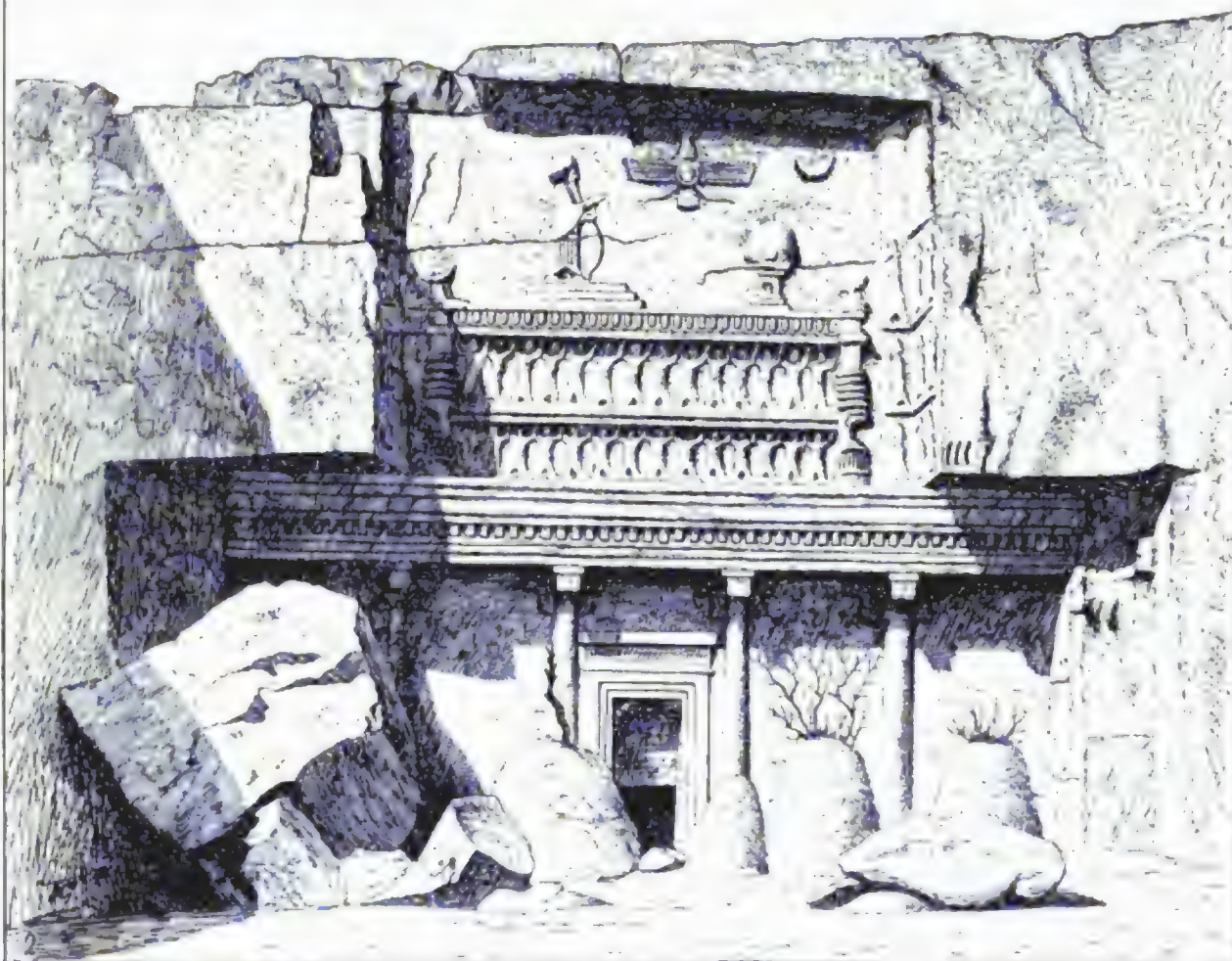
Istakhr. The tombs of Nakshi Rustem are those of Darius I., which bears a long inscription identifying it, and probably of Xerxes I., Artaxerxes I., and Darius II., and those behind Takhti Jemshed once held the bodies of Artaxerxes II., Artaxerxes III., and Darius III.

Takhti Jemshed, the most important of the groups of ruins, is situated on a vast terrace of cyclopean masonry built at the base of and backed by the Mountain of the Tombs. The vast substructure is about 1500 feet north by south, and about 800 feet east by west, and was surrounded, according to Diodorus Siculus, by a triple wall of 16, 32, and 60 cubits respectively. The whole area is further divided into three terraces, the lowest toward the south, the northern about 550 feet long and 35 feet high, the central 800 feet square, and rising 45 feet above the plain. No traces of structures are to be found on the lowest platform; the northern supports the Propylæa of Xerxes; and the central platform was occupied by the foremost structures, distinguished as the Great Hall of Xerxes, the Palace of Xerxes, and the Palace of Darius, towering one above the other in successive elevations from the ground. The stone used for the buildings is dark gray marble, cut into gigantic square blocks, and in many cases exquisitely polished. The ascent from the plain to the great northern platform is formed by two double flights, the steps of which are nearly 22 feet wide, 3½ inches high, and 15 inches in the tread, so that travelers have been able to ascend them on horseback. The Propylæa of Xerxes on this platform are two masses of stonework, which probably formed an entrance gateway for foot passengers, paved with gigantic slabs of polished marble. Portals still standing bear figures of animals 15 feet high, closely resembling the Assyrian bulls of Nineveh. The building, conjectured to have been a hall 82 feet square, is, according to the inscription, the work of Xerxes. An expanse of 162 feet divides this platform from the central one, which still bears many of the columns of the Hall of Xerxes, from which the ruins take their subsidiary name. The staircase leading up to the Tchil Minar or Forty Pillars is, if possible, even more magnificent than the first. The walls are more richly decorated with sculptures, representing colossal warriors with spears, gigantic bulls, combats with wild beasts, and processions; while broken capitals, shafts, pillars, and countless fragments of buildings, with cuneiform inscriptions, cover the whole vast space of this platform. The pillars were arranged in four divisions, consisting of a central group six feet deep every way, and an advanced body of twelve in two ranks, the same number flanking the centre. Only thirteen of the columns now remain. Their form is very beautiful. Their height is 60 feet, the circumference of the shaft 16 feet, the length from the capital to the torus 44 feet. The shaft is finely fluted in 52 divisions; at its lower extremity begin a cincture and a torus, the first two inches in depth, and the latter one foot, whence devolves the pedestal, shaped like the cup and leaves of the pendent lotus, the capitals having been surmounted by the double semi-bull. The Great Hall of Xerxes is computed to have been a rectangle of about 300 to 350 feet, and to have consequently covered 2½ acres. Behind the Hall of Xerxes was the so-called Hall of a Hundred Columns, to the south of which are indications

PERSEPOLIS



1. PALACE OF DARIUS



2. FIRST OF THE TOMBS OF THE KINGS



f another structure, termed the central edifice. Next along the west front stood the Palace of Xerxes, and to the south the Palace of Xerxes, measuring about 86 feet square, similarly decorated.

Persepolis replaced Pasargadæ (q.v.) as the capital of Persia under Darius I., by whom and his successors the city was extended and enlarged. It surrendered to Alexander the Great (B.C. 331) after the defeat of Ariobarzanes at the battle of Gaugamela. Ariobarzanes again offered battle, but was killed, whereupon Alexander ordered a general massacre, sacked the city, and, acting—it is doubtfully chronicled—on the suggestion of Thais the courtesan, fired the palaces of Takhti Jemshed. Although fifteen years later Persepolis was still the capital of Persia, it gradually sank into insignificance, until upon its ruins Istakhr rose into prominence about A.D. 200, and for centuries was a considerable centre of administrative, religious, and commercial activity. It was a formidable opponent of the Moslem invasion, suffered severely, and also passed out of existence, but, unlike its great predecessor, left few traces of its ancient glory.

Consult: Vaux, *Nineveh and Persepolis* (London, 1850; 4th ed. 1852); Fergusson, *The Palaces of Nineveh and Persepolis Restored* (ib., 1851); Rawlinson, *The Five Great Monarchies*, vol. iii. (ib., 1871); Myers, *Remains of Lost Empires* (New York, 1875); Stolze, *Persepolis* (Bern, 1882); Dieulafoy, *L'art antique de la Perse* (Paris, 1884-89); Blundell, "Persepolis," in *Transactions of the Congress of Orientalists*, vol. 1. (London, 1892); Curzon, *Persia and the Persian Question* (ib., 1892).

PERSEUS (Lat., from Gk. Περσεύς). In Grecian legend, the son of Zeus and Danaë (q.v.), and grandson of Acrisius, King of Argos. As his grandfather had been warned that he would perish by the hand of Danaë's son, he inclosed mother and child in a chest and cast them into the sea. They drifted to the island of Seriphos, where they were cared for by Dictys, brother of the King, Polydectes. The latter fell in love with Danaë, and as Perseus, now grown to manhood, interfered with his plans, he sent him to bring the head of Medusa, the Gorgon. Guided by Athena, he found the Grææ, old women with but one eye and one tooth between them, who directed him to the nymphs, from whom he received winged sandals, a pouch, and the cap of invisibility, which, like the Tarnhelm of Teutonic story, made the wearer invisible. Hermes provided him with a harpe (ἀρπη) or scimitar, and Athena with a bronze shield, in which as a mirror he could see the face of Medusa without encountering her glance, which turned all living things to stone. After a long journey, which the poets gradually filled with adventures, he reached the distant home of the Gorgons, found them asleep, identified Medusa, cut off her head, and escaped by the aid of his magic helmet. On his return he rescued Andromeda (q.v.), daughter of King Cepheus of Ethiopia (variously localized in this story), and took her with him to Seriphos, where he found his mother and Dictys suppliants at the altar, for Polydectes had resorted to violence. Medusa's head turned Polydectes and his followers to stone, and Perseus sent his magic weapons to the nymphs by Hermes, and gave the head to Athena, who placed it on her ægis.

Perseus with his wife and mother then returned to Argos, and found that Acrisius had fled to Larissa, in Thessaly. Perseus followed, and accidentally killed his grandfather while throwing the discus during some games. Returning, he exchanged the rule of Argos for that of Tiryns and later founded Midea and Mycenæ. Perseus is originally the local deity of the spring Perseia by Mycenæ, as Danaë is the ancestor of the Danaans of Argolis. The slaying of Medusa and the rescue of Andromeda were favorite subjects of ancient art, and are found on early vases and Pompeian wall-paintings, as well as in sculpture. They are catalogued and discussed by Knatz, *Quomodo Persei Tabulam Artifices Græci et Romani Tractaverint* (Bonn, 1893). For the story freely told in English, consult William Morris, "The Doom of King Acrisius," in *The Earthly Paradise* (London, 1868).

PERSEUS (c.212 B.C.-?). The last King of Macedonia, the eldest son of Philip V. He was born about B.C. 212. He was from his earliest years trained to a military life, and, having compassed through intrigue the death of his brother Demetrius, who was a favorite both with the Macedonians and with the Romans, and whom he for that reason regarded as a dangerous rival, he ascended the throne on the death of his father in B.C. 179. A struggle with Rome was inevitable, and Perseus was well prepared for it. His treasury and magazines were full, his army amounted to over 40,000 trained men, his alliances were strong, and he was himself popular with his subjects and neighbors. He sought, however, to postpone the inevitable as long as possible, but matters came to an open rupture in 171. In that year the Consul Publius Licinius Crassus was sent against him. The blunder of the Romans saved Perseus. Crassus was defeated at Callicinus in Thessaly. But Perseus failed to follow up his victory, and the war was continued without decisive result for a number of years. Finally, in the month of March, 168, Lucius Æmilius Paulus arrived in Greece to take command of the Roman forces, and on June 22d of the same year the Macedonian army was utterly defeated in the battle of Pydna. Perseus fled, but afterwards fell with all his treasures into the hands of the Romans. After gracing the triumph of the consul at Rome, he was held in captivity several years at Alba Fucens, in Italy, where he at length died. Consult: Droysen, *Geschichte des Hellenismus* (2d ed., Gotha, 1877-78); Freeman, *History of Federal Government* (2d ed., New York, 1893); Mahaffy, *Alexander's Empire* (New York, 1888).

PER'SHORE. A market-town in Worcestershire, England, on the Avon, nine miles south-east of Worcester (Map: England, D 4). It is noted for the Church of the Holy Cross, the only remaining portion of the famous abbey founded in 685. Vegetable gardening is largely carried on, and there are manufactures of stockings, and engineering and machine works. Population, in 1891, 9100; in 1901, 8800. Consult Styles, *History of Pershore Abbey Church* (London, 1839).

PERSIA, pēr'shâ or pēr'zhâ (Lat. *Persia*, *Persis*, from Gk. Περσίς, from OPers. *Parsa*, *Pers*, *Pârs*, Ar. *Fârs*, Persia). A native State of South-western Asia, called by the inhabitants Iran, the

name Persia (Farsistan) being applied only to a small province. It extends from latitude 25° N. (Ras Farsa, near the Baluchistan frontier) almost to latitude 40° N. (Aras River on the border of Transcaucasia), and from longitude 44° E. (Armenia) to longitude 63° E. (Baluchistan). A line extending northwest and southeast, nearly bisecting the country, is 1400 miles long. Its greatest north and south extent, from Ras el-Kuh on the Strait of Ormuz to its most northern point on the frontier of Russian Turkestan, is 875 miles. The country is bounded on the north by Transcaucasia, the Caspian Sea, and Russian Turkestan, on the south by the Indian Ocean and Persian Gulf, on the east by Russian Turkestan, Afghanistan, and Baluchistan, and on the west by Asiatic Turkey and the Persian Gulf. It is over one-fifth as large as the United States, excluding Alaska, having an area of about 642,000 square miles.

TOPOGRAPHY. Persia is an elevated tableland from 3000 to 5000 feet in general altitude, sinking to the Caspian Sea and the plain of Turkestan in the north and to the Persian Gulf in the south, and embracing the western and larger portion of the great Iranian plateau, which includes Afghanistan and Baluchistan. To reach this plateau great mountain barriers must be crossed on all sides excepting in the east, where the tableland and mountains merge imperceptibly with those of Afghanistan and Baluchistan. On the other three sides great mountain ranges stretch between the interior plateau and the narrow plains which slope to the Caspian Sea on the north, and the Persian Gulf on the south, and merge with the plains of Asiatic Turkey on the west. The plain of the Caspian presents a wonderful contrast to the colorless, waterless, and treeless expanse of the plateau to the south from which it is separated by the Elburz Mountains. It comprises the maritime provinces of Mazanderan and Ghilan, so rich in water that many swamps and lagoons breed miasma, and so abundantly covered with forests and undergrowth that it is often difficult to force a way through the dense vegetation. Furthermore, it possesses a degree of atmospheric humidity that is seldom found outside of the tropics. Most of the towns are among the forests on the lower slopes of the mountains. For purposes of agriculture and fruit-raising this is the most favored part of Persia. Many large and small plantations have been cleared in the forests, and all the cultivated crops of Southern Europe, including the mulberry for silk manufacture, attain high perfection. This luxuriance of vegetable life is due to the vapor-charged clouds of the Caspian, which are brought south by the prevailing winds, and, impinging upon the northern slopes of the Elburz, descend in mist and rain to the lowlands.

Along the southern maritime border the mountains, low in elevation and extending east and west, often closely approach the sea, and the narrow plains between them and the ocean are dry and barren excepting in certain districts where the rainfall, supplemented by irrigation, suffices for agriculture. Nearly all the mountains of Persia are bleakly sterile in aspect. The most imposing of the mountain ranges is the Elburz, which, continued eastward by the Kuren Dag, Kopet Dag, Ala Dag, and Binalud Kuh, stretches like a mighty mountain wall along the

entire northern border of Persia. The Elburz, from 10 to 30 miles south of the Caspian, may be crossed by a few passes or defiles, some of them at an elevation of over 8000 feet. Its upland valleys, with an average elevation of about 4000 feet, are dominated by peaks rising from 8000 to 11,000 feet above the sea; and towering above them all is Demavend, a nearly extinct volcano, about 18,500 feet high, the culminating point of Persia. From its ice-filled crater, on a clear day, the eye may survey a panorama spread over 50,000 square miles, embracing the Caspian, the mountain ranges of the north and west, and the dry expanse of the tableland with patches of green oases and the outlines of many towns. The wide mountain lands of Western Persia extend in many parallel ranges throughout the whole of that part of the country overlooking the valley of the Tigris and the Persian Gulf. Their trend is from northwest to southeast. They form the mountain barrier between Persia and Turkey and are known collectively as the Zagros Mountains. Some of the peaks are snow-crowned most of the year, and Mount Alijuk, south of Ispahan, is 14,000 feet in elevation. But the culminating range of these highlands is the Kuh-Dinar, extending north of Shiraz, whose highest summit, the Kuh-i-Dena, is over 17,000 feet in elevation, second only to Demavend. Islands along the east coast of the Persian Gulf are merely the partly submerged fragments of the coast ranges.

The tableland of the interior, thus walled in by mountains, is itself intersected by numerous ranges and detached masses of mountains, excepting in Eastern Persia, where great plains and deserts are the main topographic feature. Between these ranges, also extending northwest and southeast, are wide plains and narrow valleys. These plains and valleys would be utterly sterile were it not for the mountains near them, which collect rain and snow. The valleys are more easily irrigated and are thus more fertile than the plains, which are here and there brightened by a patch of green oasis, but for the most part are sandy and barren. The general aspect of the plateau is that of a cheerless and monotonous waste stretching to the base of mountains that are equally bleak and uninviting, and reaching the acme of frightful desolation in the two deserts of the east, the Dasht-i-Kavir or Great Salt Desert, extending between latitudes 33° and 36° N., and from longitude 52° to 57° E., and the more southerly Dasht-i-Lut or Great Sand Desert, extending between latitudes 29° and 32° N., and between longitudes 57° and 60° E. Their combined length is over 500 miles from northwest to southeast, but they are separated between the thirty-second and thirty-fourth parallels by a hilly region through which passes one of the main caravan routes between Central Persia and Meshhed. The origin of the Great Salt Desert is not yet clearly determined. One theory is that it is due to the drainage of saline streams from the surrounding higher lands and the consequent deposition of a white crust or efflorescence; the other theory is that it is the bed of an ancient salt lake. Geologists now incline to the latter explanation. In 1891 a solid bed of rock salt estimated at over 600 square miles in area and several feet in thickness was discovered in this remarkable region. Lieutenant Vaughn and Mr. C. E. Biddulph, who brought to light this sea of solid rock salt,







which is probably unrivaled in the world, found it so hard that with iron tent pegs they were able to detach only a few chips.

The Dasht-i-Lut or Great Sand Desert, which separates the Province of Khorasan from that of Kirman, has salt also as one of its chief ingredients, but it is rarely overlaid like the more northern desert with saline incrustations or briny swamps. It gives life to a few poor shrubs, while nothing grows in the other desert. Sand is its prevailing feature. It is much lower in altitude than the Great Salt Desert, its average elevation being less than 2000 feet, while in places it sinks to only 500 feet above sea-level. All these topographic aspects have a marked effect upon the distribution of the population. The lines of villages and cities follow the trend of the mountains from east to west across North Persia and from northwest to southeast across Western and Central Persia, because only in the neighborhood of the mountains can water be obtained to supply the towns and nourish the gardens and fields. Where the ranges spread far apart, and in Eastern Persia, where there are few high elevations, there is only a sprinkling of human inhabitants. Desolation reigns over vast expanses.

HYDROGRAPHY. The waters of two-thirds of Persia do not reach the sea, but are lost in inland swamps or lakes or disappear in the sands. Few rivers are worthy of special mention. Among them is the Karun, which drains a large part of the mountainous provinces of Luristan and Khuzistan, empties into the Persian Gulf, and is nearly four feet deep throughout the year. A small steamer, subsidized by the British Government, is now making regular trips 150 miles up the river to Ahwaz, where rapids and ledges obstruct navigation. No other river is navigable. The Sefid Rud, Atrek, and Gorgan, draining the northern slopes of the Elburz, and its prolongations, are the only considerable streams entering the Caspian. The streams flowing to the inland basins are much inferior in volume to those emptying into the sea. Only two lakes are of importance. Lake Urumiah lies in the extreme northwest and from its surface the snowy top of Mount Ararat may be seen. It is so heavily charged with salt that swimmers cannot dive in it. Its wooded shores and islets give a pleasing impression, but the average depth is only about 15 feet, and, though it covers an area of about 1600 square miles, its volume is six or seven times inferior to that of Lake Geneva in Switzerland. The great salt lake of Southern Persia is Niriz, much smaller than Urumiah and with a greatly indented and fantastic outline.

CLIMATE. The winter cold is intense on the high tableland. The summers are very warm, but there is little humidity, and the dry, clear heat is temperate compared with that of Northern India. On the other hand, the air is damp and relaxing in the forest-covered lowlands of the Caspian, and the southern maritime tracts are very dry and hot at most seasons. Spring and autumn are the most enjoyable parts of the year. The average annual rainfall perhaps does not exceed 10 inches in any part of the country excepting along the Caspian, where the lowland Caspian provinces have a rainfall about five times greater than that of the highlands. The soils, composed of a mixture of sandstone, lime-

stone, and volcanic debris washed down from the mountain slopes, are very productive.

FLORA. As Persia is a land of transition between Eastern Asia and the Western World, its flora partakes of the character of the surrounding lands. The zones of vegetation succeed one another quite abruptly. Polar species, for example, are found on the higher summits of the north, while wheat is cultivated at heights of 9000 feet, and rice and the fruits of Southern Europe thrive on the neighboring lowlands. Except on the Caspian seaboard, the Persian flora is poor in varieties. Over most of the plateau the konar tree, cyprus, dwarf oak, walnut, and mulberry are almost the only timber encountered. But the rich humid valleys of the Caspian belt and the lower slopes of the Elburz produce timbers of great variety, including the oak, ash, beech, elm, alder, birch, sycamore, cherry, and thorn. In the same region the fruits of Europe and of Asia meet and are grown in great variety. Among the medicinal products are gum tragacanth, gum arabic, asafetida, and several others; indigo, henna, madder root, saffron, gall nuts, and other dyestuffs are also valuable products. The rose is preëminent among flowers and attar of roses is among the famous productions.

FAUNA. The animals of Persia differ little from those of the neighboring lands. In the forests of the Caspian plain are the hare, fox, wolf, hyena, jackal, leopard, tiger, lynx, and wild boar. On the mountains are seen the ibex, mountain sheep, wild goat, antelope, and bear. The maneless lion sometimes attacks human beings, but preys chiefly on the wild boar. Although the Persian fauna is poor in number of species, the reptiles, especially lizards, are represented by many varieties. Owing to the general aridity of the land, snails and other land mollusks are nowhere found. The domestic animals include fine horses and mules, single-hump camels, sheep of the fat-tailed species yielding a fine quality of wool, dogs, and several species of falcons that are trained for the chase.

GEOLOGY AND MINERAL RESOURCES. Most of the tableland and mountains are of sedimentary formation, largely sandstone, Tertiary limestone, chalks, and Cretaceous nummulitic rocks. But interspersed among these sedimentary rocks are mountains built up of eruptive rocks and volcanic ash such as Mounts Demavend, Savalan, and many others. The deserts are composed mainly of saline and sand accumulations. The mineral resources are enormous, but are largely undeveloped. Roughly speaking, there are six mineral-producing zones: (1) the Province of Azerbaijan, in the northwest, where iron, copper, lead, and coal are found; (2) the northern and southern slopes of the main Elburz range, where iron and coal occur near each other, Teheran deriving its coal supply from this region; (3) Khorasan, the rich northeastern province, which contains the famous turquoise mines of Nishapur, and in which are obtained considerable quantities of copper, coal, and salt; (4) the Province of Kirman, with copper, lead, manganese ore, and fine marble; (5) the highly mineralized districts in the central mountains, with iron, antimony, nickel, cobalt, copper, lead, sulphur, and asbestos; and (6) the Persian Gulf littoral, with naphtha, rock salt, iron, ochre, gypsum, nitrates, and sulphur. While Persia abounds in remark-

able mineral resources, their commercial value is chiefly dependent on the cost of transportation to the coast or nearest markets. In the absence of good roads, the minerals of large parts of Persia must long remain almost untouched.

AGRICULTURE. Tillage in Persia depends upon the water supply. The detritus swept down by the streams or torrents deposits a layer of soil upon the sand, which is subsequently fertilized by the same agency that brought it. A large amount of cultivable land is not yet utilized. Cereals, chiefly wheat, barley, and rice, are grown throughout the country. Sugar-cane is sparsely cultivated and coarse sugar is made, but large imports from Russia and France are necessary. Cotton, short in staple, thrives to an elevation of 5000 feet above the sea, and over 100,000 bales are annually exported to the mills of Bombay and Marseilles. Silk is produced in the Caspian provinces to the amount of 500,000 pounds (weight) a year, most of it going to Yazd, Khashan, and Ispahan, the centres of the manufacturing trade; and in 1899 1,171,601 pounds of cocoons were sent to Europe. Persian tobacco is known throughout Western Asia for its superior quality. The home consumption is enormous, and over 5000 tons are exported to other Asiatic countries and Egypt. The production is roughly estimated at over 50,000 tons a year. The poppy has been widely cultivated since 1864, chiefly in the central and southern provinces, with an average production of over 6000 chests of opium. Most of it is sold to China, but the purest quality is sent to London for the extraction of morphine and is in part re-exported to America. Indigo grown in the southwest is used in the dyeing of cotton. Nearly every house has its vegetable and tangled but beautiful flower garden. The fruits include the grape, plum, raspberry, apple, pear, peach, and apricot; and Persia is said to produce the finest melons in the world. Dates are grown along the Persian Gulf and are sold abroad. The implements of tillage are extremely primitive.

Persia has great sources of wealth in its animal products. The sturdy Persian horse, excellent for cavalry or ordinary purposes, is exported to India. The mule, though small, has extraordinary strength and endurance. The best camels of Khorasan carry 600 pounds at the rate of twenty miles a day. Skins and hides are exported in large quantities to Bagdad and Russia. Persian lamb skins are famous. Sheep's wool (about 9,000,000 pounds exported annually) and goats' hair are used in making cloths and shawls. The shores of the Caspian and the rivers emptying into it are richly stocked with fish, and a Russian has the monopoly of preparing caviare from the sturgeon and sterlet.

MANUFACTURES. The chief manufactures are silk, woolen, and cotton tissues, and artistic fabrications. Broadly speaking, there are no factories, the output being the work of private shops or the production of special, localized schools of industry. Almost every large town has its own special manufactures which cannot be procured elsewhere. The most important and best known of the textile fabrics is Persian carpet, of which there are about 30 different kinds, all hand-made and the design varying with each carpet. Each kind has its own characteristics, so that it is easy to distinguish between the products of different districts. Carpets are sent

to Europe and America, the exports amounting to over \$700,000 a year. The woolen shawls of Kirman made of goats' hair are also famous. Cotton fabrics, chintzes, velvets, silks, and embroideries are produced in considerable quantity, though the cheaper fabrics of European looms have injured all the home textile industries including that of carpets. For illustration, see Colored Plate under the article Rugs.

The earthenware and faience of Old Persia were its most famous artistic products. The ceramic arts, however, have now largely disappeared. Enameling in gold, silver, and copper is the best surviving relic of the ancient metal work. Native artisans still excel in copper, glass, and filigree work, and carvings. The lack of good means of transportation, the neglect of the Government, the apathy of the people, and the invasion of foreign products are responsible for the undoubted decline of Persia in the manufacturing arts.

COMMERCE. The Russian frontier is within 80 miles of Tabriz, the commercial capital of Persia, and Russian steamers unload cargoes within 160 miles of Teheran. The result is that in North Persia Russia is the predominant commercial factor. In South Persia Great Britain, controlling the Persian Gulf, has been able, since the opening of the Suez Canal, firmly to establish its supremacy in trade. Between these two great spheres of Russian and British trade lies Middle Persia, over which both countries are endeavoring to extend their sway. The great inland centres of commerce are Tabriz, Teheran, Ispahan, and Meshhed, connected by caravan routes to which smaller routes extending to most parts of the country are tributary. Opium leads in the exports, followed by raw silk, rice, carpets, tobacco, dried fruits and nuts, wheat and barley, gum tragacanth, asafoetida, and raisins. The imports are determined by the fact that the country is deficient in many products which constitute the necessities of civilized life. Iron is worked only in the rudest fashion, little sugar is made, the oil wells are untouched, fabrics are in limited supply, and yet Persia consumes enormous quantities of sugar, kerosene, hardware, textiles, and many other manufactures. Cotton textiles are the largest imports (\$3,991,542 in 1901-02). Great Britain supplies most of the bleached and unbleached cottons. Then come silks and woollens, sugar, spices, hardware, glassware, iron, and many other commodities. The value of the imports in the fiscal year 1901-02 was \$27,184,536, of which Russia sent \$11,071,828; Great Britain, \$10,327,900; France, \$2,324,927; Turkey, \$1,218,100; Austria, \$995,729; Afghanistan, \$261,671; Germany, \$231,913; other countries, \$742,465.

The value of the exports in the same period was \$11,415,464. The total import and export trade was therefore worth \$38,600,000, of which Russia had 56 per cent. and Great Britain 24 per cent. The sales of pearls from the great Bahrein fisheries in the Persian Gulf amounted to \$2,895,000.

The principal ports are Bender Abbas, Lingah, and Bushire on the Persian Gulf, and Enzeli and Meshhed-i-Ser (the port of Balfrush) on the Caspian. Trebizond, a port of Asiatic Turkey on the Black Sea, is still an important outlet for the trade of Tabriz. In February, 1903, the new tariff agreement between Russia and Persia,

y which the ad valorem duties of 5 per cent. on both exports and imports were changed to a specific tariff, went into effect. All the other foreign Powers are included in this agreement on the 'most favored nation' basis.

TRANSPORTATION AND COMMUNICATION. The roads are very poor, the caravan routes being merely mule paths. An excellent highway 217 miles long, extending from Resht on the Caspian Sea to Teheran, built by the Russian Government, was completed in 1899. Another improved road built by British capital was completed in 1900 between Ispahan and Ahwaz, the head of navigation on the Karun River. Regular steamship lines connect the ports of the Caspian Sea with Russian ports, and the ports of the Persian Gulf with Great Britain and India. The only railroad extends from Teheran to one of the suburbs—six miles. The telegraph system extends north and south across the country and east and west across Northern Persia, with 4800 miles of line. There are about 100 post-offices.

BANKING. The Imperial Bank of Persia, established in 1889 under a concession granted to Baron Reuter, has an authorized capital of 4,000,000 sterling, which, however, owing to the great fall in silver and the rise in exchange, was reduced in 1894 to an actual capital of £650,000. The bank has the exclusive right to issue bank notes, which must not exceed £800,000 unless authorized by the Persian Government. The issue of notes is on the basis of the silver kran, the coin in reserve now being 33 per cent. The head office is at Teheran and there are branches at Tabriz, Resht, Meshhed, Ispahan, Yezd, Shiraz, Bushire, and Bombay. The Russian Banque des Prêts de Perse, which is connected with the Russian State Bank, and a branch of the Russian Banque de Commerce de Moscou are also established in Teheran.

GOVERNMENT. The government is an absolute monarchy in the hands of the Shah, and resembles that of Turkey. The Shah is assisted by a ministry consisting of a Grand Vizier, and of ministers (viziers) of Foreign Affairs, Internal Affairs, Finance, War, Education, Mines and Telegraphs, Post, Justice, etc., to the number of 27. The rule of the Shah, however, is restrained in that it must accord with the "divine law" of the Mohammedan religion. Furthermore, the Imam-Juma, not the Shah, stands at the head of the Shiah religious system, which prevails in Persia. There are 35 main political divisions, comprising five large provinces or *mamlikats* and 30 smaller provinces termed *vilayets*. The *mamlikats* and their capitals are as follows:

MAMLIKAT.	CAPITAL.
Azerbaijan.	Tabriz.
Farsistan, or Fars.	Shiraz.
Ghilan, or Gilan.	Resht.
Khorasan.	Meshhed.
Kirman.	Kirman.

Azerbaijan is the fief of the heir apparent. The governors of the other provinces are appointed by the Shah and usually hold office for one year. They have almost absolute power in their respective territories. The provinces are divided into sub-provinces, districts, sub-districts, parishes, cities, towns, and villages. These minor divisions are administered by lieutenant-governors, mayors, etc., who are appointed by the governor and are directly responsible

to him. Justice is administered both by the Shah and by the clergy, according to the laws of the Koran, and is often satisfied, even in connection with the worst crimes, by payment of money to the Government. The Persians, however, have been renowned through all time for the cruelty of their punishments and their disregard of human life. Teheran is the capital.

FINANCE. The revenues and business of the country suffer from the great fluctuation in value of the silver medium of exchange. Owing to the rise in the price of silver, the value of the revenue rose in 1890-91 to £1,775,000, but the subsequent decline in the price of silver reduced the value of the revenue for 1899-1900 (estimated at less than £1,500,000). About four-fifths of the revenue is derived from assessments upon towns, villages, and districts, the rest coming from the customs, post office, telegraphs, fisheries, mines, and some other concessions. The revenues exceed the expenditures, the balance being paid into the Shah's Treasury. About one-third of the expenditures is for the army, one-tenth for the royal court, one-fifth for pensions, one-sixteenth for allowances to princes, and one-sixtieth for the Foreign Office—the civil service, colleges, and local governments absorbing most of the remainder. The debt is very small. Persia's credit is good and the Government has promptly met its foreign obligations. The only foreign debts now outstanding are a loan of \$17,325,000, known as the five per cent. Persian gold loan of 1900, taken by the Russian Banque des Prêts de Perse, the loan running 75 years and guaranteed by Persian customs receipts, and a further loan of \$7,700,000, granted in 1902 by the same bank on the same conditions.

ARMY. See under ARMIES.

WEIGHTS, MEASURES, AND MONEY. The kran, a silver coin, is the monetary unit. Its value, subject to great fluctuations, is about 8.2 cents. The copper coinage has been entirely replaced by large quantities of nickel 5 and 10 centimes pieces coined at Brussels and put into circulation in 1900. There are six gold coins, subdivisions or multiplications of the toman, which is nominally worth 10 krans. Very little gold is in circulation. The unit of weight is the miskal (71 grains), but most articles are bought and sold by a weight called batman or man, which varies in avoirdupois, one of the most commonly used being the man-i-Tabriz, which equals 640 miskals or 6.49 pounds. The unit of measure is the zar or gez, of which several standards are in use, the most common measuring 40.95 inches.

POPULATION. The inhabitants number over 9,000,000, the largest part of whom live in the cities and towns. Large areas are uninhabited, and the density of the population is only about 14 to the square mile. The estimated population of the principal cities is: Teheran, 250,000; Tabriz, 180,000; Ispahan, 80,000; Meshhed, 60,000; Kirman, about 40,000; Yazd, 55,000; Balfrush and Shiraz, 50,000 each. The inhabitants are divided into two distinct classes, the dwellers in towns or villages and the dwellers in tents. Many of the richer dwellers in the towns leave for the mountains during the hot summer months. The nomads, including Arabs (260,000), Kurds and Leks (675,000), Turks (720,000), Lurs (234,000), and Baluchis and Gypsies (20,700), move from place to place according as their animals need pasturage or their other interests dictate.

RELIGION. Nearly all the inhabitants are Mohammedans, besides whom there are about 9,000 Parsis, 35,000 Jews, 45,000 Armenians, and 25,000 Nestorians. Wide tolerance is exercised toward the followers of other religions in places where Europeans reside, but elsewhere they are sometimes oppressed by the lower classes of the population. It is an interesting fact that most of the Mohammedans in Persia belong to the Shiite or "unorthodox" sect of Islamism.

EDUCATION. All wealthy families employ private tutors for their children, and many colleges supported at public expense instruct students in religion, Persian and Arabic literature, and some scientific branches. There are also many schools for children, but most of the population are taught to read only the Koran. Western languages and science have been introduced to some extent into Persia by the polytechnic school which was opened in Teheran in 1849. It has several European professors. There are military colleges at Teheran and Tabriz, and a number of schools with improved methods of teaching supported by subscription and small tuition fees are in several of the larger towns.

ETHNOLOGY. The Persians, ancient and modern, are the most numerous and the most important historically of the Iranian group of Aryan peoples. The great plateau of Iran has been occupied since the earliest historical times by peoples of Aryan stock, Medes, Proto-Medes, and ancient Persians, who played a great rôle in the development of Western Asia, produced monuments of lasting grandeur, imposed a court and a language upon nations from the Mediterranean to the Bay of Bengal, and through their literature profoundly influenced both the Orient and the Occident. They are also to have had more or less to do with the rise of strict monotheism among the Hebrews after the captivity. The culture of the modern Persians covers a wide range, from the civilization or semi-civilization of the cities and towns to the nomadism and pastoralism of a very primitive sort prevalent in the mountainous districts. The civilization of the Persians is often spoken of as only "skin-deep," the barbarian and the savage sleeping but lightly in the garb of culture. Physically, the mass of the Persians belong to the Aryan type, although much intermixture (as the modern Persian type shows) has taken place. The pure Iranian is to be found among the Farsis about Persepolis, and among the Loris (Luris), or mountaineers, somewhat farther to the west. Of the "ideal Persian type" there are three subvarieties: (1) A darker population toward the southwest, along the line of contact with the Arabs; a Semitic strain pointing toward Africa. (2) The great mass of the Persian population—the Hajemis and Tajiks of the east and northeast—the result of a Turkoman-Tatar cross with the pure Iranian. Here belong also the Azerbaijan Tatars, Turkish in speech, but distinctly Iranian in race. (3) The Susians about the mouth of the Persian Gulf in the southeast, where a strain of Negroid blood is apparent, and relationship with the hill-tribes of India is suggested. Some authorities, however, do not attribute so much importance to the 'Negroid' traits of the Susians, since they may be due to slave intermixture. With the Hajemis, whose habitat is chiefly between Teheran and Ispahan, belong the Talych, Mazandarani, and other tribes of the Caspian littoral, to whom are closely

related both dialectically and otherwise the Tat and Guran of the extreme west, who are agriculturists. The Tajiks are the settled agricultural population of the greater part of Persia, as well as the stock from which many of its mercantile classes come. The same name is applied to their kindred between the Caspian, China, and India. The Tajiks are brachycephalic and above the average in height, while the Hajemis and in part the Farsis are dolichocephalic and of average stature. The Persians of the Persepolitan country are fair-skinned, slender, finely formed, and blonds by comparison with their darker neighbors. The Loris or Luris are taller, much darker, and dolichocephalic. Besides its Aryan population, Persia contains a considerable number of Turks and some few Arabs. In the extreme west Kurds (Aryans) are also to be found; likewise some Armenians, also Aryans. See Plate of ASIA, YELLOW RACES OF.

HISTORY. Although the legendary history of Persia begins some thousands of years before the Christian Era, our earliest trustworthy information is derived from the Greek writers. Herodotus, Ctesias, and Xenophon are our chief authorities, but their accounts are very conflicting. The northwestern part of Iran, anciently called Media (q.v.), was at the earliest period known to the Greeks a part of the Assyrian empire, but the Medes revolted and under Deioces established an empire which subdued both Assyria and their own kindred Persis. Herodotus states that the Persians were brought under complete subjection, but Xenophon's account implies that they were entirely independent, or at most that they recognized only a nominal allegiance to the ruling power.

The history of the Persian Empire proper begins with the revolt under Cyrus the Great about the middle of the sixth century B.C. With the defeat of Astyages, King of the Medes, the Persians gained their independence and subdued their former masters, who from this time became amalgamated with them. Cyrus continued his career of conquest, and soon succeeded in establishing a mighty empire, which extended from the Oxus and Indus to the shores of the Mediterranean. (See CYRUS.) His son, Cambyses II., a cruel tyrant (B.C. 529-522), subdued Tyre, Cyprus, and Egypt. After the brief rule of the usurper Smerdis (B.C. 522-521), Darius I., surnamed Hystaspis (B.C. 521-486), mounted the throne. He firmly established his dynasty, added Thrace and Macedonia to his empire, and suppressed a revolt of the Greek cities of Ionia, but his two attempts to subdue Greece were completely foiled, the first by the Thracians, and the second by the Athenians at Marathon (B.C. 490). One important service which he performed for the empire was the organization of the satrap system of administration. The whole empire was divided into provinces, and over each was placed a governor, or satrap, who was directly responsible to the Great King. Some uniformity in the government was thus secured, and the empire, as a whole, was very much strengthened. Darius's son, Xerxes I. (B.C. 486-466), raised the largest army that the world had ever seen for the subjugation of Greece. His military force was seconded by a great fleet, the King himself led the expedition in B.C. 480. He at first advanced successfully, but his fleet was utterly defeated at Salamis, and in B.C. 479 his army was overwhelmed at Plataea, while his

fleet sustained another great defeat at Mycale, on the coast of Asia Minor. He was now forced to act on the defensive, and thereby, despite his energy, exhausted the resources of his kingdom. His son, Artaxerxes I. (B.C. 466-425), surnamed Longimanus, was unable to stay the decadence of Persia, which had now commenced. He, however, crushed a formidable rebellion in Egypt, though his wars with the Greeks and Ionians were unsuccessful. The empire became racked by internal strife, which continued during the reigns of his successors, Xerxes II., Sogdianus, Darius II., Artaxerxes II., and Artaxerxes III., Darius III., Codomannus (B.C. 336-330), the last of the dynasty, was compelled to yield his throne to Alexander the Great, who conquered all the former provinces of Persia and founded a vast empire, which, after his death, in B.C. 323, was divided into four parts, Persia along with Syria passing to the Seleucids, and its old dependency, Egypt, to the Ptolemies.

The Selucids soon lost Bactria, which became independent under a series of Greek sovereigns; and about B.C. 246 Parthia also rebelled under Arsaces I., who founded the dynasty of the Arsacids, by whom the greater part of Persia was wrested from the Greeks, and defended alike against the Greeks and Romans. The Greek empire of Bactria, which included part of Northern Hindustan, was overthrown by nomads from Turkestan. The Parthians drove these invaders out and added Bactria to their empire. The dynasty of the Arsacids was brought to an end about A.D. 226 by a Persian named Ardashir (q.v.), the founder of the dynasty of the Sassanids (q.v.).

The Sassanian kings raised Persia to a great height of power and prosperity, and more than once they imperiled the Byzantine Empire. The greatest of these monarchs were Khosru (Chosroes) I. (531-579) and Khosru II. (590-628). Soon after the death of Khosru II. the Persian monarchy was engulfed in the tide of Saracen conquest. The victories of Cadesia (c.635) and of Nehavend (c.642) made the Arabs masters of the kingdom. During the reigns of Omar (the first of the Arab rulers of Persia), Othman, Ali, and the Ommiads (to 750), Persia was ruled by deputy governors; but on the accession of the Abbassides (A.D. 750), Bagdad became their capital, and Khorasan their favorite province, and Persia consequently was regarded as the centre of the caliphate. But their rule soon became a nominal one, and ambitious governors established independent principalities in various parts of the country. Many of these dynasties were short-lived, but others lasted for a considerable period and represented powerful empires. The chief were the Taherites (820-872), in Khorasan; the Soffarides (869-903), in Seistan, Fars, Irak, and Mazanderan; the Samani, in Transoxiana, Khorasan, and Seistan; the Dilemi (933-1056), in Western Persia, and the Ghaznevides (q.v.), in Eastern Persia.

This series of dynasties was ended by the Seljuks (q.v.), whose dominion extended from the Hellespont to Afghanistan. A branch of this dynasty, which ruled in Khwarezm (see KHIVA), gradually acquired the greater part of Persia, driving out the Ghaznevides and their successors, the Ghurides (see GHURI); but together with the petty dynasties which had established themselves in the southwestern provinces, they were swept

away by the Mongols under Genghis Khan (q.v.) and his grandson, Hulagu Khan, the latter the founder of a new dynasty, the Perso-Mongol (1253-1335). This was supplanted by the Ilkhans in 1335, but an inroad of the Tatars under Timur (q.v.) again freed Persia from the petty dynasties which misruled it. After the death of Timur's son and successor, Shah Rukh, the Turkomans took possession of the western part of the country, while the eastern portion was divided among Timur's descendants, until, at the close of the fifteenth century, the Uzbeks (q.v.) added all Eastern Persia to their new Khanate of Khiva.

In 1500 a new dynasty arose in Western Persia. Ismail, the first prince of this line, became the leader of a number of Turkish tribes, overthrew the Turkomans, and seized Azerbaijan, which was the seat of their power. He quickly subdued the western provinces, and in 1511 took Khorasan and Balkh from the Uzbeks; but in 1514 he had to encounter a much more formidable enemy in Selim I. (q.v.), the Sultan of Turkey. The Persians were totally defeated in a battle on the frontiers; but after his retreat Ismail attacked and subdued Georgia. His son, Tamasp (1523-76), a prudent and spirited ruler, repeatedly drove out the Uzbeks from Khorasan, defeated the Turks, and assisted Humayun, the son of Baber, to regain the throne of Delhi. After a period of upheaval, during which the Turks and Uzbeks attacked the empire, Shah Abbas I., the Great (1585-1628), ascended the throne, restored tranquillity, and repelled the invaders. In 1605 he inflicted on the Turks a defeat which enabled him to recover the whole of Kurdistan, Mosul, and Diarbekir, which had for a long time been separated from Persia; while in the east Kandahar was taken from the Great Mogul. The government of Abbas was strict but just. He constructed at immense expense roads, bridges, caravansaries, and other conveniences for trade, and, with a tolerance unusual in a Mohammedan, he encouraged the Armenian Christians to settle in the country, knowing that their industry would help to advance the prosperity of his kingdom. His successors, Shah Sufi (1628-41), Shah Abbas II. (1641-66), and Shah Sulaiman (1666-94), were undistinguished by any remarkable talents, although the two former were sensible and judicious rulers, and advanced the prosperity of their subjects. During the reign of Sultan Hussein (1694-1722) priests and slaves were elevated to the most important offices of the empire, and religious persecution ran riot. The consequence was a general discontent, of which the Afghans took advantage by declaring their independence and seizing Kandahar (1709). Their leader, Mir Vais, died in 1715, but one of his successors, Mahmud, invaded Persia (1722), defeated Hussein's armies, and besieged the King in Ispahan. Hussein then abdicated the throne in favor of Mahmud, who, on his accession, immediately devoted his energies to gaining the confidence of his new subjects. He became insane and was deposed in 1725 by his brother Ashraf (1725-29), but the latter's tyranny was ended by Nadir Shah (q.v.), who raised first Tamasp (1729-32), and then his son, Abbas II. (1732-36), of the Sefevide race, to the throne. Not content with the nominal rule, Nadir Shah found a pretext to depose Abbas, and seized the sceptre (1736-47). On his death anarchy reigned; the

country was devastated by the rival claimants for the throne; Afghanistan and Beluchistan finally separated from Persia, and the country was divided into a number of small independent States till 1755, when a Kurd named Kerimkhan (1755-79) reestablished unity in Western Persia, and by his wisdom, justice, and valor gained the esteem of his subjects and the respect of neighboring States. Lutf Ali, who ascended the throne in 1789, was attacked by Agha Mohammed, a eunich of the Kajar race, who had set up an independent principality in Mazanderan. The struggle terminated in 1795 in the triumph of Agha Mohammed, who became the founder of the present dynasty. On his accession he announced his intention of regaining what had been lost since the reign of Kerimkhan, and accordingly invaded Khorasan and Georgia, subduing the former country almost without effort. The Georgians, however, besought the aid of Russia, but Agha Mohammed at once marched his army into the country and devastated it with fire and sword; his conquest was, however, hardly completed when he was assassinated, May 14, 1797. His nephew, Futteh Ali (1797-1834), succeeded him, and after a period of conflict succeeded in fully establishing his authority. He completely subdued the rebellious tribes in Khorasan, but was involved in a war with Russia soon after his accession, and by a treaty concluded in 1797 was forced to surrender Derbend and several districts on the Kur.

In 1801 Georgia was declared to be a Russian province. War with Russia was recommenced by Persia, at the instigation of France, and, after two years of disaster, Futteh Ali by the treaty of Gulistan (Oct. 12, 1813) ceded to Russia Daghestan, Shirvan, Baku, etc., and granted her the right of navigation in the Caspian Sea. In 1826 a third Russian war broke out, equally unfortunate for Persia, which in the Treaty of Turkmanchai (1828) had to surrender the bulk of Persian Armenia and pay a war indemnity of 18,000,000 rubles. The severe taxation necessary to pay this sum so exasperated the people that they rose in insurrection (Oct. 12, 1829), and murdered the Russian Ambassador, his wife, and almost all the Russian legation. The most humiliating concessions, and the mutilation of 1500 of the rioters, alone averted war. The death of the Crown Prince, Abbas Mirza, in 1833, seemed to give the final blow to the declining fortunes of Persia, for he was the only man who seriously attempted to raise his country from its abasement. By the assistance of Russia and Great Britain, Mohammed Shah (1834-48), the son of Abbas Mirza, obtained the crown. He resolved to extend the Persian dominions to the Afghan, Baluch, and Khivan boundaries, but an attempt which he made to reannex Herat was resisted by England. The war was terminated in 1838 by the landing of a small Sepoy force on the shores of the Persian Gulf.

Nasr-ed-Din succeeded to the throne on his father's death in 1848, and the new Government announced energetic reforms, but failed completely in carrying them out. Following his father's example, the new Shah resolved to reassert his claims in Afghanistan and Baluchistan. The ruler of Herat having recognized the claims of Persia, the English Government remonstrated with the Shah, and he was compelled to sign an agreement on Jan. 25, 1853, by which he bound himself

not to interfere further in the internal affairs of Herat. In October, 1856, however, on the pretext that Dost Mohammed, the Ameer of Kabul, was about to invade Herat, the Persians again took the city of Herat. In consequence of this violation of the terms of the treaty with Great Britain, war was declared against Persia, and a British army was landed on the coast of the Persian Gulf, which, under Generals Outram and Havelock, repeatedly defeated the Persians and compelled them to restore Herat (July, 1857). In 1868 the Persians occupied Seistan, a province claimed by the Afghans, and extended their jurisdiction over the western third of Baluchistan. To put an end to this incessant strife, the Persians at length agreed with the Ameer of Afghanistan and the Khan of Khelat to refer the questions in dispute to an English commissioner. Sir Frederick Goldsmid accordingly visited the eastern frontier of Persia, and in 1872 delivered his award. It carried the Baluch frontier from 58° to 63° east longitude, so as to include in Persia the inland town of Jalk, and Guadar on the Indian Ocean. In 1870 the Russians granted the extension of the jurisdiction of Persia over the whole basin of the Atrek. In 1873 Nasr-ed-Din visited several of the European courts; in 1878 he visited Russia; and in 1889 he again made a tour of Europe. As a ruler he was energetic and severe. His policy was largely under the influence of the Russian Court, though for a time after the failure of his attempt to restore the Persian dominion over Herat he maintained a somewhat friendly attitude toward Great Britain. He sternly repressed revolts and conspiracies, but, through the sale of the tobacco monopoly to English speculators, he offended many of his subjects, and his unpopularity was increased by the scarcity of food in several of the provinces in subsequent years. In 1896 a *mollah*, an adherent of a seditious sect, who had been banished from Persia in 1891, shot and killed the Shah while the latter was entering a shrine near Teheran. His son, Muzaffer-ed-Din, was proclaimed Shah in the following month.

The new Shah reduced the taxes on food, proclaimed that public office should henceforth be awarded on merit and without consideration of money, and declared that he would rule without a Grand Vizier, assuming himself the presidency of the Cabinet of twelve ministers. In 1900 he made a visit to Europe and was entertained in nearly all of the Continental capitals, although the death of the Duke of Coburg prevented him from going to England. While driving from Paris to Sevres on the 2d of August he narrowly escaped assassination at the hands of an anarchist by the name of Salson. The chief feature of his reign has been the attempt of Russia to extend her influence over the country. Very much the same tactics have been employed as in Manchuria. Russian consuls have been appointed in nearly all of the larger towns, railroad franchises have been seized, extensive loans have been made to the Government, and the number of Russian troops on the frontier has been increased. In the face of these efforts the British have been playing a losing game. The Russian Government is especially anxious to secure a post on the Persian Gulf. With this end in view, a subsidized line of steamships was established in February, 1901, between Odessa and the Persian Gulf.

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PERSIAN ART. The history of Persian art falls into two main divisions: that before and that after the advent of Mohammedanism. In the earliest period the civilization and art bore a great resemblance to the Babylonian and Elamite. The palaces, rock-cut sculptures, and images of gods closely resembled those of neighboring nations. These monuments, however, at Susa and elsewhere, were swept away by the invasion of the Iranian tribes toward the eighth century B.C., in their two divisions of Medes and Persians.

MEDES AND PERSIANS. Ecbatana and Pasargade and the rock-cut altars on several mountain summits show that the new art was quite different from the old. It had no temples, only altars in the open air, with some slight protection. Its palaces, as indicated by Polybius's description of that of Cyaxares at Ecbatana, were built of wood covered with metal, brilliant and light, a great contrast to the heavy brick architecture of the Babylonians. The conquests of Cyrus and his successors led to radical modifications; the architectural features, sculptural and decorative methods, were adopted from Lydia and the rest of Asia Minor and from Egypt; stone replaced wood and metal; sculpture in relief, in stone and glazed tiles, was copied, both in style and subject, from Babylonia and Assyria, and thus we find sporadic resemblances even to archaic Ionian Greek art, due to borrowing from a common source. But the Persians adhered to their open-air architecture, to their large, light palace halls, amid all these transformations.

A most original compound, the keynote to this style, is what is termed the Persepolitan column, found also in great perfection at Susa. It is extremely slender, its height being thirteen times its diameter, and has numerous channelings. It was also far more widely spaced than the Egyptian, as it supported a wood instead of a stone superstructure—a feature Hellenic and not Egyptian. Its capital is the most complicated devised in the history of ancient architecture, being usually in three superposed stories, the lower taken from Egypt, the middle from Assyria, the upper being two bulls back to back. These columns appear to have supported wooden beams, an idea also borrowed, apparently, from the Greeks. The size and magnificence of the monuments increased with the expansion of the empire, but, after culminating under Darius (see PERSEPOLIS), had been waning for over a century when Alexander conquered Persia.

THE PARTHIANS AND SASSANIANS. In vain the Hellenistic art of the period succeeding Alexander sought under the Seleucids to impose its yoke on these provinces. There is almost a blank until national existence was revived under the Parthian dynasty of the Arsacids. Even then art did not rise above mediocrity, for the dominant race was not artistic. The palace of Hatra, attributed to them, shows the heavy walls, small chambers and vaults of Assyro-Babylonian art, but the material is stone and the ornamentation shows Greek influence. Under the Sassanians a real artistic renaissance took place, almost thoroughly Oriental, which lasted until the Arab conquest in the seventh century A.D. Earliest of all come the domed palaces of Fars and Sarvis-tan; then that of Firuzabad, and finally those of Ctesiphon and Mashita, with characteristic Iranian elliptic domes and partial return to Babylo-

nian brickwork in place of Hellenic stone. Finally, as a transition to Byzantine art, already heralded at Mashita, with its wealth of decoration, come the palaces of Rabbath-Ammon and Eivan. This Sassanian art had many forms that are now destroyed. Its hangings and its rugs were doubtless models for mediæval workmen. Of its goldsmith work the silver cup of Khosru in Paris is a magnificent example, with clear lines and crisp details, influenced by the barbaric Greek school of the Black Sea and the Bosphorus. Coins and medals, ivories and cut gems, all show this mixture of influences.

MOHAMMEDAN PERSIA. Two centuries after the Mohammedan conquest Persia not only recovered its artistic supremacy, but enlarged its influence by dominating the Caliphate of Bagdad. But of this period almost nothing remains. Persia was then overrun by Tatars and Mongols, whose influence modified the purer native Mohammedanism. Persian art retained the dome and the broad arch—like the old Sassanian ellipse—and threw itself more and more into color and decoration. It was the only Mohammedan school consistently to allow the use of the human figure in design—in wall paintings and illuminations, in metal sculpture and textiles. This school radiated into India, and influenced all other Islamic schools, such as the Syrian, Spanish, and even, though slightly, the Egyptian. The collapse of the caliphate and the hordes of Genghis Khan and Tamerlane wiped out most of the really mediæval work, and we must judge of it from the better-preserved and more gorgeous if less pure works of the Persian renaissance of the fifteenth and sixteenth centuries, its last period of brilliancy. Even in modern times Persian art has retained its character and influence, its beauty of color and design, while other Eastern schools have died out, and it has not been without effect even in raising the standard of taste in Europe and America, especially by its rugs and hangings. (Consult: Dieulafoy, *L'Art antique de la Perse* (Paris, 1884); Perrot and Chipiez, *Histoire de l'art dans l'antiquité*, vol. v. (ib., 1890); Gayet, *L'Art persan* (ib., 1895); Coste, *Monuments modernes de la Perse* (ib., 1867); Sarre, *Denkmäler persischer Baukunst* (Berlin, 1901). See ECBATANA; MOHAMMEDAN ART; PASARGADÆ; PERSEPOLIS; SUSA.

PERSIAN GULF. An arm of the Arabian Sea, almost land-locked between the southwestern coast of Persia and the Arabian Peninsula (Map: Persia, D 7). It is entered from the Gulf of Oman, a northwestern arm of the Arabian Sea, through the Strait of Ormuz, 30 to 60 miles wide, and stretches from southeast to northwest, with a length of 520 miles and a breadth of 150 to 200 miles. Its area is about 90,000 square miles, including 1400 square miles of islands, which are generally barren and desolate. The most important islands are Ormazd, Kishm, and the Bahrein Islands (qq.v.), the last being noted for their important pearl fisheries. The coasts, which are mostly of limestone formation, are high and steep on the Persian, but low and sandy on the Arabian side. The gulf is, as a whole, shallow, being nowhere more than 300 feet deep, and having shoals and banks in many places. The only considerable river entering the gulf is the Shat-el-Arab—the combined waters of the Euphrates and Tigris.

PERSIAN LANGUAGE. The modern Iranian language of Persia. The earliest authentic specimens are found in the fragments of Handhala of Badghis in the first half of the ninth century, and of Abbas of Merv (A.D. 809). Closely connected with the Middle Persian or Pahlavi (q.v.) and with Old Persian (q.v.), modern Persian has undergone scarcely any change from the time of Abbas and Firdausi (q.v.) to the present day. In structure the language is analytic, like English. It is indeed possible to trace a certain analogue between the development of the two tongues. As English has become an analytic language as compared with Anglo-Saxon, so Persian is analytic while Old Persian is highly inflected. Again, as English received through the Norman Conquest the Romance and Latin elements, Persian was enriched with a large vocabulary of Arabic loan-words by the Mohammedan invasions. On the other hand, it is considered inelegant in English to overload one's style with Latinisms, while in Persian stylistic charm is in direct proportion to the Arabisms employed. The phonological deviations of modern from ancient Persian are comparatively few. The principal ones are as follows: Old Persian *ai* becomes New Persian *ē*, *i*, as Old Pers. *Haraiva*, New Pers. *Harē*, *Harī*, 'Herat'; Old Persian *au* becomes New Persian *ō*, *ū*, as Old Pers. *rauēah*, New Pers. *rōz*, *rūz*, 'day'; initial Old Persian *y* becomes New Persian *y*, as Old Pers. *yauviyā*, New Pers. *jōi*, *jō*, *jā*, 'canal'; initial Old Persian *v* becomes New Persian *b* before *a*, *ā*, *ē*, *i*, *iy*, but *g* before *u*, as Old Pers. *vasiy*, New Pers. *bas*, 'much,' but Old Pers. *viyatarayāma*, 'we crossed,' New Pers. *guštātan*, 'to pass over'; Old Persian *f*, *d*, *θ*, sometimes becomes New Persian *h*, as Old Pers. *kaufa*, New Pers. *kōh*, *kūh*, 'hill,' Old Pers. *dadātuv*, 'let him give,' New Pers. *diham*, 'I give,' Old Pers. *gāθn*, New Pers. *gāh*, 'place,' but initial Iranian *s*, which sometimes appears as *θ* in Old Persian, is retained as *s* in New Persian, as Old Pers. *θuxra*, Avesta *suxra*, New Pers. *surz*, 'red'; Old Persian surds between vowels and after *r* or *n* become sonants in New Persian, as Old Pers. *axšapan*, New Pers. *šab*, 'night,' Old Pers. *pitar*, New Pers. *pidar*, *pišar*, 'father,' Old Pers. *ʾarkāna*, 'Hyrcania,' New Pers. *gurg*, 'wolf.' The accent in modern Persian falls in general on the last syllable of the word. The preterite tense of the verb, except in the third person singular, however, keeps the accent of the stem, as *āfaridam*, 'I created.' In the New Persian noun there is neither gender nor, properly speaking, case. The plural, however, distinguishes to some extent between animate and inanimate, as *gāvan*, 'cattle,' but *jāmahā*, 'clothes.' The plural ending *-ān*, which is now usurped in colloquial speech by *-hā*, is the old genitive plural, as Av. *axšafnqm*, 'of the nights,' New Pers. *šabān*, 'nights.' The genitive and adjective relations are denoted by *i* (called by the Arabic term *izāfat*, 'annexation') placed between the governing word and the following genitive, and between the noun and the following adjective, as *raftan-i laškar*, 'departure of the army,' *āb-i pāk*, 'pure water.' This *i* is derived from the similar use of *hya* in Old Persian and *ya* in Avesta, as Old Persian *kāra hya manā*, 'my army' (literally, 'army that of me'), *kāra hya Bābiruciya*, 'Babylonian army' (literally, 'army that Babylonian'), Avesta *asake ya* *vahištake*, 'of best

righteousness' (literally, 'of righteousness that the best'). The dative, especially in the older poetry, is frequently expressed by an appended *râ*, as *pidar-râ guftam*, 'I said to the father.' This *râ* is the survival of the same use of *râdiy*, 'for the sake of,' in Old Persian, as *acahya râdiy*, 'on account of this.' Adjectives are compared by adding *-tar* for the comparative, and *-tarin* for the superlative, as *buzurk*, 'high,' *buzurktar*, *buzurktarin*. The verb in Persian is extremely simple. It has three persons, two numbers, an indicative, imperative, and (rarely) a precativ, an infinitive, a present (active) and past (passive) participle, and a gerundive. The tenses of the indicative are the preterite, corresponding in force to the Greek aorist; imperfect (formed by prefixing *mî* or *hamî* to the preterite), corresponding to the Greek imperfect; aorist, corresponding to the Latin indefinite present; present (formed by prefixing *mî* or *hamî* to the aorist); and future (formed by prefixing *bi* to the aorist). The passive is formed by the past participle with auxiliary *âdan*, 'to be,' as *ârsidah âdan*, 'to be asked,' while active periphrastic tenses are formed by the participles and the infinitive with the verbs *ast*, etc., 'he is,' *âdan*, 'to be,' & *âstan*, 'to wish.'

The dialects of Persian are both numerous and, especially from a linguistic point of view, important. They are divided into three groups, the Pamir, Caspian, and Central. The Pamir dialects are Wakhi, Shighni, Sarikoli, Roshani, Gajiki, Sanglici, Minjani or Mungi, Yidghah, and Yaghnobi. The Caspian group includes Samnani, Mazanderani, Lahijani, Gilaki, Talishi, and Tat or Judæo-Persian. The Central dialects embrace Gabri, Shirazi, Bahbahani, Sivandi, Gajdi, Zafrahi, Kashahi, Vonishuni, Kuhrudi, Gayini, Natanzi, and Kashani. But few of these dialects have as yet received any literary culture.

Consult: Ibrahim, *Grammar of the Persian Language* (London, 1843); Vullers, *Institutiones Linguae Persicae* (2d ed., Giessen, 1870); Wahnundt, *Praktisches Handbuch der neu-persischen Sprache* (ib., 1875); Darmesteter, *Etudes iraniennes*, vol. i. (Paris, 1882); Chodzko, *Grammaire de la langue persane* (ib., 1883); Salemann and Shukowski, *Persische Grammatik* (Berlin, 1889); Horn, *Grundriss der neupersischen Etymologie* (Strassburg, 1893); Hübschmann, *Persische Studien* (ib., 1895); Platts, *Grammar of the Persian Language* (London, 1894); Kanga, *Hints on the Study of Persian* (Bombay, 1895); Quart, *Grammaire élémentaire de la langue persane* (Paris, 1889); Mirza-Jafar and Korsh, *Grammatika persidskova yazyka* (Moscow, 1901); St. Clair-Tisdall, *Modern-Persian Conversation-Grammar* (London, 1902); Horn, *Neupersische Schriftsprache*, and Geiger, *Kleinere Dialekte und Dialektgruppen*, in Geiger and Kuhn, *Grundriss der iranischen Philologie*, vol. i., part ii. (Strassburg, 1898-1901); Gray, *Indo-Iranian Phonology* (New York, 1902); Richardson, *Dictionary: Persian, Arabic, and English* (London, 1829); Vullers, *Lexicon Persico-Latinum Etymologicum* (Bonn, 1855-67); Bergé, *Dictionnaire persan-français* (Leipzig, 1868); Steingass, *Persian-English Dictionary* (London, no date); Wollaston, *Complete English-Persian Dictionary* (ib., 1894).

PERSIAN LITERATURE. The literature of Persia is, strictly speaking, divided into three great periods, old, middle, and new. In view, however, of the wide distinctions in chronology, language, and spirit, the Old Iranian literature, including the Avesta (q.v.) and the Old Persian inscriptions (see OLD PERSIAN), as well as the Middle Persian or Pahlavi (q.v.), may best be treated separately. The literature which began shortly after the Mohammedan conquest of Persia is that which is usually implied by the term Persian literature. It is for the most part in verse, although prose is by no means lacking. The genius of the poetry of Persia lies in the ability to say old things in a new way. Perfection of form and euphony of phraseology are the marks of the Persian poet rather than lofty thought and sincere inspiration, while originality of theme is supplanted by fertility of conceits. The poetry is, consequently, so essentially different from that of the Occident that it is somewhat difficult for a Western reader to become interested in Persian verse unless he can habituate himself to the somewhat artificial poetic atmosphere to which he is transported. This artificiality, which to the Occidental mind is a defect, is to the Oriental a proof of genius. Nor is this view unreasonable. The freedom of the West has never existed in Persia. Crushed by a despotism, hampered by Mohammedanism, and circumscribed by social conditions, only a small range of subjects has been left open for the Persian poet. Striving to make the best of his material, he has been driven to elaboration rather than creation. The monotony which wearies the Westerner, whose meagre vocabulary cannot match the luxuriousness of synonyms and rhymes found in Persian, does not exist in the original. There the music of the verse and the dexterity of the turns of thought conceal the poverty of idea, and give a pleasure which is real and justifiable.

The first Persian poetry of which any extensive remains have survived was epic, with the general metrical scheme, read from right to left, $\bar{u} \bar{u} | \bar{u} \bar{u} | \bar{u} \bar{u} | \bar{u} \bar{u}$. Here belong the fragments of a translation by Rudagi (tenth century) of Bidpai (q.v.). To judge from these fragments, his style was simple and free from trivial conceits. The Persian literary historians term him the Sultan of bards, and regard him as the first classical poet. About this period flourished Kisa'i, Khabbaz, Abu'l Abbas, Khusrawani, and Umara. When the Samanid dynasty fell before the attack of Mahmud of Ghazni, the conqueror gathered at his court the poets and philosophers of the time. Of them the laureate was Unsuri, the author of an epic entitled *Wamik u 'Adhrâ*, of which a few verses are preserved in Asadi's rhyming dictionary, and the composer of a long series of eulogies on his patron. Greater than he, however, was his rival, Farrukhi, a master of description, although artificial and Arabized, who bent his energies, like Anvari, Khakani, and others, to eulogies of Mahmud. To this period also belongs Daqiqi, who began the task of composing an epic on the legends of ancient Iran. The work of Daqiqi, amounting, according to tradition, to about a thousand couplets, was incorporated after his death into the greatest of all Persian epics and one of the masterpieces of world-literature, the

Shāhnāmāh, or Book of Kings of Firdausi (q.v.). Of the epic poets who immediately followed Firdausi but two names have survived. The first of these is Ali ibn Ahmad al-Asadi at-Tusi, of the eleventh century (generally, but perhaps erroneously, supposed to be the same as the lexicographer Asadi), the author of the *Garshāspnāmāh*, wherein he recounts in between nine and ten thousand couplets the deeds of Garshasp (a mutilation of the Avesta name *Keresāspa*), the grandfather, according to some traditions, of the legendary Iranian hero Rustam. The second is the *Sahryār-nāmāh* of Muhtari (died 1149 or 1159), who wrote of the adventures of Shahryar, the great-uncle of Rustam. Of this poem, the scene of which is in great part laid in India, but a few fragments remain. The other epics of this legendary cycle are anonymous. Of these probably the most important is the *Sām-nāmāh*, which almost equals in length the *Shāhnāmāh* itself, and contains the adventures of Sam, according to the Avesta the grandfather of Keresaspa; and still longer is the *Barzūnāmāh*, which, like the comparatively short *Jahāngīr-nāmāh*, the *Farāmūz-nāmāh*, and the *Bānū Gušāspnāmāh*, also forms a part of the Rustam style. The legendary epic yielded, however, to the historical. Here it was the story of Alexander the Great, augmented by myths, which gave the first impulse. The poets Nizami, Amir Khusru, and Jami, from the twelfth to the fifteenth century, each wrote an *Iskandarnāmāh*. This series was followed by a long line of epics, in many instances hardly more than rhymed chronicles, of comparatively little poetic worth. It will be sufficient here to name as the most important Ahmad Tabrizi's *Sāhanāshāhnāmāh* on Genghis Khan and his successors until 1338, Abdullah Hatifi's (died 1521) *Timūr-nāmāh* on Tamerlane, and the long *Jārj-nāmāh*, or Book of George, by Mulla Firuz ibn Ka'us, celebrating the English conquest of India up to the fall of Poona in 1817. Side by side with the legendary and historical epic the romantic epopee was developed. Firdausi himself had set the example in his *Yūsuf u Zalikhā*, based on the story of Joseph and Potiphar's wife. The type of the romantic epic is conventional. The lovers become enamored of each other through a dream or a description, and the interest then centres about their constancy and their trials. The hero and heroine are either Iranian, as in the twenty-one epics on the loves of the Sassanian Khusru, his wife, the fair Armenian Shirin, and her lover, Ferhad, the sculptor, and the ten versions of Behram Gor's seven (or eight) love-adventures; or they are borrowed from the Arabs, as the fourteen poems on Joseph and Zalikhā, the seven on Wamīk and Adhra, and the eighteen on Laila and Majnun. After Firdausi the first great poet in this genre whose work survives was Fakh ed-Din of Gurgan (born about 1048). His poem, the *Wis u Rāmin*, in about nine thousand couplets, relates the love of Wis, the young wife of the aged King Mobad of Merv, for his brother Ramin. The point of the epic, which has many old Iranian elements, lies in the repeated deception of the doting monarch, and it is marked by a humor which is piquant even if unethical. A far greater romantic epic poet than Fakh ed-Din was Nizami (died c.1203), who wrote poems on three of the favorite themes already noted, the loves of Laila

and Majnun, of Khusru and Shirin, and of Behram Gor. These works, together with his historical epic, the *Iskandarnāmāh*, and his mystical poem, the *Makhzan-ul-asrār*, or Treasury of Mysteries, made a *khamsah*, or pentade, which was imitated by many poets. (See NIZAMI.) Nizami thus became the model for the romantic epopee in Persia. Of his successors the most important was Jami (1414-92) (q.v.), whose *Yūsuf u Zalikhā* and *Laila u Majnun* are not inferior to the corresponding poems of Firdausi and Nizami. Khwaja Kirmani (1281-1352) returned to the legendary epic in his *Humāi u Humāyūn*, which describes the love of Humai, son of the mythical Iranian hero Hushang (the Haoshanha of the Avesta), for Humayun, Princess of China, and a similar story is told in the same poet's *Gul u Naurūz*, on the wooing of Gul, the Princess of Rome (i.e. Byzantium), by Nauruz, Prince of Khorasan. On the other hand, Amir Khusru (1253-1325) wrote a romantic epic of his own time, entitled *Dural-rānī Khidrkhān*, on the tragic loves of the Persian Prince Khidrkhān and Duvalrānī, Princess of Gujarat. The multitude of minor poets in this genre may be passed over. A noteworthy modification of the romantic epic, however, deserves mention. This is the mystical romance. Katibi (died about 1434) in his *Majma' al-Bahrain*, or Union of the Two Seas, also called *Nāzīr u Manzūr*, or Seer and Seen, set forth in Sufistic diction (see SUFISM) the mutual love of God and man, while Jami treated the same theme in his poem on the loves of Salaman and Absal. Here too belong, together with many others, the *Gāi u Caugān*, or Ball and Mallet (also called *Hābnāmāh*, or Book of Ecstasy) of Arifi (1438), and the *Sāh u Gaddā*, or King and Dervish, of Hilali (died 1532).

From the epic one turns to the lyric poetry. Here the verse-schemes are for the most part borrowed from the Arabs, although the *rubā'i*, or quatrain, is distinctly Persian in origin. The principal lyric forms are five in number, and are as follows: (1) The *kassida* (from Arabic *qasada*, 'to break') is employed chiefly in eulogies. It consists of at least twelve and at most ninety-nine couplets (*bait*), the second lines of which must rhyme with the first two lines (*matla'*), thus giving the rhyme-scheme *aa, ba, ca, da*, etc. The thought in each *bait* must be complete in itself, but need not be inseparably connected either with the preceding or following couplet. To employ the Persian figure, the rhyme is the thread on which the pearls of the *bait*s are strung. The frequent change of order of distichs which is found in Persian manuscripts of lyric poetry thus becomes easily explicable. (2) The *ghazal* (from Arabic *ghazala*, 'to be abundant') is identical in form with the *kassida*, but can have no more than twelve couplets, the last of which must contain the name of the poet. This verse is devoted especially to poems on love and wine. (3) The *kit'a* (from Arabic *qata'a*, 'to cut off') is the same as the *kassida*, excepting that the *matla'* is lacking. Its rhyme-scheme is accordingly *ab, cb, db, eb*, etc. (4) The *mathnawi* (from Arabic *thanaya*, 'to fold') is a long poem of epic, mystic, or didactic content, with each *bait* or couplet rhyming, *aa, bb, cc, dd*, etc. (5) The *rubā'i*, or quatrain (from Arabic *rubā'a*, 'four'), is preëminently the Persian form of epi-

(q.v.) (1207-1273), whose *Diwān* and *Mathnawī* are among our most important sources for the study of Sufism. The first mystic poets, however, were probably Bayazid Bistami (died c.874) and Abu Saïd ibn Abul Khair (968-1049), of whose works a number of quatrains have survived. In the eleventh century the *Rūšanā'īnāmāh* of Nasir-i Khusru deserves mention. The earliest great predecessor of Jalal-ud-Din, however, was Farid-ud-Din Attar (q.v.) (died 1299), whose *Mantig ut-Tair*, or Bird-Parliament, is a remarkably beautiful allegory of the struggle of the soul to attain to the infinite. Here belongs also another of the greatest names of all Persian literature, Saadi (q.v.) (c.1190-1291). His *Gulistan*, or Rose Garden, and *Būstān*, or Garden, are among the greatest didactic productions of the East. The last important mystic poet was Mahmud Shabistari (died 1317), the author of the *Gulshān-i-Rāz* or Rose Garden of Mystery, which may serve as a text-book of Sufistic philosophy.

The Court poetry, the third division of the lyric, is the least interesting of all from a literary point of view. The favor shown to poets from the earliest period of Islamic rule in Persia naturally encouraged the production of eulogies, which, with the luxuriance of Oriental imagination, are so fulsome as to cloy the Occidental reader. The metrical intricacy keeps pace with the increasing artificiality of the Court poets. Such rhymes as *aaaaaaaax*, *bbbbbbbbb*, and so on, and a series of ghazals, united by *mizra's*, or rhyming couplets at regular intervals, are common. Within the poems themselves there are conceits and obscure allusions which in many cases baffle even the ingenuity of an Oriental reader, and give rise to commentary after commentary. From the long series of poets of this type the names of Watwat (1088-1182), Muizzi (died 1147), Khakani (died about 1199), and the greatest of them all, Anvari (q.v.) (died about 1190), may be mentioned.

The drama of Persia, apart from the miracle play of *Hasan and Hossein* (q.v.), is of the late development and little importance. The prose literature, as has been intimated, is also of small extent and value as compared with the poetry. While it is true that Saadi in the works already mentioned intermingled prose and verse, and that his example was followed by Nakhshabi (died 1330) in his *Sindbādnāmāh*, or Book of Sindbad, it seems, nevertheless, strange that so few of the great Persian writers should have availed themselves of prose. There is, however, a mass of novels, tales, fables, legends, and anecdotes, as well as of history, encyclopædias, and the like. The oldest specimens of Persian prose are Muwaffak's book on pharmacology and Balamis's translation of Tabari, both dating from the tenth century. As authors of notes and travel, we may mention Abu Tahir, whose numerous romances are chiefly concerned with old Iranian legends, as in his *Dāstān* or *Ishrāmānāmāh* (dealing with the legend of Hushang) and his *Darābnāmāh* (on the story of Darius and Alexander), the anonymous writers of the *Sikandarnāmāh* (on the Alexander legend), the *Hssah-i Hatim Iā'i* (on Hotim Tai, proverbial for his generosity and nobility), and the modern Mohammed Taki (seventeenth century), the author of a huge romance in fifteen volumes, entitled *Būstān-i Yayāl*. There is besides a multitude of novelettes and of

tales in the style of the *Arabian Nights* (q.v.). Here the most important are the *Baxtyār-nāmāh*, or Book of the Ten Viziers, the *Jissa-i cahār darvīsh*, or Story of the Four Dervishes, perhaps by Amir Khusru (died 1325), the *Iuṭīnāmāh*, or Book of the Parrot, based on the Sanskrit *Sukasaptati*, and the *Bahār-i dāniā*, or Spring Garden of Wisdom, by Inayat-ullah Kanbu (died 1671). The best known of all the prose fiction in Persian is Waiz Kashifi's (died 1504-05) *An-rār-i Suhaili*, or Lights of Canopus, based on the *Kalila wa Dimnah*, and so ultimately on the Sanskrit *Pāncatantra* (q.v.), although the *Lafā'if ut-tawā'if*, or Witty and Amusing Stories, by Saif, the son of Waiz Kashifi, also deserves mention.

Consult: Hammer, *Geschichte der schönen Redekünste Persiens mit einer Blütenlese* (Vienna, 1818); Ouseley, *Biographical Notices of Persian Poets* (London, 1846); Barbier de Meynard, *La poésie en Perse* (Paris, 1877); Darmesteter, *Les origines de la poésie persane* (ib., 1887); Pizzi, *Storia della poesia persiana* (Turin, 1894); Ethé, *Die höfische und romantische Poesie der Perser* (Hamburg, 1887); id., *Die mystische, didaktische und lyrische Poesie und das spätere Schriftthum der Perser* (ib., 1888); id., "Neupersische Literatur," and Nöldeke, "Das iranische Nationalepos," in Geiger und Kuhn, *Grundriss der iranischen Philologie*, vol. ii. (Strassburg, 1896); Reed, *Persian Literature, Ancient and Modern* (Chicago, 1893); Horn, *Geschichte der persischen Literatur* (Leipzig, 1901); Remy, *Influence of India and Persia on the Poetry of Germany* (New York, 1901); Browne, *Literary History of Persia* (London, 1902); Chodzko, *Specimens of the Popular Poetry of Persia* (London, 1842); Costello, *Rose Garden of Persia* (new ed., ib., 1899); Dole and Walker, *Flowers from Persian Poets* (New York, 1901).

PERSIAN MUSIC. See ARABIAN MUSIC.

PERSIAN MYTHOLOGY. Only scanty traces of the mythology of ancient Persia have survived. The reform supposedly instituted by Zoroaster (q.v.) seems to have swept away the older nature worship which prevailed in Iran as in India. It is evident, however, that this reform was not absolutely thorough, and that under the orthodoxy which was forced on the people by Vishtaspa, the royal patron of Zoroaster, according to the rather doubtful Parsi traditions, there lurked many old beliefs and myths which were heritages of the Indo-Iranian religion. When the first enthusiasm of this Zoroastrian Protestantism died out, the ancient faith revived in some measure, and in the Yashts, a part of the Avesta (q.v.) late in form, but almost certainly old in content, many mythological allusions may be found. In some of the Pahlavi texts (see PAHLAVI LITERATURE), especially in the Bundahish, there survive numerous traces of the primitive faith, despite the Zoroastrian orthodoxy to which they theoretically conform. The six Amshaspands, who in Zoroastrianism represent the cardinal virtues of Good Mind, Best Righteousness, Desirable Kingdom, Holy Concord, Health, and Immortality, were originally deities protecting respectively cattle, fire, metals, earth, water, and plants, being therefore nature divinities. Ormazd, who in the Zoroastrian reform became the chief, and really the only god, was originally a sky-deity, whose son was the fire, and who

was also the father of the Good Mind, or, in the early evaluation of this godling, of cattle. His daughter was Holy Concord, the earth, who from many allusions in the Yashts was a goddess of fertility. The demons, who play a subordinate part in the orthodox texts, find a more prominent place in the Yashts. Important here is the serpent Azhi Dahaka, who was probably the sky-serpent, corresponding to the Vedic Vritra slain by Indra (q.v.), especially as the Bundahish describes him as falling from heaven. The Yashts emphasize the nature worship of the pre-Zoroastrian religion in the chapters devoted to the sun, the moon, the planet Tishtrya, who, mounted on a black horse, perhaps the storm-cloud, defeats the demon Apaosha, drought, and to the waters, Anahita, who is the Anaitis (q.v.) of the classical writers. To all these not only heroes, but even Ormazd himself, offer sacrifices, clearly pointing to an earlier period when one god was dependent on another for aid. Ghost worship also (see GHOSTS) is represented by the cult of the Fravashis, who seem to have originally represented the spirits of the beneficent dead. The cosmogonic mythology (see COSMOGONY) is largely derived from Semitic sources, for the antithesis of Ormazd, the god of the sky and light, to Ahriman (q.v.), the god of darkness, and their conflict at the creation of the world, is precisely analogous to the battle of the Babylonian solar deity Marduk with Tiamat, the demon of chaos. About trees and animals myths clustered. In the white *Hôm* tree, which will give man immortality at the day of resurrection, there is a pre-Zoroastrian reflex of the Semitic tree of life, while the human-headed bulls of Assyrian sculptures are represented by Gopatshah, a being half bull and half man, who pours holy water into the sea. With the downfall of the Iranian religion before Mohammedanism, the old myths vanished almost entirely, so that the mythology of modern Persia is practically Islamic. However, the *pairika*, a female demon of Iran, is reserved as the beneficent *pêri* of modern Persian folk-lore, and the *simurgh*, a bird of magic properties, has become the *roe* of the Arabian Nights.

PERSIAN POWDER. See INSECT POWDER.

PERSIGNY, pār'sô'nyâ', JEAN GILBERT VICTOR FIALIN, Duke de (1808-72). A French politician, born at Saint-Germain-Lespinasse, in the Department of Loire. He joined the hussars in 1828, but after the Revolution of July, 1830, owing to doubts as to his loyalty, he was expelled from the army on a charge of insubordination. He now became a journalist in Paris, formed the most intimate relations with Louis Napoleon, and commenced a career of Bonapartist propagandism throughout France and Germany, in which he displayed extraordinary energy, pertinacity, and fertility of resource. Articles from his pen had already appeared in *Le Temps*, and in 1834 he founded *l'Occident français* as a Bonapartist organ. He had the chief hand in the affair of Strassburg (See NAPOLEON II.). He also took part in the expedition to Boulogne, where he was captured and condemned to twenty years' imprisonment. His confinement, however, became almost nominal, and he passed his time in writing a voluminous and singular work on the *Utilité des pyramides d'Égypte* (1844). On the breaking out of the Revolution

in 1848 Persigny hurried to Paris, and set himself, with his accustomed vigor and swiftness, to organize the Bonapartists. He was appointed aide-de-camp to the President, Louis Napoleon, and major-general of the Parisian National Guard. In 1849 he was chosen a member of the Legislative Assembly. He was sent to Berlin as Ambassador at the close of the same year. As was to be expected, Persigny took a prominent part in the coup d'état of December 2, 1851. In January, 1852, he succeeded Morny as Minister of the Interior. From 1855 to 1858, and again from 1859 to 1860, Persigny was the French Ambassador to Great Britain. He was recalled to France, however, in 1860, to resume the office of Minister of the Interior. This office he resigned in June, 1863, when the elections of Paris and other large towns showed dissatisfaction with his policy. In the autumn of the same year he was created a duke. He did not long survive the overthrow of the Second Empire, his death occurring at Nice, January 13, 1872. Consult references under NAPOLEON III.; also Delarva, *Le duc de Persigny et les doctrines de l'empire* (Paris, 1865); Delard, *Histoire du Second Empire* (ib., 1868-75).

PERSIMMON (from the Virginia Indian name), or DATE PLUM. A tree and its fruit, including several species growing wild and cultivated to some extent. The Japanese persimmon or kaki (*Diospyros kaki*) is the principal native fruit of Japan. It is found also in Korea, Eastern and Southern China, and parts of the East Indies. It is grown to a limited extent in Southern Europe, and was introduced into the United States about 1875. It finds a congenial climate in California and the Southern States as far north as Virginia. The cultivated trees grow 8 to 12 feet high, and bear a very attractive yellow, thin-skinned globose fruit often attaining the size of a medium orange. When ripe, the fruits contain a soft sweetish pulp. A number of varieties are in cultivation, and these vary much in size, color, the number of seeds they contain, period of ripening, etc. The American persimmon (*Diospyros Virginiana*) is native from Pennsylvania and Indiana south to the Gulf. Wild trees some-



NATIVE PERSIMMON (*Diospyros Virginiana*).

times reach a height of sixty feet in the forest, and are valuable as cabinet woods. In the open the trees seldom exceed 20 to 30 feet in height. Another American species, *Diospyros Texana*, is grown in Texas. The fruits of the American persimmon are much smaller than those of the Japanese varieties, are very soft when ripe, and on this account are seldom marketed.

Persimmons are propagated from seed. Varieties seldom reproduce themselves, and so budding and grafting are resorted to. Seed sown in the fall is allowed to grow the following season. The second spring the seedlings are either budded or crown-grafted. Grafting gives the better results. Native trees may be successfully top-grafted with improved varieties. In transplanting to the orchard trees one to two years from the graft are preferred. Persimmons thrive on nearly all soils. Like other orchard fruits, they respond generously to cultivation. Trees come into bearing within four years after setting in the orchard. Top-worked trees produce fruit within three years from the graft. Japanese varieties are inclined to overbear, and should therefore be thinned. The green fruit of all varieties of persimmons is extremely astringent, and maintains this condition until fully ripe. The ripening period of the different varieties varies from August until December. The Japanese sorts should be gathered before frost and stored in a cool, well-ventilated, moist room until fully ripe. Some native persimmons ripen before frost, which greatly improves others. The fruit is usually consumed fresh as a dessert or out of hand. Some varieties may be dried or preserved. Consult: Hadley and Troop, *The American Persimmon*; Indiana Agricultural Experimental Station Bulletin 60; Watts, *Persimmons*; Tennessee Agricultural Experimental Station Bulletin XI, No. 1. In the latter bulletin both native and Japanese persimmons are considered. See Plate of PAPAW AND PERSIMMON.

PERSIMMON INSECTS. The persimmon does not suffer greatly from the attacks of insects. Several caterpillars may occasionally defoliate individual trees, especially the larvæ of *Spilosoma Virginica*, *Orgyia leucographa*, *Tolyte velleda*, and *Edemasia concinna*. The little leaf-miner (*Aspidisca diospyriella*) forms a minute blotch-mine in the leaves of this tree, and eventually cuts out a case in which it pupates. One of the plant-lice (*Aphis diospyri*) seems to be specifically attached to this tree, but does little damage, and the same may be said of one of the flea-lice (*Psylla diospyri*). One of the weevils of the family Otiorhynchidæ, namely *Brachystylus acutus*, is found only on the persimmon, but does comparatively little damage.

PERSIO. See ARCHIL.

PERSIUS (AULUS PERSIUS FLACCUS). One of the most famous Roman satirists. He was born at Volaterræ (now Volterra), in Etruria, A.D. 34. He was of a distinguished equestrian family, was educated under the care of the Stoic philosopher Cornutus, lived on terms of intimacy with the most distinguished personages of his time in Rome, and died November 24, A.D. 62, in the twenty-eighth year of his age. The principal authority for the life of Persius is an abridgment of a 'commentary' by one Probus Valerius. Modest and gentle in his manners, virtuous and pure in his whole conduct and relations, he stands out conspicuously from the mass of corrupt and profligate persons who formed the Roman 'society' of his age, and vindicated for himself the right to be severe by leading a blameless and exemplary life. His six satires were greatly admired, not only in Persius's own day, but all through the Middle Ages; but the estimate which modern critics have formed of his writings from

a literary point of view is not so high. He is remarkable for the sternness with which he censures the corruption of morals then prevalent at Rome, contrasting it with the old Roman austerity and with the Stoic ideal of virtue. The language is terse, homely, and sometimes obscure, from the nature of the allusions and the expressions used, but the dialogues are the most dramatic in the Latin tongue. The *editio princeps* appeared at Rome in 1470; later editions are those of Isaac Casaubon (Paris, 1605); Passow (Leipzig, 1809); Jahn (Leipzig, 1843); Hermann (Leipzig, 1881); Conington (with an English translation and commentary, revised by Nettleship, Oxford, 1893); and Bücheler (Berlin, 1893). Persius has been frequently translated; the two best English translations are those by Dryden and Conington. There is a complete bibliography of Persius by Morgan (Cambridge, Mass., 1893).

PERSON (OF. *persone*, Fr. *personne*, from Lat. *persona*, person, actor's mask, from *personare*, to sound through, from *per*, through + *sonare*, to sound, from *sonus*, sound; connected with Skt. *svana*, sound, from *svan*, to sound). In theology, the word person is applied to the distinctions in the divine Trinity in a modified sense. Sabellius applied the Greek word *prosopon* (face) to the Father, Son, and Spirit, on the supposition that they were three separate appearances, or faces, of the one divine nature. In the trinitarian controversy culminating at Constantinople (381), the orthodox party accepted the term, but affirmed that the 'faces' were eternal faces, or were manifestations of eternally existing distinctions. The natural tendency of the word, when the meaning 'person' had become attached to it, was to emphasize the separateness of the trinitarian hypostases, and in that respect it had a bad influence.

PERSONA GRATA (Lat., acceptable person). A term applied to a diplomatic agent, indicating that he is acceptable to the sovereign to whom he is accredited. See DIPLOMATIC AGENTS.

PERSONAL ACTION. Under the common-law system of pleading and practice, any action available to enforce rights or redress wrongs, including actions to recover possession of personal property, and excluding actions to recover possession of involving rights in real property. See ACTION; FORMS OF ACTION; PLEADING.

PERSONAL EQUATION. See EQUATION, PERSONAL.

PERSONALITY. See INDIVIDUALITY; MENTAL CONSTITUTION; SELF.

PERSONAL PROPERTY; PERSONALTY. These terms are applied to all that class of property which is to be distinguished from real property or real estate, and which consists for the most part of property which is either movable or merely temporary in character. The only absolute distinction, however, between real and personal property lies in the legal method of its disposition after the death of its owner. Real property is inheritable or descendible, and passes to the legal heirs of the owner according to the rules of the common law or statutes governing descent. Personal property is not inheritable, but passes to the administrator or executor of the deceased person.

The term 'personal property' is generally used as synonymous with 'goods' or 'goods and chattels.' The term, however, has a broader significance than either of those terms, and includes both chattels and choses in action. Property that is personal in its nature may become real by becoming affixed to real property, and in the same way real property may be converted into personal property by severance from the realty.

Title to personal property may be acquired in three ways: (1) By original acquisition; (2) by transfer by operation of law; (3) by transfer by act of the parties.

(1) Property acquired by original acquisition may be acquired by either: (a) occupancy when one appropriates to his own use a thing which was not then subject to ownership, as in the finding and appropriation of lost property or the capture of wild animals; or (b) accession, which is the right which a person has to all the property which his own property produces, as the young of animals, and the right to all property which is annexed naturally or artificially to his own property; or (c) by confusion, which is the inextricable commingling of other property with one's own property; or (d) by intellectual labor, which is the source of the property right of authors and inventors in their writings and inventions.

(2) The transfer of the title to personal property by operation of law may be by forfeiture; by sale under execution; by operation of bankruptcy or insolvency laws; by exercise of the right of eminent domain; by marriage; by death of the owner; or by escheat.

(3) Transfer of title of personal property may be accomplished by act of the parties. At common law all that is necessary to transfer an interest in personal property from one to another is intent or mutual meeting of the minds of the parties without writing or other formality. (See CONTRACT; SALES; GIFT.) Modern statutes have made formalities requisite under some circumstances in order to protect the rights of the transferee from the claims of third persons.

For further information as to the various kinds of personal property, the methods of acquisition, and transfer of title thereto, the remedies for injury to personal property, etc., consult such subjects as CHATTELS; CHOSE IN ACTION; DESCENT; ADMINISTRATION; FIXTURES; EMBLEMENTS; ESTRAY; FERE NATURE; PATENT; LITERARY PROPERTY; FRAUDS, STATUTE OF; MORTGAGE; TORT; CRIME, etc.

Consult: Schouler, *The Law of Personal Property* (3d ed., Boston, 1896); Brantley, *Principles of the Law of Personal Property* (San Francisco, 1890); Goodeve, *Modern Law of Personal Property* (3d ed., London, 1899); Williams, *Principles of the Law of Personal Property for the Use of Students in Conveyancing* (15th ed., London, 1900).

PERSONAL REPRESENTATIVE. Besides its general sense of one who succeeds to or represents another in the enjoyment or possession of rights or property by reason of some relationship existing between them, the term personal representative is specifically used in law to designate the person who as executor or administrator administers the estate of another. In the general sense of the word it is applied to

those who represent others in conducting transactions, as one acting under a power of attorney to vote stock, and also to those who succeed to property by assignment, as the assignee of a lessee for years, and sometimes in wills for those who are technically called next of kin (q.v.), according to the statute of distribution, and, in its broadest use, even all persons who stand in the place of another and represent his interests, respecting his property, whether transferred to them by law or by his act.

Primarily and usually, however, the term is used to designate only executors or administrators as officially administering the estate of the deceased, and in that capacity protecting it from dissipation or waste, as well as paying out of it the debts of the decedent, and distributing the surplus, if any. Unlike the heir under the civil law the personal representative is not liable for any debts of the decedent, except to the extent of the assets received by him; and neither is he now entitled to any surplus remaining after the payment of the obligations of the estate. His duties, and the method and form of his administration are usually particularly prescribed by statute. See ADMINISTRATION; EXECUTOR; DISTRIBUTION, etc., and compare NEXT OF KIN and HEIR.

PERSONIFICATION (from Lat. *persona*, person + *facere*, to make). A figure of rhetoric by which inanimate objects, or mere abstract conceptions, are invested with the forms and attributes of conscious life. See RHETORIC, FIGURES OF; METAPHOR.

PERSOON, pār'sōn, CHRISTIAN HENDRIK (1755-1837). A Dutch physician and botanist, born at the Cape of Good Hope, Africa. He was educated in Holland and practiced his profession for a number of years in Germany. He went to Paris about 1802, where he published several interesting works on cryptogamous plants; also, a *Synopsis of Plants* in two volumes. The titles of his principal works are: *Observationes Mycologice* (1796); *Synopsis Methodica Fungorum* (1801); *Icones Pictæ Specierum Rariorum Fungorum* (1803-08); *Synopsis Plantarum* (2 vols., 1805-07). The Australian genus *Persoonia* is named in his honor. It embraces about 60 species, some of which are valuable timber trees.

PERSPECTIVE (Fr. *perspective*, from Lat. *perspectus*, p.p. of *perspicere*, to see through, from *per*, through + *specere*, to see). The art of representing natural objects upon a plane surface in such manner that the representation shall affect the eye in the same way as the objects themselves. The distance and position of objects affect both their distinctness and apparent form, giving rise to a subdivision of perspective into *linear perspective*, which is strictly scientific and a branch of applied geometry, and which, as its name denotes, considers exclusively the effect produced by the position and distance of the observer upon the apparent form and grouping of objects; while *aërial perspective* confines itself to their *distinctness*, as modified by distance and light, and belongs to the non-scientific sphere of pictorial representation. After the 'scope' (i.e. the number of objects to be introduced, and the distance at which they are to be viewed) of the picture has been determined, and before the design is commenced, it is necessary to draw upon perspective plan three lines: (1) The *base line*, or *ground line*, which limits the sketch toward the

operator, and is the base line of the picture. (2) The *horizontal line*, which represents the ordinary position of the sensible horizon. The height of the horizontal line is about one-third of the height of the picture, when the sketcher is placed at or a little above the level of the horizon; but it may rise in a degree corresponding to his increase of elevation till it reaches near to the top of the perspective plan. The general rule is to have a high horizontal line when the view is taken, or supposed to be taken, from an eminence; but when the station is on a level, either

(in nature) at an angle of 45° to the base line; but, in all cases, the two points of distance are about twice as far apart as the eye is from the picture. One important use of the points of distance is to define the distance of objects in a row (Fig. 1) from each other. For this purpose, two points of distance are not necessary, as, when the position of one pillar is found, that of the opposite is at once obtained by drawing a line parallel to the base or ground line.

There are many other groups of parallel lines in a picture which have different situations, and therefore different vanishing points. Such lines with their vanishing points (called, for distinction's sake, *accidental points*) are represented in Fig. 2. If the accidental point is above the horizontal line, it is called the *accidental point aerial*—if below, the *accidental point terrestrial*; and a little consideration

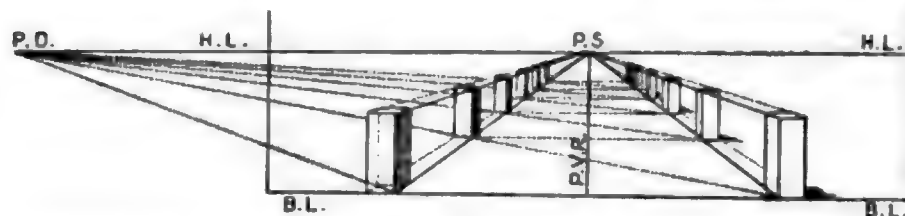


FIG. 1.

Illustrating the more important points and lines. P.V. is the principal visual ray.

actual or assumed, the horizontal line must be low. The horizontal line in nearly all cases is supposed to be level with the spectator's eye. (3) The *vertical line*, which is drawn from the supposed position of the sketcher, perpendicular to the *ground* and *horizontal* lines, meeting the latter in a point which is called the *point of sight*, or centre of the picture. The vertical line has no representative in nature, and is merely a mechanical adjunct to the construction of the picture, all vertical lines in nature being parallel to it in the picture. The point of sight, being the point directly opposite to the observer, is often placed in the centre of the picture; but we very

makes it evident that these points may or may not be situated within the plane of the picture. Such are the points and lines necessary for the construction of a plan in true perspective; and from the above explanation, we may deduce the two general principles: (1) That all parallel straight lines in nature are no longer parallel when projected on the perspective plane, but meet in a point which is called the vanishing point, and is some one of the three above described, unless these lines happen to be also parallel to the ground line or the vertical line, in which case they remain parallel when transferred to the picture; and (2) that since

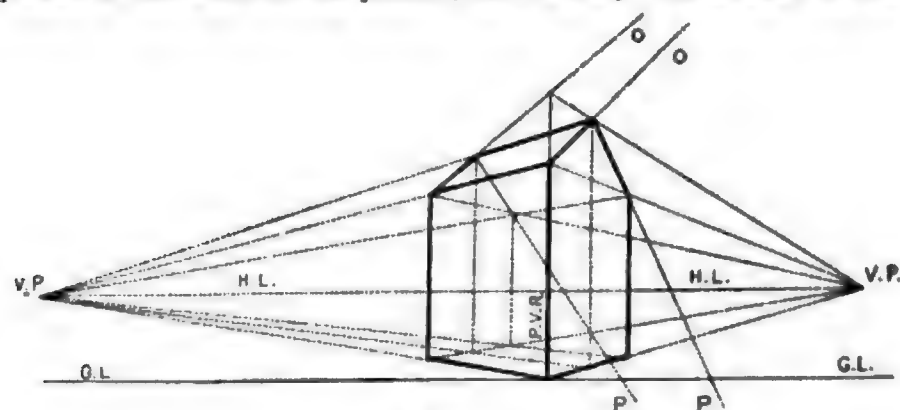


FIG. 2.

The lines OO converge to the accidental point aerial, and PP to the accidental point terrestrial.

frequently find it on the right or left side, though always, of course, on the horizontal line. All lines which in nature are perpendicular to the ground line, or to a vertical plane which is raised upon it as a base, meet in the point of sight, which is thus their *vanishing point* (see the line of the tops and bottoms of the pillars in Fig. 1). The *points of distance* are two points in the horizontal line on each side of the point of sight, and in a 'direct' sketch are at a distance from it equal to the horizontal distance of the sketcher's eye from the ground line. The equality of distance of these points from the point of sight is not, however, necessary, as it occurs only in those cases where the lines, of which the points of distance are the *vanishing points*, are inclined

the bodies drawn below the horizontal line are seen as if from above, those above as if from below, and those to the right and left of the point of sight as if observed from the left and right, it follows that straight lines which in the picture are above the horizontal line lower themselves, and those below raise themselves to it; those to the left, following the same law, direct themselves to the right, and vice versa.

Besides the more usual angular perspective there is the *bird's-eye perspective*, when the eye is taken up to an imaginary high level; the *curvilinear* or panoramic perspective, in which the surface of projection is a concave cylinder; and the *oblique perspective*, with its triple horizons and vanishing points.

Aërial perspective consists in a modulation of the brightness and colors of objects in accordance with the state of the atmosphere, the depth of the body in the perspective plane (i.e. distance in nature from the ground line), and other accidents of place and time. As the distance of objects increases, their illuminated parts are made less brilliant, and their shaded parts more feeble. The bluish tint imparted by a large mass of the atmosphere to the bodies seen through it is fre-

uently imitated by the mixing of a slight tint of blue with the colors to be applied; a yellow object thus assumes a greenish tint; a red one a violet tint, etc. The air, when charged with vapor, is represented by a diminution of the brightness of colors, and by the grayish tint imparted to them.

Architectural perspective is simply the application of linear perspective to architectural drawing. The plans, elevations, and sections by which buildings are represented in the working drawings are orthographic projections, which give the correct geometric and dimensional relations of the various parts of the building shown, but present in each case only two dimensions, and do not exhibit the natural aspect of the structure as it appears to the eye from any given point of view. This deficiency is supplied by the perspectives, which show its appearance as seen from one or another point of view, all three dimensions being represented, but with the foreshortenings and angular distortions of its actual appearance from the given point. It is customary to make perspectives not merely of the exterior of a projected or executed building, but also of the more important interior portions. See **DRAWING**.

HISTORY. Knowledge of perspective in all its branches is comparatively modern.

Oriental art knew nothing of any branch. A glance at Egyptian and Assyrian reliefs shows that the most elementary principles were ignored. Buildings and trees were laid flat on the ground or stood up in front view; the figures were placed one on top of the other instead of on different planes.

Greek art first studied and solved some of the mysteries of linear perspective, but it is doubtful that the Greeks ever got beyond the architectural form into the plastic and pictorial forms. This step was reserved for the more realistic art of the Alexandrian and especially the Roman age. The rescues at Pompeii often exhibit an elaborate attempt to draw buildings in perspective with varying degrees of unsucess.

Renaissance art, however, attacked almost immediately the question of linear perspective in all its branches. Such men as the Pollainolo and Andrea del Castagno, Melozzo and Mantegna revelled in their ability to overcome its difficulties. After playing with architectural design, with both normal and abnormal base lines, they played with the foreshortening of figures. From painting the use of linear perspective crept into sculpture, especially through Donatello. During the fifteenth century aerial perspective appeared in the landscape backgrounds of the early Flemish painters, like the Van Eycks, whose use of oil colors gave the necessary element of depth, diffused luminosity, and softness. The highest development of aerial perspective, however, was accomplished mainly by the Venetians of the sixteenth century, like Paolo Veronese, and by Correggio.

BIBLIOGRAPHY. Early treatises are Houdin, *La perspective* (Paris, 1642); Alberti, *Deux livres sur la perspective* (Nuremberg, 1671). The subject is very fully treated in Ware, *Modern Perspective* (Boston, 1885). Consult also: Cloquet, *Nouveau traité élémentaire de perspective* (Paris, 1823); Herdman, *Curvilinear Perspective in Nature* (London, n. d.); Seeberger, *Principien der Perspektive* (7th ed., Munich,

1900); Checa, *La perspective* (Paris, 1900); La Gournerie, *Traité de perspective linéaire* (ib., 1898); Pratt, *Perspective*, including the *Projection of Shadows and Reflections* (London, 1901); Conz, *Lehrbuch der Perspektive* (2d ed., Stuttgart, 1902).

PERSPECTIVE. In mathematics, a term applied to figures, one of which is formed from another by a single central projection. Thus, if from a point S, exterior to two planes P and P', a pencil of rays pass through the vertices of a triangle ABC situated in plane P, these rays meet P' in the vertices of a triangle A'B'C' in perspective with the triangle ABC. In general, P cuts P', and the line of intersection is called the *axis* of perspective, the point S being called the *centre* of perspective. If the planes P and P' be brought into coincidence, the triangles, or other figures similarly related, are still said to be in perspective. In two perspective figures, a point or line of one corresponds to a unique point or line of the other, hence a curve and its projection are of the same order and the same class (see **CURVE**), e.g. a conic section is always projective, or in perspective with a conic section, although the species may not be the same. Many properties of perspective figures are demonstrated by means of the fundamental proposition: The anharmonic ratio (q.v.) of perspective ranges is constant. See **PROJECTION**.

PERSPECTIVE DRAWING. See **DRAWING**.

PER STIRPES (Lat., according to stocks). A term used in designating that succession to the property of a deceased person by which the descendants take 'by the stock or root of their race'; that is, by virtue of representing an ancestor who would have been entitled to take if alive. The term is used in opposition to the phrase *per capita*. By the general rule, where the descendants of the same deceased ancestor are of unequal degrees of relationship, they take *per stirpes*, instead of *per capita*. For example, if A dies, leaving three living children, B, C, and D, and three grandchildren, the children of his deceased child E, these descendants will take *per stirpes*, that is, the estate will be divided into four parts, each of the living children, B, C, and D, taking one part, and the three grandchildren taking the fourth part, which their ancestor, E, would have taken if alive. If there is real estate, the three grandchildren will become tenants in common of the whole, with the three living children, and will be entitled to one undivided fourth part thereof. In some States the above rule is not followed, and the statutes of each State should be consulted. See **DESCENT**; **DISTRIBUTION**; **PER CAPITA**; **SUCCESSION**.

PERTH, pĕrth. The capital of West Australia, situated on the north bank of the Swan River, 10 miles northeast of Fremantle, on the Eastern Railway, in the vicinity of the Victoria range of mountains, and surrounded by picturesque scenery (Map: Australia, B 5). It is the see of Anglican and Roman Catholic bishops. The most notable of the public buildings are the Government and Parliament houses. It received a marked influx of population during the last decade of the nineteenth century, owing to the discovery of gold in the district. Population, in 1890, 9617; estimated, in 1895, 19,600.

PERTH. The capital of Perthshire, Scotland, a city, royal and Parliamentary burgh, on the Tay, 45 miles northwest of Edinburgh (Map: Scotland, E 3). The charming scenery of the immediate vicinity, the Tay, sweeping southward along its eastern side, and the superb background of the Grampians, on the north, render the site of the 'Fair City' exceedingly beautiful; while the important rôle it has played in the history of the country claims for it a high rank among the cities of Scotland. The river is spanned by two handsome bridges, and there are two beautiful public parks, called the North and South Inches. Among the most interesting public buildings are the Church of Saint John (whence Saint Johnstown, or Saint John's Town, the old name of the city); the Episcopal Cathedral of Saint Ninian's; the county building; the town-house, part of which is as old as 1210; King James VI.'s Hospital; the infirmary; and the city prison. At the head of the South Inch stands the penitentiary, or general prison, where all criminals sentenced to imprisonment for long periods are confined. The town also contains a statue of Albert, Prince Consort, a public library, the museum of the Antiquarian Society, public seminaries, and other educational institutions. It has ink, glass, cotton, and dye works, iron foundries, breweries, linen and winey manufactures, shipbuilding yards, distilleries, and extensive bleaching fields. The salmon fishery on the Tay is very valuable. The total quayage of Perth harbor is 1225 feet, and vessels of 200 tons can draw alongside. Perth has a charter as a royal burgh from King William the Lion (1105-1214). Perth was the scene of the murder of the Earl of Cornwall, by his brother Edward III. in 1336; of a combat between two Highland clans (1396), described in Scott's *Fair Maid of Perth*; of the assassination of James I. in 1437, notwithstanding the heroic action of Catharine Douglas, who died to prevent the entry of the murderers by making her arm do duty for the missing bar on the door; and of Knox's Reformation sermon. Population, in 1891, 30,000; in 1901, 32,872. Consult Peacock, *Perth: Its Annals and Archives* (London, 1849).

PERTH, FIVE ARTICLES OF. Certain articles agreed upon in a meeting of the General Assembly of the Church of Scotland, convened at Perth, by command of King James VI. (James I. of England) on August 25, 1618. They enjoined kneeling at the Lord's Supper; the observance of Christmas, Good Friday, Easter, and Pentecost; confirmation; and sanctioned the private administration of baptism and the Lord's Supper. They were highly obnoxious to the Scotch Presbyterians, not only because of their character, but because they were adopted without discussion in mere compliance with the will of the King. The General Assembly at Glasgow in 1638 declared that at Perth to have been 'unfair, unlawful, and null,' and condemned the five articles.

PERTH, GEORGE DRUMMOND. Earl of (1807-1902). A British nobleman. He was born in London during the reign of George III. and consequently saw five monarchs occupy the throne of the United Kingdom. For a short time he served as an officer in the 93d Sutherland Highlanders, and, from 1853 till 1859, was a major in the Victoria Middlesex Rifles (Volunteer).

Because of his ancestors he was chief of the Clan Drummond, 14th Earl of Perth, 6th Earl of Melfort, Viscount Melfort and Forth, Baron Drummond of Cargill, Baron Drummond of Stobhall and Montifex, Baron Drummond of Richertown, Castlemaine, and Galstown, hereditary Thane of Lennox, hereditary Steward of Monteith and Strathearn, Duc de Melfort, Comte de Lussan, and Baron de Valrose. When he died these titles were separated, as he left no direct male heir.

PERTH AMBOY, *âm-boi' or âm'boi.* A city and port of entry in Middlesex County, N. J., 15 miles south of Newark; on Raritan Bay, at the mouth of the Raritan River, and on the Lehigh Valley, the Central of New Jersey, the Pennsylvania, and the Staten Island Rapid Transit railroads (Map: New Jersey, D 2). It has a fine harbor, with transportation facilities by water, and controls important shipping interests, particularly in coal. The manufactures, which are extensive, include terra cotta, bricks, chemicals, oil, cork, copper, iron, steel, and lumber, the first two named being developed from the valuable deposits of fire clay found in the vicinity. There are also two large smelting and refining plants and important shipbuilding interests. The city hall park and the bridge of the New Jersey Central Railroad are among the features of Perth Amboy. The government is administered, under a charter of 1871, by a mayor, elected every two years, and a council which has powers of election and confirmation in important administrative offices. The water-works are owned and operated by the municipality. Population, in 1890, 9512; in 1900, 17,699.

Perth Amboy was settled in 1683, and was expected soon to outstrip its neighbors and become 'the London of America.' It was named Perth, after James, Earl of Perth, but 'Amboy,' the original Indian name for the place, was soon added. It was the capital of the province from 1684 almost continuously up to the time of the Revolution. William Franklin, the last royal Governor, was captured here in 1776. Perth Amboy was incorporated as a city in 1784. Consult Whitehead, *Contributions to the Early History of Perth Amboy* (New York, 1856).

PERTHES, *pâr'tās,* FRIEDRICH CHRISTOPH (1772-1843). A German publisher and patriot. He was born at Rudolstadt. In his fifteenth year he was apprenticed to a Leipzig bookseller, with whom he remained six years. In 1793 he was employed by Hoffman, the Hamburg bookseller, and in 1796 started business on his own account, and developed an important publishing business. The iron rule of the French in Northern Germany, and the prohibition of intercourse with England, nearly ruined trade, yet Perthes found ways and means to extend his business. He endeavored to enlist the intellect of Germany on the side of patriotism, and in 1810 started the *National Museum*. Its success was far beyond Perthes's expectations, and encouraged him to continue his patriotic activity, till Hamburg was formally incorporated with the French Empire. He subsequently took a prominent part in the movement that forced the French garrison to evacuate Hamburg, March 12, 1813; and on its reoccupation by the French, he was one of the ten citizens who were specially excepted from pardon. In 1822 Perthes removed to Gotha, where he devoted himself to the publication of historical and theo-

ological works. He was the prime mover in the organization of the German book trade and in the foundation of a museum connected therewith. His correspondence with literary, political, and theological notables is extremely interesting, and throws light upon the inner life of Germany early in the nineteenth century. Consult the biography (12th ed., 1853), by his second son, Clemens Theodor Perthes.

PERTHITE. A red flesh-colored feldspar, consisting of interlaminated orthoclase and albite, that is found in Perth, Canada. It often affords bright aventurine reflections, and consequently is in some demand as a gem.

PERTH'SHIRE. An east midland county of Scotland, bounded north by Inverness and Aberdeen, east by Forfar, Fife, and Kinross, south by Sterling and Clackmannan, and west by Argyll and Dumbarton (Map: Scotland, D 3). Area, 2528 square miles. It is divided into highland and lowland districts, the former occupying the larger surface. The Grampian Mountains here reach altitudes of 3843 and 4000 feet respectively in Ben More and Ben Lawers. The lakes are numerous and include Lochs Tay, Ericht, Katrine, and Acharay. The principal river is the Tay. The climate is comparatively mild and healthful. Old red sandstone, granite, and slate abound; in the lowland districts the soil is composed mostly of a rich loam, in which crops of all kinds are brought to perfection; only about one-fifth of the total area, however, is under cultivation. The highland districts are chiefly devoted to sheep pasturage and extensive deer forests. Stock-raising is largely carried on. The chief industries are the manufacture of textiles, bleaching, and dyeing. Capital, Perth. Population of county, in 1891, 122,185; in 1901, 23,260. Consult Drummond, *Perthshire in Bygone Days* (London, 1879).

PERTINAX, PUBLIUS HELVICUS, Emperor of Rome. He was born, according to Dio Cassius, at Alba-Pompeia, a Roman colony of Liguria, A.D. 126. He received a good education, and, entering the military service, rose through the various grades till he obtained the command of the First Legion, at the head of which he signalized himself in Rætia and Noricum against the native tribes. In 179, or, according to other authorities, in 172, he was chosen consul, aided in repressing the revolt of Avitus in Syria, and was Governor successively of the provinces of Mæsia, Dacia, and Syria. He was sent by the Emperor Commodus to take the command of the turbulent regions in Britain, and these troops, against his will, proclaimed him Emperor; on which he solicited a recall, and was appointed proconsul of Africa, prefect of Rome, and consul (a second time) in 192. On the death of Commodus, his assassins almost forced Pertinax to accept the purple, which with great hesitation he did (January 1, 193), but in spite of his promise of a large donation, he was unable to gain over the Prætorian Guard. His accession was, however, hailed with delight by the Senate and people, who were rejoiced to have, as ruler, an able captain, instead of a ferocious debauchee; and Pertinax, encouraged by this favorable reception, announced his intention of carrying out an extensive series of reforms, having reference chiefly to the army, in which he hoped to reestablish the ancient Roman discipline. Unfortunately, he was at-

tacked by a band of the rebellious prætorians, about three months after his accession, and, disdaining to flee, was slain (March 28, 193). His head was carried about the streets of Rome in triumph.

PERTURBATIONS (Lat. *perturbatio*, confusion, from *perturbare*, to confuse, from *per*, through + *turbare*, to disturb, from *turba*, throng, tumult). In astronomy, a term used to describe disturbances in the orbital motion of the planets or other celestial bodies. The simplest kind of motion imaginable under the law of gravitation would be that of a small material particle revolving about a larger central attracting body. If this particle is so small that its mass may be neglected altogether, as being inappreciable in comparison with that of the central body, then the particle will describe an elliptic orbit having the larger body in one of its foci. If, however, both bodies have masses so large that neither is negligible, then each body will describe an elliptic orbit having the common centre of gravity of the two bodies in the common focus, and its distance from either body will be inversely proportional to that body's mass. Thus the larger body will describe proportionally the smaller orbit. The problem of determining mathematically all the circumstances of motion in such a system is called the 'problem of two bodies,' and its complete solution is possible. When the number of bodies in a system is increased to three, we have the famous 'problem of three bodies,' whose complete mathematical solution has never been made. It is not even certain whether our inability to solve this problem completely is due to the lack of sufficient power in the known methods of mathematical analysis, or to the fact that the problem is actually insoluble. Fortunately, astronomers have been able to obtain an approximate solution of the problem as it actually exists in the solar system, and this approximate solution is sufficiently exact for all practical purposes of predicting planetary phenomena. This solution is made by taking advantage of the fact that all the planets in the solar system are very small in comparison with the central body, the sun. The effect of this is to make such planet describe an orbit very nearly the same as the elliptic curve in which it would move if that planet and the sun were the only bodies in the system. Consequently, astronomers can predict planetary phenomena on the assumption that the orbit is a true ellipse, and then calculate the small disturbances or perturbations produced by the gravitational attraction of the other planets in the system. The continuing action of perturbative attraction may in time produce certain changes in the size, shape, and position of an orbit. Suppose, for instance, that in the case of a given planet perturbative action should suddenly cease. Then the planet would go on from that moment in a true elliptic orbit which would never undergo further change. But the ellipse would not be the same ellipse if the perturbative action were to stop to-day as it would have been if that cessation of action had occurred ten thousand years ago. For in that long interval the size, shape and position of the orbit would have been changed appreciably. It follows from these considerations that we may consider perturbative action, if we choose, from the following point of view. We may regard

each planet as traveling for the moment in a certain elliptic orbit, and consider the perturbations as disturbing the orbit instead of the planet itself. Having then deduced from observation the elements (q.v.) of the orbit at a given epoch, we can calculate the changes of the orbit in another epoch, and thus predict the actual motion of the planet for any future time.

The principal planetary perturbations are of several kinds: some change a planet's position on the sky alternately forward and backward every few years (*periodic perturbations*); others require a longer cycle to act forward and backward (*long inequalities*); and lastly there are the *secular inequalities*, whose effects are so slow that hundreds of thousands of years are included in their cyclic action. The planetary periodic perturbations may displace the planets as seen from the sun by 15" in the case of Mercury, 30" for Venus, 60" for the earth, and 120" for Mars. The most important 'long inequality' is that existing between Jupiter and Saturn. It may displace the former planet 28' and the latter as much as 48'. The long-period secular inequalities do not alter either the mean distances of the planets from the sun or their periods of revolution. But the nodes (q.v.) and perihelia (q.v.) of the orbits move continuously. The perihelia of all the planets except Venus are gradually increasing their celestial longitudes, and all the nodes are moving in the opposite direction on the ecliptic. At the same time, the inclinations of the planetary orbits to the ecliptic plane are oscillating through narrow limits in very long periods of time and the eccentricities are similarly affected. But, on the whole, the mathematical researches so far made indicate that the continued effect of gravitational perturbative action will not end in the disruption of our solar system. But its permanent existence might be jeopardized by other than gravitational forces, or by forces operating from outside the system. In the case of the moon, perturbations are more complex and larger than they are in the planetary orbits. The moon is so near us that the slightest error in her predicted position is observed with ease and certainty; and therefore her motion offers a much severer test to mathematical calculations than do the planetary phenomena. (See MOON.) Consult *Tisserand's Mécanique Céleste*.

PERTUSSIS. See WHOOPING COUGH.

PERTY, pãrtã, JOSEPH ANTON MAXIMILIAN (1804-84). A German zoölogist and philosophical writer; born at Ohrbau, in Middle Franconia. He studied medicine and natural history at Landshut and Munich; in 1833 became a professor in the University of Bern; and subsequently was made rector. His principal works are: *Allgemeine Naturgeschichte als philosophische und Humanitätswissenschaft* (1837-44); *Die mystischen Erscheinungen in der menschlichen Natur* (2d ed. 1872); *Ueber das Seelenleben der Tiere* (2d ed. 1875); *Blicke in das verborgene Leben des Menschengenies* (1867); and *Erinnerungen aus dem Leben eines Natur- und Seelenforschers des 19. Jahrhunderts* (1879).

PERTZ, përts, GEORG HEINRICH (1795-1876). A German historian. He was born at Hanover, studied at Göttingen, and at twenty-four published an authoritative *Geschichte der Merovingischen Hausmeier* (1819). Four years after-

wards Pertz was appointed secretary of the royal archives of Hanover and began his important research in mediæval German history as editor of the *Monumenta Germaniæ Historica*. The materials for the Carolingian period were edited personally by Pertz, and an account of his travels and preliminary research was published in the *Archiv der Gesellschaft für ältere deutsche Geschichtskunde* (1824 et seq.). He resigned his post as editor in 1874. Pertz had become librarian and keeper of the Hanoverian archives in 1827, librarian in Berlin in 1842, and had written biographies of Stein (1849-54), and of Count von Gneisenau (1864-69). With Grotefend he edited Leibnitz's works (1843-47).

PERU' (corrupted from *Biru*, name of a chief of the early sixteenth century, who ruled a small territory of South America near the Isthmus of Darien). One of the four countries of South America bordering on the Pacific Ocean. It is bounded on the north by Ecuador, on the east by Brazil and Bolivia, on the south by Bolivia and Chile, and on the west by the Pacific Ocean. Its frontiers on the north, east, and south cannot be exactly defined throughout their whole extent, on account of boundary disputes with Ecuador, Bolivia, and Chile still pending (1903). The coast line, however, is not affected by these disputes except for a comparatively short distance in the extreme south. In 1880 Peru claimed an area of 504,000 square miles, but its claims, according to the Lima Geographical Society, now embrace nearly 700,000 square miles. According to the last census taken (1876) the area was 463,747 square miles. Probably a near approximation to the area is 440,000 square miles actually under the present control of Peru. The length of the coast line conceded to belong to Peru is about 1100 miles, not reckoning sinuosities.

TOPOGRAPHY. Extending north and south through Peru are three well-marked topographic divisions: the Coast Desert, the region of the Andes, and the Montaña or tropical forested plain east of the Cordilleras, and included in the basin of the Amazon. The *Zona seca* or dry zone extends along the Pacific coast from 3° S. latitude (Southern Ecuador) through Peru to 22° S. latitude in Northern Chile. Most of this sandy desert is only 20 miles in width, but in the north it is 120 miles wide. It gradually rises from the Pacific to nearly 1000 feet, where it merges with the foothills of the Andes. It is nearly as destitute of vegetation as the African Sahara, except that it is crossed at intervals by rivers, some of them rising among the snow tops of the Central Andes. The banks and valleys of these roughly parallel streams are covered with perpetual vegetation, ribbons of green among the desert waste. Here are many estates and plantations. The desert is whitish in color, owing to the large admixture of marine shells. On the sea margin steep cliffs generally rise, and the waste behind them is slightly undulating, with ridges of considerable height rising here and there. The surface is hard, excepting near the coast, where drifting sea sands are whirled aloft by the winds in clouds of dust. The coast is fairly supplied with harbors well sheltered from the sea; but at many small ports the ships of the coasting trade roll uncomfortably in open roadsteads. The bays of Payta, Sechura, Chimbote,



10° F West 55° from G Greenwich 50° H 45° J 40° K

BOLIVIA, BRAZIL, COLOMBIA, ECUADOR, GULANA, PERU AND VENEZUELA.

SCALE OF ENGLISH STATUTE MILES.



KILOMETERS,



Capitals of Countries: Capitals of States, Provinces, Departments and Territories:
Railroads: Telegraph Lines:

A T L A N T I C
O C E A N



Callao, Samanco, and Norato are secure, land-locked havens, where the largest vessels may find shelter.

The region of the Andes is about 250 miles in width. It contains enormous chains of mountains, between which are elevated plains and tablelands, warm and fertile ravines and valleys. The mountain system consists of three Cordilleras extending from northwest to southeast, more or less parallel with the line of the coast. The two western chains, for long distances comparatively near each other, are identical in origin and have been separated by denudations in the course of many ages. On these maritime and central Cordilleras are the volcanoes and many thermal springs. Some peaks of the maritime range rise to a height of 15,000 feet. The Sierra, a name that is not applied to any particular cordillera in Peru, designates the region between the maritime and central ranges, rising from 4000 feet, where it abuts on the western, to 10,000 feet at the central mountains. This region, from 50 to 150 miles wide, is a high, broken plain, corresponding to the temperate zone of Mexico, and is best adapted for settlement by whites of the temperate zones. The central range, with culminating peaks 19,000 feet above the sea, is for the most part a distinct water-parting between the Atlantic and Pacific drainage systems, though a few Pacific streams rise to the east of this line of summits. Between the central range and the Eastern Cordillera is the Puna (signifying hard breathing), a broken plain rising from 9000 feet at its western edge to 14,000 feet at the edge of the great Eastern Cordillera of the Andes, where several of the grandest mountains of the continent are found, some of them overlooking the northern plain of Bolivia, rising 20,000 feet. On the Puna rise a number of the great southern headwaters of the Amazon. The Peruvian Andes increase in height from north to south and from west to east.

The eastern part of Peru drops steeply from the cordilleras to the plain of the Upper Amazon, called the Montaña, 800 miles in length, covered with subtropical forests, where it joins the mountains, and with dense tropical vegetation on the plain, which is cut by the eastern frontier. The Montaña is very rich in rubber and agricultural resources, with abundant navigation, and promises to be one of the most prosperous parts of Peru, though it has yet reached only the early stages of development.

HYDROGRAPHY. The dry west and the rainy east of Peru naturally produce a striking contrast between the hydrographic aspects of the western and eastern slopes of the country. Only feeble streams flow to the Pacific, and most of them are lost in the desert or their waters are wholly diverted to nourish the plantations. None of them flows perennially to the Pacific excepting the Santa, which rises, not on the western slopes of the mountains, like most of the coast rivers, but in a long valley between the maritime and central ranges. During the flood the Santa discharges such an enormous quantity of water that it is difficult to cross. Most of the coast rivers are quite short, and their great value is derived wholly from the facilities they afford, by means of irrigation, for turning belts of the desert into the most fertile of lands. The more important among them, from north to south, are

the Chira, the Piura, the Santa, the Rimac, which created the fertile plain on which Lima stands, and the Rio Grande.

The Amazonian affluents of the eastern slope, on the other hand, constantly increase in volume with distance from their sources. The rivulets among them carry more water than most of the Pacific streams. The upper parts of these rivers are interrupted by cascades and rapids, and thus the economic periphery of Eastern Peru is largely determined by the line joining the heads of navigation on these many rivers. All the very numerous rivers of the eastern slope of Peru are included in the Amazon basin, and belong to one or another of the three secondary basins of the Marañón, the Huallaga, and the Ucayale, which are entirely in Peruvian territory, besides a few tributaries of the Purus and Madeira. The Marañón is usually regarded as the main upper branch of the Amazon, not because it carries so much water as the Ucayale, but because it prolongs farthest toward the Pacific the longitudinal axis of the Amazon. Ocean steamers now regularly ascend the Amazon and Marañón to Iquitos, Peru, 3000 miles from the Atlantic, and light-draught steamers prolong navigation for 825 miles up the Ucalaye, Pachitea, and Pichis rivers. There are no important lakes excepting Titicaca (q.v.), which lies partly in Bolivia; it is 12,500 feet above sea-level, and affords navigation between Peruvian and Bolivian ports on its shores.

CLIMATE. The chief determining influences on the climate are the trade winds and the great differences in elevation. The country is more temperate than might be expected from its position in the tropics. The trade winds coming west from the Atlantic deluge the eastern mountains, drop cold rain and snow upon the Puna, give a smaller supply of water to the central range, and moisten the plain of the Sierra to some extent. So little water is left for the maritime range that it is included with the coastal desert in the dry belt. These facts explain the aridity of the west slope of Peru. Once in seven or eight years a marvelous change comes over the face of this desert. Sufficient rain comes over the mountains to bring life out of the parched surface; grass and flowering plants appear, attracting thousands of cattle and goats from the irrigated valleys to the new pasturage, which withers again in a few weeks. Only about 1½ inches of rain fall in Lima in a year. The mean annual temperature of the coast provinces is 68° F. In the hottest months, January and February, the mean temperature is between 82° and 86°. The dry heat is not oppressive; and after 11 A.M., when the torrid sun has rarefied the atmosphere over the desert, sea air comes rushing to this area of low pressure, all life is refreshed by the breeze, and often a little rain is scattered over the maritime range. In the evening, when the surface of the desert grows cool, the wind sets to sea again, bringing cool breezes from the mountains. Conditions are nowhere unhealthful excepting in the low, hot plains of the north and east. The whole mountain region lying between 3000 and 9000 feet above the sea has a temperate and healthful climate. Thus in nearly all parts of Peru the climate is exceptional.

FLORA. Varying with the climate, the flora of Peru is represented on the dry coast only by a few gray herbs and in the depressions by the Prosopis, a low tree of scraggy growth, and two

shrubs, the *Capparis* and a variety of *Apocynum*. The western slopes of the maritime range, exposed to fogs and occasional rains, have sufficient vegetation to give them a green aspect mixed with yellow due to the abundance of yellow marguerites. The high plateaus among the mountains have a great variety of species, among which resinous and other herbs and the gigantic cactus are especially abundant, and several varieties of forest trees are found. The flora of every zone is represented among the mountains, from the tropical in the deep gorges to the Arctic approaching the snow line. The potato thrives and the llama, vicuña, and sheep feed on the grasses of the uplands. The most valuable plants, economically, are the quinine-yielding cinchona, the coca plant, from which cocaine is derived, the *Siphocampylus*, a plant 50 feet high, from which Peruvian rubber is extracted, and the sarsaparilla.

FAUNA. The headlands of the coast and the neighboring islands are the home of myriads of sea birds, whence came the immense deposits of guano that were long a great source of Peruvian wealth. Among them are the guano bird (*Sula variegata*), a large gull (*Larus modestus*), a tern (*Sterna inca*), and several cormorants. Sea-lions (*Otaria forsteri*) are common on the promontories and islands. The domesticated llama and alpaca and the wild vicuña belong especially to the mountain regions; among the other animals of the highlands are the taruco, a deer, the viscacha, a large rodent, the atoc, a species of fox, the puma, and two species of bear. The largest bird is the condor; another bird of the vulture family whose black and white wing feather was used by the Incas in their head-dress is the coraquenque. Woodpeckers, a species of partridge, geese, a plover, two kinds of ibis, gulls, water hens, finches, and parrots are also found. Nearly all the characteristic animals of tropical South America are found in the Montaña, including monkeys, the tiger cat, jaguar, tapir, peccary, tortoise, alligator, manatee, snakes, and vipers.

GEOLOGY AND MINERAL RESOURCES. Sections of the desert zone, exposed along the coast and valleys for several hundred feet, reveal nearly horizontal layers of calcareous sandstone above strata of pudding stone and shell marl, beneath which are beds of argillaceous shale, considerably tilted and often of immense thickness. The ridges found on the coast plain are of granite or syenite. The Maritime and Central Cordilleras consist chiefly of crystalline and volcanic rocks on each side of which are sedimentary strata, principally of Jurassic age. The Eastern Cordillera is in great part of Silurian formation, with talcose and clay slates, many quartz veins, and intrusions of granite rocks. The igneous cones of Peru are found in the southern section of the maritime and central ranges, about 1200 miles south of those in Ecuador. None of them has been in eruption in recent times. Sara-Sara, Achatayhua, Coro Puna, Ampato (all over 13,000 feet), Chachani (19,820 feet), and Misti (about 20,000 feet) are quiescent and snow-clad. Misti, a magnificent cone, near whose base stands the city of Arequipa, appears to be the focus from which some of the earthquakes that afflict Peru have been propagated. South of Misti is the elongated crest of the volcano of Omate, in the seventeenth century the most active of the Peruvian

volcanoes. Farther south is Tutupaca (18,960 feet), which as late as 1862 was still ejecting vapors by which a little sulphur was deposited. The frequent and severe earthquakes are most destructive in the neighborhood of these southern volcanoes. In 1746 Callao and in 1868 Arequipa were destroyed by earthquakes. The shocks of 1877 were equally severe, and all the southern ports were overwhelmed by earthquake waves.

Peru is a vast storehouse of mineral wealth, though it long ago lost the first rank as a mining country, and is now surpassed even by Bolivia and Chile. The Eastern Cordillera contains gold in the quartz veins of the Silurian strata, but the annual yield is small because the richest mines occur in the most unhealthful and remote parts of the Montaña, where miners dislike to go, and transportation is very difficult. The Central and Maritime Cordilleras are poor in gold, but rich in silver, which occurs nearly always with antimony, copper, and lead. Copper is found in greatest abundance in the coast lands, where also are important areas of salt, borax, and petroleum (in Piura). Anthracite and bituminous coal are reported in the province of Hualgayoc and are known to exist in the Huamachuco and other districts. But silver remains the chief mineral product. The greatest centre of the industry is at Cerro de Pasco, which produced \$475,000,000 of silver between 1630 and 1849, and has yielded an average of about 1,200,000 ounces a year for the past ten years, dropping, however, to 1,000,000 ounces in 1901, owing to the inundation of some of the chief mines, which will be drained by a tunnel. Other important silver-mining centres are those around Puno, and at Caylloma, Castrovireina, and Recuay. United States and British companies are largely interested in the mining industry, and the number of mines increased from 1456 in 1886 to 3475 in 1897. In 1900 there were 5178 mining claims, including silver, gold, copper, quicksilver, lead, zinc, coal, sulphur, salt, and petroleum. Many of these claims are unworked.

AGRICULTURE. The chief crops of the fertile coast valleys are sugar, cotton, and coffee. In 1903, 370,650 acres of these irrigated lands were in sugar-cane, which is grown to perfection, 12.5 tons of cane yielding a ton of sugar, the great export crop, and the basis of agricultural prosperity. The unoccupied land capable of producing sugar is measurable only by the possibilities of irrigation. Cotton is indigenous, and that grown in the northern provinces is distinctive (tree cotton), the plant often reaching a height of 20 feet and producing for 7 to 10 years, the fibre ranging in color from pure white to dark brown. This cotton is especially valued for mixing with fine wool, to which it adds strength, lustre, and protection against shrinkage. Its value is greater than that of any other cotton excepting American sea island. The ordinary staple grown in the coast valleys farther south is adapted for spinning fine yarns. Extensive irrigation works both north and south are now being developed to enlarge the area of cotton culture, and the product is steadily increasing. Rice and tobacco are important crops, and there are several large establishments for the preparation of rice for market. Maize and alfalfa (lucerne), vegetables, and fruits of all kinds are cultivated in every valley. Grape culture is increasing, and the production of wine is impor-

tant. Olives are grown in the south, and there are many profitable grazing farms in the coast valleys. In the valleys and to some extent on the plateaus of the Andean region wheat and barley ripen, the potato is a very successful crop, and the cultivation of coffee is a growing industry. The cultivation of the cacao-tree is especially successful in the valley of the Pórené River in the Montaña, where 200,000 trees were recently added to the plantations. In 1901, 107 tons of cacao were exported. Over 1500 tons of rubber are annually shipped from the Montaña, whose other chief products are cinchona, dyes, and medicinal substances, all the exports going down the Amazon from Iquitos. The coca-tree thrives best near the Pacific, in the Department of La Libertad, where in 1901 there were 2,700,000 trees, the exports being 610 tons of coca and 10.69 tons of cocaine.

MANUFACTURES. The manufacturing industries have as yet little importance, though some progress is being made. Five cotton factories operate 1400 looms, but they supply only a small part of the cotton cloths required. Beer, boots and shoes, wine, clothing, furniture, watches, soap, lard, saddlery, olive oil, and cottonseed-oil cake are among the other products, Callao and its environs being the chief centre of production. The Indians of the north make fine straw hats, which enter the trade as Panama hats, though the name is properly applied only to the product of Ecuadorian natives. Indians on the mountain plateaus make coarse woolen fabrics and earthenware for local consumption; and a few coast towns produce filigree and other fancy articles. The quantity of petroleum refined is not large. Owing to the small variety and quantity of home manufactures, it is necessary to import a great deal of machinery and wares of all kinds.

COMMERCE. Peru's business relations with foreign countries have been steadily increasing in recent years. The following table shows the progressive growth in the value of international commerce for six years:

	1896	1897	1898	1899	1900	1901
Exportation.....	\$6,113,678	\$6,700,428	\$7,265,945	\$7,374,218	\$10,795,198	\$10,316,109
Importation.....	4,201,234	3,870,874	4,611,540	4,496,486	5,561,100	6,619,737
Total.....	\$10,314,912	\$10,631,302	\$11,877,485	\$11,871,704	\$16,356,298	\$16,935,846

The following table shows the progressive increase in metric tons in the exports of the ten principal products of Peru for the same period:

ARTICLE	1896	1897	1898	1899	1900	1901
Cotton.....	4,718	5,586	6,712	5,876	7,246	8,011
Rice.....	2,804	4,222	4,276	2,873	4,200	4,164
Sugar.....	71,735	105,463	105,713	103,706	112,222	114,637
Cocoa.....	.....	12	62	54	99.3	107
Coffee.....	713	1,240	1,245	1,215	1,454	946
Coca leaves.....	.....	497	490	312	566	610
Cocaine.....	.....	4.2	4.35	4.5	7.75	10.6
Leather.....	1,352	1,710	2,127	2,062	2,286	2,251
Wool.....	2,544	3,770	3,489	3,434	3,534	3,856
Minerals.....	12,000	15,000	17,225	23,158	39,405	46,885

In the sugar trade, Peru has the great advantage that the fields are cheaply irrigated and the absence of rain permits grinding for three-fourths of the year. Raw sugar is therefore produced at small cost. About five-sixths of the crop is ex-

ported, Great Britain, the United States, and Chile being the largest buyers. The distinctive qualities of Peruvian cotton create a demand for it in the leading woolen centres of this country and Europe. Coffee exports are not expanding, because most of the plantations are on the Andes slopes and transportation by mule train to the railroads is very expensive.

The principal imports and exports in 1900, in dollars, were:

IMPORTS	1900
Cottons.....	\$1,806,285
Woolens.....	725,680
Other tissues.....	352,545
Furniture, etc.....	845,810
Small wares, etc.....	5,884,075
Provisions, etc.....	1,264,515
Wines, etc.....	227,920
Drugs, etc.....	485,770
EXPORTS	1900
Ores.....	\$8,475,275
Sugar.....	7,279,210
Wool.....	1,433,365
Cotton.....	1,030,379
Coffee.....	327,155
Borax.....	283,185
Hides.....	542,790
Rice.....	319,515
Cocaine.....	580,890

The distribution of trade to the leading countries in 1900 was:

FROM OR TO	Imports	Exports
United Kingdom.....	\$5,405,725	\$10,446,340
Germany.....	1,802,995	2,579,965
United States.....	1,487,180	4,774,480
France.....	781,745	702,340
Chile.....	457,066	3,052,600

The trade with the United States for five years was as follows: Exports from Peru in 1898, \$714,247; 1899, \$1,406,978; 1900, \$4,774,480; 1901, \$3,656,180; 1902, \$3,269,411; and imports into Peru in 1898, \$1,302,697; 1899, \$1,325,650; 1900, \$1,487,180; 1901, \$3,126,934; 1902, \$2,558,995.

The chief articles which Peru sold to the United States in the fiscal year 1902 were: Raw sugar (including some molasses), \$2,126,686;

cotton, \$592,509; gold bars and concentrates, \$469,772; goat skins, \$265,798; coca leaves, \$175,552; straw hats, \$65,385; sulphide of silver, \$52,745; silver ore, \$36,595; rubber, \$36,644; alpaca wool, \$21,728; guano, \$8,750. The chief

purchases from the United States were hardware, machinery, breadstuffs, and provisions.

TRANSPORTATION AND COMMUNICATIONS. Foreign vessels call at nearly every port, but most of the international trade is conducted through the port of Callao. The vessels of over 50 tons entering that port in 1901 numbered 531, of 755,461 tons; the clearances were 537 vessels, of 753,334 tons. There entered also 959 vessels under 50 tons, of 12,697 tons. About one-half of the tonnage of foreign vessels was British. The steamships of the Pacific Steam Navigation Company, on the route between Chile and San Francisco, call at nearly all the Peruvian ports. Very little freight is carried in domestic bottoms, the merchant marine of the country in 1902 consisting of only 1 steamer of 19 tons, 29 sailing vessels of 50 tons, and 86 under 50 tons, the aggregate tonnage being 10,629 tons.

Good wagon roads and bridges are among Peru's greatest needs. Western Peru is still almost isolated from the Montaña because the road on which a vast sum has been spent to connect Oroya, the terminus of the Central Railroad with the Pichis River, the head of navigation leading to Iquitos, is not yet in a satisfactory condition. Freight between Oroya and the great mining centre of Cerro de Pasco, 66 miles, is still carried by llamas, horses, and mules.

Peru in 1902 had 1035 miles of railroad in operation, of which 844 miles were worked by the Peruvian Corporation, which manages all the property turned over in liquidation of the national debt. Not only Lima, but also the larger inland towns are connected by rail with their seaports, but the country needs branches extending north and south to connect the Andean towns with the routes to the sea and with one another. Peru thus has numerous sections of a railroad system, but, owing to the lack of branches between them, the railroads are as yet wholly inadequate for the needs of the country. The greatest railroads are the line from Callao and Lima across the Maritime and Central Cordilleras to Oroya, 136 miles long, with 63 tunnels, enormous bridges, embankments, and cuttings, and a tunnel in the mountains at an altitude of 15,645 feet, the most elevated spot reached by any railroad in the world; and the railroad between the port of Mollendo and Puno on Lake Titicaca, on which there is a connection by steamers with Bolivia. The gross receipts in 1901-02 from railroads and steamers amounted to \$2,508,875; the working expenses were \$1,619,135. The State owns 1400 miles and the Peruvian Corporation 533 miles. There are 48 telegraph offices, and in 1901 152,808 telegrams were sent. Electric communication with the rest of the world is supplied by the cables along the coast, with stations at Payta, Callao, Lima, and Mollendo. There are 369 post-offices, which in 1900 carried 8,884,604 letters, etc.

BANKING. The four commercial banks of Peru are the Bank of Peru in London (paid up capital and reserve fund, \$1,058,050); the Italian Bank (paid up capital and reserve fund, \$362,388); the International Bank of Peru (capital and reserve, \$362,388); and the Banco Popular (capital and reserve fund, \$362,388). The only savings bank had deposits in 1902 amounting to over \$750,000.

EDUCATION. The municipalities maintain free public schools; elementary education is com-

pulsory for both sexes. In 1898 there were 1544 primary schools, with 91,853 pupils. The number of teachers in the primary schools was 1991, the cost of maintaining the schools being \$241,790; 2168 pupils attended the high schools maintained by the Government at the capitals of the departments. The University of San Marcos had 650 students, and faculties of jurisprudence, literature, medicine, political science, and theology. There are also universities with very small attendance at Arequipa, Cuzco, and Trujillo. A few high schools are under the direction of European teachers, and Lima has a school of mines and civil engineering and a public library.

RELIGION. The religion of the State is Roman Catholic, and the Constitution prohibits the public exercise of any other religion; practically, however, there is considerable toleration, and Callao, Lima, and Cuzco have Protestant churches and missionary schools. The non-Catholic population probably does not number over 30,000.

FINANCE. The public revenue is chiefly derived from the customs and the direct taxes levied by the departments and municipalities on rent derived from real estate. Among the other sources of revenue are the salt monopoly and the postal and telegraph services. The revenue in 1901 amounted to \$7,739,307; expenditures, \$7,208,626. In 1902 the expenditure was distributed as follows: Congress, \$213,485; Ministry of Interior, \$1,676,732; Foreign Affairs, \$342,190; Justice, \$724,520; Finance, \$2,612,965; War and Marine, \$1,926,615; Public Works, \$387,260; total, \$7,883,770.

Owing largely to her war with Chile, Peru was enormously in debt, her bonds being held in England to the amount of £31,579,080. Though the two loans represented by this total were secured by the guano deposits and the general resources of the country, no interest was paid on the public debt after 1876, and the arrears in 1889 amounted to £22,998,651. In 1890 Peru was released from all responsibility for the two loans, and all the railroads and rights over guano deposits, mines, and lands were ceded to the bondholders for 66 years. The Government agreed to pay \$400,000 annually to the Peruvian Corporation, which was to carry on railroad building. Disputes as to the fulfilment of these conditions on both sides have not yet been settled. The internal and floating debt of Peru amount to £4,759,000, of which £2,660,645 bears interest at the rate of 1 per cent. per annum.

MONEY, WEIGHTS, AND MEASURES. Peru adopted the gold standard in 1901. Both the pound sterling and the national gold coin, the libra, which is of the same standard and weight, are legal tender. Silver is legal tender up to 100 soles. The sol is worth 49 cents. Spanish standards of weight and measure are still in use, though the French metric system was established by law in 1860, and is employed in the custom houses.

POPULATION. There has been no census since 1876, when the number of the population was given at 2,660,881, of whom about 13.8 per cent. were white, 1.9 negroes, 57.6 Indian, 24.8 mixed bloods, and 1.9 Asiatic, chiefly Chinese. The Lima Geographical Society in 1896 estimated the population at 4,609,999. The estimate is believed to be excessive. To all appearances the population is increasing very slowly, if at all. Immigration

from Europe, which is promoted by the Peruvian Corporation, is very small.

The list of departments, with their capitals and population (estimated in 1896), is given as follows:

DEPARTMENTS	Population 1896	Capitals
Piura.....	213,909	Piura
Cajamarca.....	442,412	Cajamarca
Amazonas.....	70,676	Chachapoyas
Loreto.....	100,596	Moyobamba
La Libertad.....	250,931	Trujillo
Ancachs.....	428,703	Huaraz
Lima.....	298,106	Lima
Callao.....	48,118	Callao
Huancavelica.....	223,796	Huancavelica
Huánuco.....	145,309	Huánuco
Junín.....	394,393	Cerro de Pasco
Ica.....	90,963	Ica
Ayacucho.....	302,409	Ayacucho
Cuzco.....	438,646	Cuzco
Puno.....	537,345	Puno
Arequipa.....	229,007	Arequipa
Moquegua.....	42,604	Moquegua
Apurímac.....	177,387	Abancay
Lambayeque.....	124,091	Lambayeque
Total.....	4,599,550	

GOVERNMENT. For political purposes the Republic of Peru is divided into 17 departments and 2 provinces (Callao and Moquegua), and these departments in turn are subdivided into 90 provinces. The present Constitution, based on that of the United States, was proclaimed in 1856 and revised four years later. Under it the executive power is vested in a President, who must be thirty-five years of age, and a native Peruvian, elected by direct vote for four years, and two Vice-Presidents elected for the same period. The President is ineligible for two consecutive terms. He is assisted by six responsible ministers, who hold office at his pleasure, but whose signature is necessary to validate his acts.

The legislative power is vested in a Senate of 48 members and a Chamber of Deputies of 108. The Senators, with the same age and residence qualifications as the President, are elected by departments, the number varying from one to four, according to the number of provinces in the department. The Deputies, Peruvians by birth and citizens of good standing, are elected in the proportion of one for every 30,000 inhabitants or majority fraction, though each province is entitled to one representative even if its population is less than 15,000. Senators must have an annual income of \$1000 and Deputies of \$500, or have a scientific profession. They are elected indirectly by provincial electoral colleges and serve six years.

The judicial power is vested in a Supreme Court of Justice, whose members are elected by Congress from names submitted by the President; superior courts in each department, whose members are appointed by the President; and judges of first instance in each province and local justices in each municipality, appointed by the judges of the superior courts. The conduct of all trials must be public. The executive and police powers of the Republic depend directly upon the President, who appoints the prefects of the various departments and the sub-prefects, who control the provinces. The districts are under Governors appointed by the prefects, and the municipalities under Lieutenant-Governors

appointed by the sub-prefects. All police officials hold directly from the President. Citizenship is restricted by educational and property qualifications. The capital of the Republic is Lima.

ARMY AND NAVY. The army is to be reorganized. It numbers some 4000 men on a peace footing. There is a new military academy near Lima. The navy has four small vessels in more or less bad condition.

HISTORY. Little is clearly ascertainable regarding the early history of the Peruvian Empire, and the lists given of its early sovereigns are by no means to be trusted. Almost all we know of their early history is derived from the traditions of the people, collected by the early Spaniards. (See PERU, ANTIQUITIES OF.) In 1453 Tupac Inca Yupanqui, the eleventh Inca, according to the list given by Garcilaso de la Vega (q.v.), greatly enlarged his widespread dominions. He led his armies southward into Chile, marched over the terrible desert of Atacama, and, penetrating as far south as the river Maule, fixed there the southern boundary of Peru. While thus engaged, his son, the young Huayna Capac (q.v.), heir to the fame as well as the throne of his father, had marched northward to the Amazon, crossed that barrier, and conquered the Kingdom of Quito. In 1475 Huayna Capac ascended the throne, and under him the Empire of the Incas attained to its greatest extent, his sway extending from the valley of the Amazon to Chile and from the shores of the Pacific to the sources of the Paraguay.

About the year 1516, and ten years before the death of Huayna Capac, the first white man had landed on the western shores of South America; but it was not till the year 1531 that Pizarro (q.v.), at the head of a small band of Spanish adventurers, actually invaded Peru. On his death-bed the great Inca had expressed a wish that the Kingdom of Quito should pass to Atahualpa (q.v.), one of his sons by a princess of Quito, and that all his other territories should fall to his legitimate son, Huascar, the heir to the crown, and who, according to the custom of the Incas, should have inherited all its dependencies. Between these two princes, quarrels, resulting in war, arose; and when Pizarro entered Peru he found the country occupied by two rival factions. Atahualpa had completely defeated the forces of his brother, had taken Huascar prisoner, and was now stationed at Caxamalca, on the eastern side of the Andes, whither, with a force of 102 foot soldiers and 62 horsemen and two small falconets or cannon, the dauntless Spanish leader, in September, 1532, set out to meet him. Shortly after the execution of Atahualpa (August, 1533) at Caxamalca the invaders set out for Cuzco. Their strength had been increased by reinforcements, and they now numbered nearly 500 men, of whom about a third were cavalry. They entered the Peruvian capital November 15, 1533, having in the course of their progress toward the city of the Incas had many sharp encounters with the Indians, in all of which their armor, artillery, and cavalry gave them the advantage. At Cuzco they obtained a vast amount of gold, the one object for which the conquest of Peru was undertaken. As at Caxamalca, the articles of gold were for the most part melted down into ingots, and divided among the band. After stripping the palaces and temples of their treasures, Pizarro placed Manco,

a son of the great Huayna Capac, on the throne of the Incas. Leaving a garrison in the capital, he then marched west to the seacoast, with the intention of building a town, from which he could the more easily repel invasion from without, and which should be the future capital of the kingdom. Choosing the banks of the river Rimac, he founded, about six miles from its mouth, the *Ciudad de los Reyes*, 'City of the Kings.' Subsequently its name was changed to Lima, the modified form of the name of the river on which it was placed. The Inca Manco succeeded in effecting his escape, and headed a formidable rising of the natives. Gathering around Cuzco in immense numbers, the natives laid siege to the city, and set it on fire. The city was relieved by the failure of provisions among the besiegers and the departure of the Peruvians for their farms. The advantages, many, though unimportant, which the Inca gained in the course of this siege, were his last triumphs. He afterwards retired to the mountains, where he soon after perished. More formidable, however, to Pizarro than any rising of the natives, was the quarrel between himself and Almagro (q.v.), a soldier of generous disposition, but of fiery temper, who, after Pizarro, held the highest rank among the conquerors. Civil war ensued in which Almagro was defeated and put to death. His followers, however, plotted revenge, and in 1541 Pizarro fell beneath their swords. The son of Almagro then proclaimed himself Governor, but was soon defeated in battle and put to death. In 1542 a council at Valladolid in Spain, called at the instigation of the ecclesiastic Las Casas, who deplored the cruelties committed on the natives, framed a code of laws, known as the 'New Laws for the Indies,' for Mexico and Peru, according to which the Indians who had been enslaved by the Spaniards were virtually declared free men. It was also enacted that the Indians were not to be forced to labor in unhealthy localities, and that whenever they were desired to work in any particular locality they were to be fairly paid. Blasco Nuñez Vela, sent from Spain to enforce the new laws, rendered himself unpopular, and was seized and sent back to Panama. He had come from Spain accompanied by an *audiencia* of four, who now undertook the government. Gonzalo Pizarro (q.v.) was induced to declare himself Captain-General of Peru and marched upon Lima. He was too powerful to withstand, and the *audiencia* elected him Governor as well as Captain-General of the country. Pizarro was overthrown by Pedro de la Gasca and put to death in 1548.

A series of petty quarrels and the tiresome story of the substitution of one ruling functionary for another make up a great part of the history of Peru during the next two centuries. The country became one of the four viceroyalties of Spanish America, and the Spanish authority was fully established and administered by successive viceroys. The Province of Quito was separated from Peru in 1718, and in 1788 considerable territories in the south were detached and formed into the Government of Buenos Ayres. At the outbreak of the War of Independence in South America, Spain, which had declined greatly in internal strength, was distracted by the French invasion and the dissensions of a regency; nevertheless in July, 1816, when the Viceroy Abascal turned over his office to Don Joaquin de la

Pezuela, there was a Spanish army of 23,000 men in Peru and all resistance had apparently been stamped out in Chile, Upper Peru (Bolivia), Quito, and New Granada, Buenos Ayres alone maintaining her independence. Peru was the last of the Spanish South American possessions to set up the standard of independence. In August, 1820, an army under General San Martín, one of the liberators of Chile, landed at Lima, and, after a number of successes both on sea and land, in which the patriots were effectively assisted by Lord Cochrane, General Miller, and other English volunteers, the independence of the country was proclaimed at Lima, July 28, 1821. San Martín assumed the protectorate of the young Republic. By the spring of 1822 he had forced the surrender of the last large body of Spanish troops. At this juncture General Bolívar (q.v.), flushed with his successes in the north, landed at Guayaquil. San Martín, recognizing the dangers of rivalry, arranged a meeting on July 26, 1822, the details of which were never made public, but as a result of which San Martín resigned, and, a year later, retired to England. A Congress was summoned, and on February 28, 1823, Don José de la Riva Agüero was installed as the first President of Peru. Meanwhile the scattered bands of Spanish royalists had managed to collect in the south, around Cuzco, and the agents of Bolívar succeeded in persuading the Congress to depose Riva Agüero. On September 1, 1823, Bolívar landed at Callao and devoted himself to organizing an army. On February 10, 1824, he was appointed supreme dictator by the Congress. For a while the royalists under Canterac made considerable headway, occupying Callao Castle and forcing Bolívar to evacuate Lima. The two armies met on the plains of Junín, where a remarkable battle was fought in which the Peruvian cavalry turned defeat into victory by repeated charges with their lances. The Spaniards retired to Cuzco, where the Viceroy, La Serna, concentrated his forces for a final stand. On December 9th a battle was fought at Ayacucho in which the patriots, under General Sucre, were completely successful, and the Spanish officials and generals, with over three thousand soldiers, surrendered. The guerrilla fighting continued for a while in the north, where General Olañate stubbornly held out until shot by his own troops in April, 1825. In 1826 the Spaniards evacuated Callao and the war was at an end. Bolívar, on February 10, 1825, resigned the dictatorship, but was immediately reappointed, and remained in control of the Government until March, 1827, when he returned to Colombia with his soldiers. On June 4, 1827, a congress met and framed a provisional Constitution, adopted in 1828. General Lamar was elected President. Lamar promptly forced a quarrel with Bolívar, who declared war and defeated him, enforcing a money indemnity and the surrender of Guayaquil. The history of the next thirty-five years is the record of repeated changes in Government, one man after another gaining a personal ascendancy, lasting a few days or years, until some rival took advantage of his mistakes to supplant him. Withal, the state of the country gradually improved, commercially, socially, and intellectually, but with few events of especial interest or importance.

In April, 1864, a Spanish squadron seized the

Chincha Islands in reparation for injuries sustained by Spanish subjects. President Pezet was unwilling to risk a war with Spain, and a treaty of peace was signed in January, 1865. The action of the President aroused bitter opposition in the country; he was declared a traitor by the Assembly, and in February a revolution broke out which ended in the overthrow of Pezet and the proclamation of Mariano Ignacio Prado as dictator (November 26, 1865). An alliance against Spain was concluded with Chile, Ecuador, and Bolivia, war being declared in January, 1866. On May 2, 1866, a Spanish fleet bombarded Callao, but was compelled to withdraw. This marked the termination of hostilities. In 1879 Peru as the ally of Bolivia became involved in war with Chile. (See BOLIVIA; CHILE.) In October, 1879, the Peruvian man-of-war *Huascar* was captured by the Chilean fleet, and on November 19th the forces of Bolivia and Peru were overwhelmed at Dolores. A Chilean army under General Baquedano captured Moquegua and Tacna, two important cities in Southern Peru, in March and May, 1880. Early in June the same general carried the almost impregnable stronghold of Arica by storm, thus gaining possession of the whole of Southern Peru. In the meantime the Chilean fleet was blockading or pillaging the Northern Peruvian seaports. The Peruvians refusing to accede to the terms for peace dictated by Chile, Baquedano organized an expedition against Lima. This expedition started in November, by water, and landed at Pisco and Curayaco, about 200 miles south of Lima. With an army 30,000 strong, the Chilean general marched on the capital, spreading devastation along the way. The Peruvians were defeated at Chorillos on January 13, 1881, and at Miraflores on January 15th, and on January 17th the Chileans made their entry into Lima. Capt. Patrick Lynch, the leader in a raid which had devastated the northern coast towns, was appointed Chilean commandant of the town. After the fall of Lima desultory fighting continued until a treaty of peace was concluded, October 20, 1883. Peru ceded to Chile the District of Tarapacá and the Territories of Tacna and Arica for a term of ten years; the people of these territories to decide by popular vote whether they wished to return to Peru or to remain under Chilean rule. This term was further extended, Chile apparently distrusting the result of the plebiscite, and the territory has become practically Chilean. The war left Peru in a shattered and bankrupt condition, from which it has very slowly recovered. Boundary disputes, especially with Chile, have arisen periodically to threaten the peace relations.

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PERU'. A city in LaSalle County, Ill., about 60 miles north-northeast of Peoria; at the head of navigation on the Illinois River, on the Illinois and Michigan Canal, and on the Chicago, Rock Island and Pacific Railroad (Map: Illinois, C 2). Picturesquely situated, it has a public square and public parks, and is the seat of Saint Bede College (Roman Catholic), opened in 1891. Among the prominent buildings are Turner Hall and the Masonic Building. There are four bridges here, including a fine railroad bridge. Peru is the centre of valuable bituminous coal fields and of extensive deposits of cement rock and white sand rock. Its industrial establishments include large zinc-rolling mills and furnaces, a foundry and machine shop, scale works, plow and wheel works, clock works, breweries, grain elevators, nickeloid works, a planing mill, and fertilizer works. The government is administered under a charter of 1890, by a mayor elected every two years, and a council. The water-works and the electric light plant are owned and operated by the municipality. Peru was first settled in 1827 and laid out in 1834. In 1852 it was chartered as a city. For the archaeologist, the vicinity presents much interest, as there are relics of the Mound Builders. Population, in 1890, 5550; in 1900, 6863.

PERU. A city and the county-seat of Miami County, Ind., 75 miles north of Indianapolis; on the Wabash River, and on the Wabash, the Lake Erie and Western, and the Cincinnati, Richmond and Muncie railroads (Map: Indiana, C 2). Five bridges span the river at this point. The city has a public library, the Wabash Railroad Hospital, a sanatorium, and Boyd Park. It derives considerable trade from the tributary country, which is largely agricultural. There are railroad shops of the Erie, and of the Cincinnati, Richmond and Muncie, carbon works, woolen mills, basket factory, bagging mills, glass works, steel works, a cabinet factory, wagon shops, a candy factory, etc. Peru, incorporated in 1848, is now governed under a charter of 1868 which provides for a mayor, elected biennially, and a council. There are municipal water-works and a municipal electric light plant. Population, in 1890, 7028; in 1900, 8463.

PERU BALSAM. See BALSAM OF PERU.

PERUGIA, pā-rōō'jā. The capital of the Province of Perugia, Italy, situated on picturesque hills between the Tiber and Lago Trasimeno, at an altitude of 1700 feet above the sea, 103 miles by rail southeast of Florence, and the same distance north of Rome (Map: Italy, G 4). Its situation is beautiful, offering delightful views of the Umbrian and Foligno valleys, and of the Tiber and the Apennines. Its mediæval appearance also is attractive and interesting. It has many striking edifices dating from its glorious days at the beginning of the Renaissance period, and numerous art treasures, but is not nearly so much frequented as Orvieto and Siena, with their famous cathedrals.

Perugia is irregularly laid out. Many of its substructures belong to the ancient Etruscan town. It possesses ample squares and pleasant grounds. The unfinished Gothic Cathedral of San Lorenzo is not very striking, although of the Renaissance period. The most valuable of its varied contents is Signorelli's "Madonna with John the Baptist." Its library possesses ancient and costly manuscripts. The Oratorio di San Bernardino has a multi-colored early Renaissance façade. The San Domenico is a fine Gothic church which has been attributed to Giovanni Pisano. It was rebuilt in 1614, and contains the elaborate and celebrated monument to Benedict XI. The Basilica San Pietro de' Cassinensi in the vicinity is also notable. It was constructed about 1000. It contains noteworthy pictures by Perugino, Caravaggio, and others, and has rich choir stalls in walnut. The notable old secular edifices of Perugia include the fine Collegio del Cambio, with its celebrated mural paintings of the Chief Virtues by Perugino—his finest fresco—and other artistic features, all in the best Renaissance. The immense Palazzo del Municipio, dating from 1281, is in Italian Gothic with two façades. It has been latterly restored, and is elaborately embellished with ancient sculptures, etc. Under its roof are the Vannucci picture gallery (municipal), a valuable collection of ancient Umbrian works taken from suppressed religious institutions, and the public library, with over 30,000 volumes and some rare mediæval manuscripts.

The finest section of the picture gallery is the Sala del Pinturicchio, with examples by Perugino and Pinturicchio. The College of San Severo is a notable ancient building, formerly a cloister. Here Raphael, who had been a pupil of Perugino, painted his first fresco in 1505. It is now in a spoiled condition. Among the attractive modern buildings are the arcaded Prefettura. In the centre of the modern city is a fine bronze equestrian statue of Victor Emmanuel II. Perugia has also a bronze statue of Julius III., a monument to Garibaldi, and a monument to the soldiers who fell for freedom in 1859. There are, besides, the beautiful Maggiore fountain, dating from the close of the thirteenth century and bearing reliefs by Nicola and Giovanni Pisano; the striking Roman Arch of Augustus, constructed in the third century of our era, and still one of the gateways of the city; and the house where Perugino dwelt.

The famous 'free' University of Perugia, founded in 1320, is now in a state of decline. It had, in 1901, two faculties, 26 teachers, and 320 students. Its library possesses 20,000 volumes. In addition there may be mentioned an Art History collection and a Botanic Garden, and the valua-

ble university collection of Etruscan, Roman, and mediæval antiquities. There are in the city a lyceum, a gymnasium, a technical school, a seminary, an academy of fine arts, and an economic-agrarian institution. A large orphan asylum is the chief of its benevolent institutions. There are factories of silk goods, velvet, and spirits. In the commerce figure chiefly grain, wine, and oil. Three miles southeast of the city lies the Etruscan necropolis of Perugia, discovered in 1840, with remarkable tombs including the sepulchre of the Volumnii. Population in 1901, 61,385.

Perugia (anciently called *Perusia*) was one of the twelve important Etruscan League cities. It became Roman in B.C. 309. In B.C. 41-40 it was unsuccessfully held by the partisans of Antonius against Octavius (Perusian War). It was destroyed by Octavius and then rebuilt by him. It was again destroyed by Totila after a siege of seven years. Early in the Middle Ages it fell under the dominion of the popes, but it afterwards enjoyed a long period of independence, and at the close of the Middle Ages ruled Umbria. About the middle of the sixteenth century it was incorporated in the Papal States. It passed to the Sardinians in 1860 and became a part of the new Kingdom of Italy. Consult: Symonds and Gordon, *The Story of Perugia* (London, 1898); Cruickshank, *The Umbrian Towns* (ib., 1901).

PERUGIA, LAKE OF. A lake in Italy. See TRASIMENO, LAKE.

PERUGINO, pā'rōō-jē'nō. **PIETRO**, properly **PIETRO VANNUCCI** (1446-1523). An Italian painter, one of the chief masters of the Umbrian Schools during the earlier Renaissance. Born at Città della Pieve, a mountain town near Perugia. In 1446, Perugino was the natural heir of the traditions of the Umbrian School, the leading note of which was the atmosphere of sentiment and mystic poetry, which found its best expression in the portrayal of the ideals of devotional art. In 1455 he was apprenticed to a Perugian artist, probably Fiorenzo di Lorenzo, whose influence is manifest in his work. Benedetto Buonfiglio and Niccolò da Foligno have likewise been credited with his tutelage. According to Vasari, Perugino completed his studies under Verrocchio at Florence, but this seems unlikely in view of the severe tactile tendencies of Verrocchio's art and the unvarying Umbrian characteristics exhibited in Perugino's work. His first public commission was received in 1475 and related to the execution of certain frescoes for the Palazzo Comunale in Perugia. From this time his rise was rapid, and when, in 1480, Sixtus IV. gathered together the best artistic talent in Tuscany and Umbria to embellish his newly completed chapel with fresco, although the company included such men as Rosselli, Ghirlandajo, and Botticelli, the major works were assigned to Perugino. The most important of these Sistine creations is the "Delivery of the Keys to St. Peter," a work showing great breadth of treatment, and peculiarly typical of his methods of bringing out the effects of space and atmosphere. The accurate knowledge of perspective, the feeling for the true values of distance, and the balancing and relation of these values make the work of Perugino peculiarly significant in view of the fact that these very elements of space composition were fundamental in the works of his pupil Raphael.

Perugino led a wandering life, but after 1502 he worked mostly in Florence, where he married and purchased a house, while retaining his citizenship in Perugia. In 1450 Perugino finished the decoration of the Sala del Cambio, Perugia, with frescoes allegorical of "Fortitude," "Temperance," "Justice," and "Prudence," and sacred subjects like "God, the Father," the "Nativity," and "Transfiguration." This work marks the height of his art. The "Marriage of the Virgin," now in the museum at Caen, belongs to this time. Painted for the cathedral at Perugia, it was the model of Raphael's production of the same subject. The most remarkable of Perugino's mural paintings, excepting those noted above, are the fresco of "Crucifixion," Santa Maria Maddalena, Florence (1492-1496), those at Città della Pieve, Panicale, Spello, and Trevi. Among the altar pieces may be selected "Virgin Enthroned" (1496), in the Vatican; the "Annunciation," Fano (1487); "Crucifixion," "Gethsemane," and "Assumption" (1500), from Vallombrosa, now in the Florence Academy; "The Vision of Saint Bernard," at Munich; the triptych painted for the Certosa, near Pavia, now in the National Gallery, London. His heads of "Two Monks of Vallombrosa" (Florence Academy) show him as a portraitist of high ability. His later pictures, of which he produced large numbers, show decline. The artist's last work, the "Nativity" (1522) from Fontignano, is now in the South Kensington Museum. He died of the plague at Castello di Fontignano in 1523.

Consult: Mezzanotte, *Della vita e delle opere di Pietro Vannucci* (Perugia, 1836); Jubinal, *Perugin, sa vie et ses œuvres* (Saint Germain, 1867); Braghirolli, *Notizie e documenti inediti intorno a Pietro Vannucci detto il Perugino* (Perugia, 1874); Caletti, *Lo stile di Perugino* (Bologna, 1887); Williamson, *Perugino* (London, 1900).

PERUVIAN ANTIQUITIES. The social structure of Peru was not unlike that of the more primitive tribes to the north. There was a head chief or Inca, who had an advisory council elected by the various clans or gentes of the people. The office of Inca was hereditary in the female line.

The religion was based upon the worship of the sun as the supreme god, who according to the Peruvians had three sons: Kon or Viracocha, Pachacamac, and Manco Capac, the last the founder of the Incan Empire. It is, however, probable that the myths of Viracocha and Pachacamac antedate the Incas. Legend says that Viracocha signifies Foam of the Lake or Sea. One day he arose out of the waters of Lake Titicaca and created the sun, moon, and stars. He made stone statues, and, putting life into them, commanded them to follow him to Cuzco. After setting Allica Vica, the ancestor of the Incas, over them he disappeared in the water.

Pachacamac signifies 'He who animates the universe.' He was regarded as the being who created and ruled the world. In the valley of Rimac a vast temple was erected to this invisible god.

Next to the sun the Incas worshiped the moon, his sister and consort. Cuycha, the rainbow, was venerated as the servant of the sun and moon; Chasca, the planet Venus, as the page of the sun. The Pleiades were the next most venerated.

Fire was worshiped as coming from the sun, and thunder as his servant. After these were many minor deities and *canopas*, which last correspond to the Lares and Penates of the Romans. The bloody rites so frequent in Mexico and Yucatan were unknown in Peru.

The Peruvians believed in the existence of the soul after death, and also in the resurrection of the body. The good were to live a life of luxury and ease; the wicked must expiate their crimes by ages of wearisome labor.

The Empire of the Incas was a perfect theocracy. The reigning Inca was not merely the representative of divinity; he was divinity itself, the law, and the law-giver, the violation of whose ordinance was sacrilege. The Inca appointed the chief priest, who in turn nominated all his subordinates. All the higher offices were filled by members of the Inca family. The virgins of the sun were young maidens dedicated to the service of the deity. They dwelt in convents under the charge of elderly matrons. These holy virgins were occupied in weaving the fine wool of the vicuña into garments for the Inca and hangings for the temples. In the houses of the virgins of the sun at Cuzco all the inmates, said to number 1500, were of royal blood. These virgins of the sun were brides of the Inca, and at marriageable age the most beautiful were transferred to the royal seraglio. The great nobles were also allowed a plurality of wives. At an appointed day of each year all those of marriageable age were called together in the great squares, throughout the Empire. The marriage ceremony consisted in joining the hands of the couples to be united. The Inca performed this ceremony for his own kindred, pronouncing them man and wife. His *curacas* performed a like office for those of inferior rank. Land was allotted to the newly wedded pair for their maintenance, and a dwelling was built at the charge of the district.

The land was parceled out to the various clans by whom it was owned in common, and under the wise system of administration every one not incapacitated by age or other infirmity was obliged to be a producer. Agriculture was the basis of prosperity and was carried on carefully and thoroughly, with division of labor, irrigation, manuring, and terracing of rocky slopes, to make every tillable acre yield its full return. Their chief crops were maize, potatoes, yucca, quinoa, and cotton. Much attention was given to irrigation, aqueducts and canals crossing the low lands in all directions like a vast network. Dogs were kept as elsewhere, besides monkeys, birds, and guinea pigs, and the llama had been domesticated as a beast of burden and for its hair, from which, as well as from native cotton, were spun and woven the fabrics in common use.

Peruvian architectural structures composed of stone were characterized by simplicity, symmetry, and solidity. These stones, often huge boulders, were put together without mortar, but so exactly cut and fitted to each other that the blade of a penknife could not be forced between them. The Peruvians excelled as road-builders. Remains of many of these roads exist, the most important ones extended from Quito to Cuzco, and, diverging, continued in a southerly direction. In places galleries were cut, for miles, through solid rock, rivers crossed by swinging bridges, and ravines filled up with solid masonry. It is estimated that some of these roads, which were used

principally for military purposes, were from 1500 to 2000 miles in length.

In the manufacture of textile fabrics the Peruvians stand unrivaled among ancient peoples, being acquainted with every style of weaving known to-day. Some of their tapestry, in the excellence and finish of the weaving and beauty of the colors and designs, has probably never been excelled. They showed a degree of skill in other mechanical arts similar to that displayed in their manufacture of cloth. They have left behind them many remarkable evidences of their knowledge in working metals. They were familiar with the processes of smelting, casting in molds, hammering, and soldering. Tools and various objects of bronze were in use. In the ancient tombs have been found many elegant and curious objects of gold and silver, vases, cups, bracelets, collars, and personal ornaments. Emeralds they possessed in considerable quantity and these they cut with great skill. In the manufacture of pottery they attained to a high degree of excellence. Many of these vessels are beautiful in outline. Often they represent the human form or that of some familiar object or animal, and in the firing and decoration they show an advanced stage in the potter's art.

In music they had reached considerable proficiency, judging by the number and variety of the musical instruments left behind them. Among these are Pan-pipes, flutes of cane and bone, clay trumpets, trumpets of shell, bells of bronze and copper, and a great variety of whistles, capable of yielding a scale of several tones. It does not appear that they ever reached the more advanced stage of stringed instruments. Of the character of their vocal music we know nothing.

They had considerable knowledge of medicine and surgery, employing bleeding and purging. In astronomy they had made some progress, dividing the year into twelve lunar months. They also had weeks, but of how many days is uncertain. As their lunar year would necessarily fall short of the true time, they corrected their calendar by solar observations made by means of columns raised on the high lands at Cuzco. These served them for taking azimuths, and by measuring their shadows they ascertained the exact times of the solstices. The period of the equinoxes was determined by the help of a solitary pillar.

The ancient Peruvians, having no written language, made use of the *Quipu*, a device consisting of a main cord with others of different colors depending from it like a fringe. Each color denoted some object or abstract idea. *Quipu* signifies a knot. Knots tied in the depending cords served as ciphers, and by tying them at different distances from the main cord and from each other, they could be made to represent numbers to any amount required. These knotted cords were also used as mnemonic aids. There was also a considerable body of song, legend, and drama handed down by oral tradition. Among these the drama of *Ollanta*, committed to writing soon after the Conquest, has been translated into several languages.

The burial customs varied in different parts of the country. Believing in the resurrection of the body, the same care was everywhere exercised to preserve it. The mummies, or more strictly speaking the desiccated bodies of the dead, owe their preservation to the exceedingly dry and

rarefied atmosphere of the mountains or the dry nitrous sand of the coast regions. In preparing the body for the grave, it was commonly placed in a sitting posture, with the knees drawn up and the chin and hands resting upon them. In the extreme northwestern part of Peru the body was buried in an extended position. The mummies of the better class were often covered with wrappings of fine cotton cloth; over this were ponchos and blankets made of the wool of the alpaca and vicuña. With them were placed vases of elegant design, and often objects of gold and silver. The ceremonies of the poor are scanty and mean, and the objects buried with them of inferior quality. Food was always placed with the dead, and generally the objects most prized in life. The last resting place varied with the locality. In some places vast mounds, penetrated by galleries, were raised over the dead. In others mummies are found in little vaults or chambers of adobe, roofed with sticks or canes, often containing four or five bodies. In the Callao and parts of Bolivia the burials were in stone chulpas or burial towers.

Scattered over the country are extensive ruins of ancient temples, convents, palaces, and burial places, many of which undoubtedly long antedate the Incan Empire.

The ruins of the so-called temple, convent, and palace at Tiahuanaco, near the southern extremity of Lake Titicaca, in Bolivia, are good examples of pre-Incan remains. Although but few stones of the structures are in position, enough remain to show their character and size. In these buildings copper clamps were used to hold the stones in position. The temple was rectangular in form, 445 by 388 feet. Here also is the famous monolithic doorway. The stone is 13 feet 5 inches long, 7 feet 2 inches high, and 18 inches thick. Through this is cut the doorway, 4 feet 6 inches high and 2 feet 9 inches wide. Scattered about the ruins are blocks of sandstone, trachyte, and basalt, many of them symmetrically cut and elegantly decorated. When Tiahuanaco was first visited by Europeans these structures had been in ruins for such a length of time that even native traditions were silent as to their builders.

At Pachacamac (q.v.) the Incas erected a magnificent Temple of the Sun, a House of the Virgins of the Sun, and a temple to Pachacamac. The temple was rifled of a vast amount of gold and silver by the Spaniards.

On the islands of Titicaca and Coati, in Lake Titicaca, are a number of famous ruins. The island of Titicaca was dedicated to the sun, and was the sacred island of Peru. Its most notable ruins are those of the Palace of the Incas, the Storehouse of the Sun, and the Bath or Fountain of the Incas. The Temple, a stone building 51 by 44 feet, and two stories high, is in a fair state of preservation. The walls were covered inside and out with stucco, and painted, as may be seen by patches still remaining on the stones. The large stone edifice called the Storehouse by the early chroniclers gained its title from the darkness of its small rooms and connecting passages, which precluded the idea that it had been used as a habitation. The Bath or Fountain has suffered but little from time. It is a pool 40 by 100 feet, and 5 feet deep, paved with worked stones and fed by four streams of water from openings cut in the stone.

On the island of Coati (dedicated to the moon) are two groups of ruins. The principal of these,

the Palace of the Virgins of the Sun, is in a fair state of preservation. It is rectangular in form, 183 feet long by 80 broad. The structure, built of roughly cut stones, was two stories high. The first story is divided into thirty-five apartments of various sizes. The floors of the upper rooms, which were probably of wood, have disappeared. The second group consists of stone buildings with narrow passages between them. These and similar buildings on Titicaca are believed to have been used for ceremonies through which pilgrims were obliged to pass before visiting the sacred shrines.

At Cuzco the Temple of the Sun was said to have been the most imposing edifice in all Peru. Existing remains confirm the accounts of the early chroniclers. Surrounding the Temple were other buildings, dedicated to the Moon, Venus, the Pleiades, the Thunder and Lightning, and the Rainbow.

Among the other notable ruins of Peru may be mentioned those of the ancient city of Chimú, consisting of a labyrinth of ruined walls, dwellings and other structures, and gigantic *huacas*, or burial places; Sillustani with its *chulpas* or stone burial towers and sun-circle; the great fortress in the valley of Castete, near Lima; those of Hervai, in the valley of Huarco (also near Lima), including a temple said to have been dedicated to the oracle-deity, Rimac; the rock tombs of Ollantaytambo, these tombs being excavations, natural or artificial, in the face of a high cliff, within which the dead were placed and walled up with stones, stuccoed over and painted. Here also are the ancient porphyry quarries, and the remains of numerous Inca walls and structures.

Consult: Raimondi, *El Perú* (Lima, 1874-1902); Paz Soldán, *Diccionario geográfico-estadístico del Perú* (ib., 1879); Markham, *Cuzco and Lima* (London, 1858); id., trans., *Travels of Cieza de Leon* (ib., 1864); id., *Peru* (ib., 1881); Squier, *Observations on the Geography and Archæology of Peru* (New York, 1870); id., *Travels and Exploration in the Land of the Incas* (New York, 1877); Chérot, *Le Pérou* (Paris, 1876); Wiener, *Pérou et Bolivie* (ib., 1880); Bates, *Central and South America* (London, 1882); Middendorf, *Peru: Beobachtungen und Studien, etc.* (Berlin, 1893); Haëke, *Description del Perú* (Lima, 1901); and the writings of Ischudi. For the history: Garcilaso de la Vega, *Royal Commentaries of Peru*, trans. by Markham (London, 1869); Prescott, *History of the Conquest of Peru* (Philadelphia, 1868); Markham, *The War Between Peru and Chili, 1879-81* (London, 1883); id., *A History of Peru* (ib., 1892).

PERUVIAN ARCHÆOLOGY. The Spanish Conquest came at the height of the power of the Incas in Peru. This people was of Quichua stock and they had conquered the tribes of the present country as well as those of Bolivia, Ecuador, and Chile, and had subjected them to their remarkable organization. The Incas, at their beginning a clan of the Aymara, had their ancestral seats on the shores of Titicaca, where they built a number of cities, the greatest of which was Tiahuanaco. Comparatively few in number, they moved north and settled in the valley of Huilcamayo. After taking Cuzco, the home of an earlier culture, they grew more powerful, and began their conquest about the year 1200. At first stone-

worshippers, they later became sun-worshippers, and fixed this cult upon the people whom they subjugated. The success of the Incas was due to their despotic commune, by which they fixed the people to the soil, and in return for the regulated labor of all insured the well-being of each. The organization consisted of a priest-king, a council, hierarchy, rulers of districts, and grades of officials. The growth of Inca power occupied about three centuries, and since their history is somewhat well known they occupy a disproportionate station among the peoples of Peru. It is known that other civilizations preceded that of the Incas to which they merely superadded their peculiar organization.

There are three well-marked races in Peru, which are associated with three civilizations. Of these the Kechua or Quichua (q.v.) occupied the region from the river Andasmayo, above Quito, to the Rio Maure in Chile, except a narrow area extending from the basin of Lake Titicaca to the coast. They were an inland people, living in the high mountain valleys, the basin of Titicaca, the Collao, and on the eastern slopes of the Andes, above the forested zone, from which they were excluded by the wild tribes. The Aymara (q.v.), who preponderate among the existing Indians of Peru, are of Guichuan stock. A second civilization displaced by the Incas is that of the Quito Kingdom of Ecuador, which was the northernmost extent of the Inca dominion, and whose inhabitants were the Cara of early writers. A third civilization was that of the Muchik, called Yunga by the Incas and Chimú by the Spaniards, of which Pachacamac (q.v.) was an important city. The Chimú kingdom extended from the Gulf of Guayaquil south to Callao, the port of Lima; also south of this was the domain of another related people and civilization.

It seems probable that the oldest civilization in Peru existed in the Collao south of Lake Titicaca, where are found the rude stone circles and dolmens of Sillustani, which resemble the monuments of Northern Europe. (See MEGALITHIC MONUMENTS.) It is thought by some writers that the authors of the highland culture came from the south, settling in the Collao, hunting the huanaco and practicing rude agriculture, and spreading into the basin of Titicaca, which has a prominent place in Peruvian origin myths. Thence they spread throughout the mountain region, having domesticated the llama and occupying the lower valleys for the purpose of raising maize. In the highland region are found the numerous evidences of Quichua greatness; the stupendous and elaborate ruins of Tiahuanaco (q.v.) and Pumapungu; the tombs of Sipa in the Santa Valley, formed out of cubical blocks of stone; Huanaco, where is a temple of five stories of rooms and corridors close against a mountain wall, and built of great blocks of carefully dressed stone laid in mortar, and adorned with statues; the statues of Chavin, like those of San Augustin in Colombia; the remarkable square or round *chulpa* or burial towers, found about Umayo Lake, in the Collao, and in Bolivia.

Quichua architecture is expressed in massive stone furnished by the environment, and grades from the rude monolithic structures of the Collao to the finely constructed and finished Temple of the Sun at Cuzco, at the best period. In plan the buildings were rectangular, inclosing rooms, or with rooms surrounding a court. There were

few external openings, except the doors, so that the walls had a blank appearance, unrelieved with sculpture or ornament. The door jambs lean toward each other so that the threshold is wider than the lintel. This feature is invariable in Inca architecture. The non-use of the arch and the lack of timber did not prevent the erection of buildings of more than one story. The pitched roofs were probably of cane, thatched with reeds and grass. The houses of the people were flimsy structures that have not survived. In many places rock masses have been modified in a remarkable manner, the most common form being the so-called seats, which are single or in tiers. No obstacles seem to have balked the highland Peruvians; with their bruising tools of stone they shaped granite hills, tunneling, cutting steps, platforms, fountains, or tombs as they saw fit; at this day it is difficult to see the purpose of many of their works. One of the most complicated of these sculptures, thought to be a hygrometric observatory, is found at Quenco, near Cuzco. On the same grand scale are the reservoirs, baths, fountains, and aqueducts; the terraced fields, called *andenes*, covering the mountain sides; bridges, roads, and road inns or *tambos*; fortresses, prisons; sun dials, rock tombs, and *chulpa* tombs, which prevail in the track of the ancient highland civilization. On the objects connected with daily life, rather than in architectural decoration, this people lavished the art of the metal-worker, potter, and weaver, producing many designs expressive of a luxuriant fancy, but rarely showing a sense of the beautiful.

The coast peoples, the principal of which were the Yungas, occupied the hot valleys near the Pacific. Their country extended from the Gulf of Guayaquil south to Callao, but south of this was another related people in the same culture plane. They had solved the problems of the arid region by dividing the channels of the rivers and by other irrigation works, some of which are in use to this day by Peruvian planters. Guano, brought from the islands, was used to fertilize their fields, a practice which the Incas adopted from them. They also had boats of reeds provided with sails, and made in them considerable voyages along the coast. The highland people had such boats on Lake Titicaca, and it is believed that they were derived from the coast tribes. The coast civilization was ancient, and had begun to fade away long before the Incas became prominent on the highland. The last political organization of the coast was the Chimú kingdom, whose capital was Chanchán, or Gran Chimú, near Trujillo, the ruins of whose principal buildings cover about 250 acres, but the remains of other works thickly cover a plain six by twelve miles in extent. This city, which may be taken as typical of the coast culture, was laid out in the form of a long parallelogram, extending inland from the sea. The material used for construction is adobe formed in large blocks; stone is used sparingly in minor details. This, it will be observed, is earthquake construction, the coast suffering from violent earth movements. The city was divided into squares by cross streets: large buildings of labyrinthine plan, with a court and numerous rooms, the whole structure having a single entrance, occupied many of the squares; others were occupied by great palaces. Excavations have shown that the inclosed labyrinths or wards were the quarters of the artificers of Chimú and were in effect

fortresses, probably each assigned to a different trade. The walls of Chimú have broad foundations of stone, the superstructure of adobe bricks, the walls narrowing toward the top. Decoration was by frescoes, rustic work, or by laying the adobes in checker, lattice, or arabesque patterns. The roofs were of cane, and a few beams of algaroba wood have been found in the ceilings of chambers.

On the plain of Chimú may be seen the embankment of the aqueduct supplying the city with water, its terminals leading to the fields and into the city. Sunken gardens made by clearing away the soil down to the moist layer are numerous. The most prominent landmarks on the plain are the three pyramidal cemeteries. These are cellular structures built of adobe and stone. The largest covers an area 580 feet square, or eight acres, and is 150 feet high.

In material civilization the Peruvians stand first among the aborigines of this hemisphere, but in intellectual progress they fall below the Mexicans, especially in the lack of writing, of which the *quipus* of knotted cords of different color poorly took the place. They had some knowledge of astronomy and metrology; the balance, it appears, was used. Their surgical knowledge is shown by the successful trephining practiced.

Artificial deformation of the skull was extensively practiced. The people were of low stature (1600 cm., 5 feet 3 inches), thickset and strong, not differing in this respect from the present Peruvian Indians.

Consult: Tschudi, *Travels in Peru* (Eng. trans., New York, 1849); Squier, *Peru* (1853); Salcamahuya, *An Account of the Antiquities of Peru* (London, 1873); Wiener, *Pérou et Bolivie* (Paris, 1874); Reiss and Stübel, *Das Totenfeld von Ancon in Peru* (Berlin, 1880-1887); Brinton, *The American Race* (New York, 1891); Markham, *Cuzco* (London, 1856); id., *Narrative of the Rites and Laws of the Incas* (ib., 1873); id., *A History of Peru* (Chicago, 1892); Winsor, *Narrative and Critical History*, vols. i. and ii.; Stübel and Uhle, *Die Ruinenstätte von Tiahuanaco* (Breslau, 1893); McGee and Muniz, *Primitive Trephining in Peru* (16th Annual Report of the Bureau of American Ethnology, Washington, 1897); Nadaillac, *Prehistoric America*, Eng. trans. (New York, 1893); Baessler, *Ancient Peruvian Art* (ib., 1903).

PERUVIAN BARK. See CINCHONA.

PERUZZI, pà-rōt'sè. BALDASSARE (1481-1536). An Italian architect and painter, the most gifted artist of the High Renaissance. He was born at Volterra, near Siena, January 6, 1481. Little is known of his early career, but from his work it is probable that he followed Il Sodoma and Pinturicchio in painting. In 1504 he went to Rome and speedily distinguished himself in frescoes in Sant' Onofrio—in the Vatican (ceiling of the Camera del Eliodoro)—and Santa Maria della Pace. Aided by Agostino Chigi, Baldassare studied the treasures of Rome, especially its architecture, and encouraged by Bramante, then in charge of the construction of Saint Peter's, became skilled in the elements of architectural design and composition. It is notable that in his detail especially he reflects the grace and sentiment of Umbria in his choice of profiles and ornament *motifs*, discarding the mechanized forms of Roman detail of the time of the Empire.

and choosing as his models the types used in the buildings of the Republic—forms which exhibit a delicacy of proportion and a pleasing individuality. In 1516 he designed for Agostino Chigi the Villa Farnesina, which was destined to become famous through the frescoes of Raphael and his school. The admirable frescoes on the ceiling of the room containing Raphael's Galathea are after his designs. In 1520 Leo X. appointed him, as the successor of Raphael, architect of Saint Peter's, and in 1525 he designed the Ossoli Palace, which shows an evident advance in the principles of planning. At the sack of Rome in 1527 Peruzzi was forced to paint a portrait of Bourbon, but upon its completion escaped to Siena, where he was made the city architect and superintended the construction of the Sienese fortifications. At this time he executed a number of frescoes and panel paintings, among which was the well-known "Augustus and the Sibyl" in the Church of Fontegiusta (Siena). His paintings are decorative in character, even to the sacrifice of truth to nature; they show the influence of Raphael and Michelangelo, and are apt to be mannered.

In 1532 he returned to Rome and commenced the building of the Massimi Palace, his architectural masterpiece, both in its general proportions and the variety of the detail and ornament. He carried on this work until his death in 1536, caused, according to tradition, by poison given by those envious of his position as architect of Saint Peter's.

Consult: Letarouilly, *Edifices de Rome moderne* (Paris, 1840-57); Donati, *Elogio di Baldassare Peruzzi* (Siena, 1879); Weese, *Baldassare Peruzzi's Anteil an dem malerischen Schmucke der Villa Farnesina* (Leipzig, 1894).

PERUZZI, UBALDINO (1822-91). An Italian statesman, born in Florence. After pursuing the study of law at Siena, he went to Paris and Freiberg, where he devoted himself to the subjects of mathematics and mining. In 1848 he was appointed Gonfaloniere (chief magistrate) of Florence, but was removed in 1850 on account of his outspoken opposition to the reactionary policy of the Tuscan Government. He remained a warm advocate of liberal ideas and after the revolution of April, 1859, became a member of the provisional Government. After the annexation of Tuscany to the dominions of Victor Emanuel, he was elected from Florence to the new Italian Parliament (1860). In 1861 he was Minister of Public Works under Cavour, and he continued in office under Ricasoli. Afterwards he held the post of Minister of the Interior in the Farini and Minghetti Cabinets. With Minghetti he went out of office in 1864, and thereafter acted as one of the Liberal leaders in Parliament.

PER VIGILUM VEN'ERIS (Lat., Night Watch of Venus). An anonymous poem of 93 lines, dating from the second or third century A.D., celebrating the power of Venus and referring to a nocturnal festival in her honor. It has been edited by Bücheler (Leipzig, 1859).

PESADO, PÁ-SÍ-NÓ, JOSÉ JOAQUÍN (c.1812-61). A Mexican poet and politician, born at San Augustin del Palmar. He was chiefly self-educated while living in Orizaba as a young man, became proficient in languages, science, and philosophy, entered politics in 1833 as member of the Vera Cruz Legislature, and five years afterwards was

made Minister of the Interior. In 1854 he gave up his post as Foreign Minister, which he had held for eight years, to become professor of belles-lettres in the University of Mexico. He became joint editor of the paper *La Oposición* in 1834, and wrote a novelette directed against the Inquisition, though religious subjects and Catholic sentiment prevail in his poems. Besides a collection of them, *Poesías originales y traducidas* (1839; 3d ed., 1886), he published a fragment, *La revelación* (1856), and a Spanish version of part of Tasso's *Gerusalemme liberata* (1860).

PESARO, PÁ-ZÁ-RÓ. The capital of the Province of Pesaro e Urbino, Italy, situated at the mouth of the Foglia, on the Adriatic, and on the Bologna-Ancona Railroad, 20 miles northeast of Urbino (Map: Italy, G 4). It has broad streets, and is still partly surrounded by walls. Its fifteenth-century castle is now used as a prison. There are an old cathedral and a new cathedral, several palaces, including that of the dukes of Urbino, a public library of 35,000 volumes, a museum with collections of paintings and antiquities, a technical institute, and a musical lyceum, founded by Rossini, who was born here. The industries are silk-spinning, ship-building, and manufactures of ironware, earthenware, and machinery. There is a brisk shipping trade in figs, wine, oil, hides, grain, and cheese. Population (commune), in 1881, 20,909; in 1901, 25,103. Pesaro, the *Pisaurum* of the Romans, was founded in B.C. 184. It was destroyed by the Goths and restored by Belisarius and later formed a part of the Pentapolis. Pepin presented it to the Papacy. It came at the end of the thirteenth century under the rule of the Malatesta family, who sold it to the Sforza family in 1445. It was subsequently ruled by the Rovere dynasty of Urbino. In 1631 it reverted to the States of the Church, and since 1860 has formed a part of United Italy.

PESCADORES, PÉS-KÁ-NÓ-RÁS. A group of small basaltic islands situated off the western coast of the Japanese island of Formosa and on the Tropic of Cancer (Map: Japan, D 8). They cover an area of about 85 square miles and are mostly flat and barren. The largest of the group, Hokoto, has a good harbor. The inhabitants are engaged principally in fishing, and dried fish is the only export. Population, in 1898, 40,288, chiefly Chinese. The group was ceded to Japan, together with Formosa, in 1895, and is now an administrative dependency of Formosa.

PESCARA, PÉS-KÁ-RÁ, FERNANDO FRANCESCO D'AVALOS, Marquis of (c.1489-1525). A Neapolitan general in the Spanish service. He was taken prisoner by the French at the battle of Ravenna in 1512. During his captivity he composed poems addressed to his wife, Vittoria Colonna. Being soon after ransomed, he took part in several minor battles and contributed greatly to the victory over the French at Pavia in 1525, but was severely wounded. He commanded the army in Italy after the battle and was approached by Morone, the counselor of Francesco Sforza, Duke of Milan, in the interest of an Italian national party, since it was believed that Pescara was dissatisfied with Charles V. for not rewarding his services sufficiently. Pescara, however, betrayed the plot. He died soon after, November 30, 1525.

PESCHIERA, PÉS-KYÁ-RÁ. A fortified town in the Province of Verona, Italy, situated partly

on an island in the Mincio, and partly on the right bank of that river, on the Milan-Verona Railroad, 15 miles west of Verona (Map: Italy, E 2). It was a member of the famous Quadrilateral (q.v.) until 1860. In the Middle Ages it was known as *Piscaria*, and belonged first to Verona and later to the Venetians, who strengthened its fortifications. Population (commune), in 1901, 2351.

PESCIA, *pesh'ā*. A town in the Province of Lucca, Italy, 29 miles west by north of Florence, on the Pistoia-Pisa Railroad (Map: Italy, E 4). It has a fourteenth-century cathedral, and an old castle, in which Galeazzo Visconti died in 1328. There are manufactures of silk, leather, paper, and hats, and a trade in wine, oil, and fruit. Population (commune), in 1881, 13,073; in 1901, 17,517.

PESELLINO, *pā'zēl-lē'nō*, or **PESELLO**, *pā'zēl'ō*, FRANCESCO DI STEFANO (c.1422-57). An Italian painter, born in Florence. Little is known of his life, except that he was the grandson, and perhaps the pupil, of Giuliano d'Arrego. He first imitated Andrea del Castagno, and then Filippo Lippi. There is an "Adoration of the Magi" by him in the Uffizi Gallery, Florence, which shows his skill in painting animals. His other works include "The Trinity," in the National Gallery, London, and the predella (except the central panel, painted by Filippo) of the altar for Santa Croce, which is divided between the Accademia at Florence and the Louvre, Paris.

PESHAWAR, or **PESHAWUR**, *pe-shā'wēr*. The capital of the newly formed northwest frontier province, British India, near the Kabul River, a tributary of the Indus 20 miles from the Afghan frontier, and 10½ miles east of the entrance to the Khyber Pass (q.v.) (Map: India, B 2). It is irregularly built with narrow winding streets, and is surrounded by a mud wall with watch towers. Although it dates from the fifth century, the city has few ancient monuments, and consists chiefly of mud houses. The cantonments contain a public garden, Christian churches, and a mission school. Peshawar is an important British military station, and is a great market; its bazaars are frequented by numerous Afghan and other Central Asiatic traders. It is the terminus of a railroad connecting it with the main railroad system of India. Population, in 1891, 84,191; in 1901, 95,147, of whom three-fourths are Mohammedans and about 4000 Christians.

PESHIT'O, or **PESHIT'TO**. See BIBLE.

PESHA, *pesh'wā* (Pers., leader). The Brahman ministers of the Mahratta dynasty of India. On the decline of the Mahratta rulers, the power of their ministers increased until in 1718 the first Peshwa, Balaji Visvanath, acting in the name of Maharaja Sahu, marched against Delhi to assist Farrukh Shah against the Mogul Emperor, Jehandar Shah. The Peshwa rule lasted for exactly a century. Balaji was succeeded in 1720 by his son, Baji Rao, who for twenty years was active in expeditions of conquest, even wresting Bassein from the Portuguese in 1739. He was followed in 1740 by his son Balaji Baji Rao, under whose administration the Mahrattas reached the acme of their greatness. They ravaged Northern India far and wide, levied *chauth*, or a quarter-tax, on Bengal, and were in formal

possession of Orissa. In 1761, however, the last year of Balaji's life, the power of the Peshwas in Northern India was ended by their rout at Panipat by Ahmed Shah of Kabul, conqueror of the Punjab. Balaji was succeeded by his son, Madhu Rao, in 1761, who proved more than a match for Haider Ali, and at the same time governed with remarkable order the Mahrattas themselves. In 1773, after the assassination of Narayan Rao, who ruled for a short time after Madhu's death, Raghunath Rao, a brother of Balaji Rao, became Peshwa. To defend himself against Narayan's posthumous son, Madhu Rao II., he was forced to call upon the English for aid. The first Mahratta War (1779-82) then broke out, in which Raghunath failed in his object, despite the aid of the English, and in 1782 he became a prisoner, while Madhu Rao succeeded him as Peshwa. Madhu committed suicide in 1795, after a puppet-reign, and was followed by Raghunath's son, Baji Rao II., the last of the Peshwas. To secure himself, Baji invoked English assistance, and by the Treaty of Bassein in 1802 ceded territory for the maintenance of the force given him. The result was an attack by the other Mahratta rulers, and the second Mahratta War (1803). This gave the Peshwa a prolongation of his rule, but he revolted in 1817. The third Mahratta War, which followed, ended in utter defeat for Baji and the extinction of the Peshwa power. His territory, which now forms the Bombay Presidency, was annexed by the English, and Baji Rao was a British pensioner until his death in 1853. His adopted son was the notorious Nana Sahib (q.v.). See SINDIA.

PESNE, *pān*, ANTOINE (1683-1757). A French painter, born in Paris. He is said to have been a pupil of his uncle, Charles de la Fosse, and afterwards traveled in Italy. He lived most of his life in Berlin, where he was made Court painter to Frederick the Great, and director of the Academy. His portrait of the engraver Schmidt, in the Berlin Museum; his portrait of himself with his family (1718), in the New Palace, Potsdam; and the portrait of Vleughels, at Versailles, are familiar, vigorously painted pictures.

PESSIMISM (from Lat. *pessimus*, worst). The doctrine that life is or tends to become wholly undesirable, or that the world is essentially evil. It is thus contrasted with optimism, which teaches that the world is essentially good, and with meliorism, which maintains that the world is constantly becoming better and life more endurable.

Pessimism is characteristically a mental attitude toward life rather than a philosophical doctrine, and its significance is ethical rather than metaphysical. It never appears, however, except as a consequence of reflection and so of a certain amount of intellectual enlightenment. Most commonly it is the outgrowth of a consciousness of human impotence, and especially of the inadequacy of human effort in the struggle for ideal attainment. Where pessimism is based upon metaphysics, the world is usually conceived to be governed by blind necessity and human life to be a toy of fate. Accordingly the doctrine is most commonly maintained by those who hold a pantheistic conception of the universe, as the Orientals, or by those who conceive it as wholly determined by mechanical laws or as wholly

materialistic. Optimism, on the other hand, is a necessary corollary of belief in a beneficent God, and so is characteristic of theistic religions. (See LEIBNITZ for the argument.) At the same time there is a purely empirical pessimism—the denial that human life *per se* is worth while—which is compatible with any cosmological conception, whether theistic or not. Such a pessimism is that of the author of *Ecclesiastes*, and such a pessimism is the implied basis of Christian asceticism, by which physical life is valued only as a discipline for a more worthy existence.

Historically, philosophical pessimism has been of two leading types. Perhaps the most ancient is the pessimism of India, the essential character of which is the denial of the value of life on the ground that its pains overbalance its pleasures and progressively tend to do so with the growth of desire. This doctrine does not appear in the Vedic hymns; for these belonged to the restless, active period of the history of the Aryans in India, and activity is little compatible with pessimistic theory; but it early developed with Brahmanistic pantheism, and attained its full growth in Buddhism (q.v.). The salient features of Indian pessimism are: first, the assertion that life is predominantly painful; second, the notion that conscious evolution is dominated by growing desire and growing failure to attain satisfaction; and, third, the conception of Nirvana, or annihilation of individual consciousness as an ultimate relief from the fever of living.

In contrast to this Oriental pessimism stands the Greek type. This was faintly foreshadowed by the Platonic doctrine of the impotence of the material world in its efforts to attain the perfect good embodied in the divine ideas. Plato himself was saved from pessimism by the very vividness of his idealism; but with the philosophers who followed him the ethical problem became paramount and the problem of the existence of evil and the fact of human insufficiency were poignantly recognized. Epicurus (q.v.) is the typical Greek pessimist, his doctrine differing from the Oriental in that it denied the excellence of life in general and rather for its failure to achieve the good than for its mere painfulness. His practical doctrine, however—to make the best out of life by a temperate hedonism—speedily degenerated among his followers into a rough and ready sensuality. The most metaphysical and thorough-going of Greek pessimists was Proclus (q.v.), who taught that the whole evolution of the world is away from the divine or good.

But there was little congenial to pessimism in the exuberant paganism about the ancient Mediterranean; the classic peoples were too heartily in love with life. With the Teutonic Aryans the case was different. A gloomy fatalism was early characteristic of their myth and mood, and though the Northman looked forward to eventual annihilation in the cataclysmic contention of Ragnarok, the 'twilight of the gods,' rather than through passive absorption, his ultimate conception varied little from that of the Brahman. And the Teutonic point of view seems to have dominated mediæval Europe, giving it that ascetic pessimism which Christianity made empirical rather than ultimate. In modern times, however, pessimism has reasserted itself, largely under the influence of scientific determinism. The notion that the world is governed by invariable laws and conserves none but material elements has seemed

to argue the defeat of the commonest human expectations. The pessimistic reaction has appeared most strongly in poets, as occasionally in Tennyson, for example, but notably in the Italian Leopardi (q.v.) and in James Thompson, the author of *The City of Dreadful Night*. In philosophy Schopenhauer and Hartmann (qq.v.) are the chief exponents of modern pessimism. The pessimism of the former is the result of his philosophic creed and is curiously eclectic in its origin. Schopenhauer as a follower of Kant believed that the world is a creation of experience to be idealistically interpreted; but according to his interpretation the creating power is a blind, uneasy, hapless-tending will, while intelligence is a suffering consequence of the will's activity. The painfulness of conscious life he endeavored to establish upon empirical, psychological grounds, and this feature of his pessimism is plainly Oriental in source. His further doctrine, however—that final escape from the misery of existence is to be attained through pure intelligence defeating the blind energy of the will by overcoming desire—seems to be allied not only to Brahmanism, but also to the Platonic doctrine of escape to the world of divine ideas and the Spinozistic theory of immortality through the soul's identification with eternal verities. (See PLATO; SPINOZA.) Schopenhauer's disciple, Hartmann, carried the doctrine further by arguing that the evolution of consciousness from an unconscious universe must ultimately result in an intelligence so acutely powerful that it should not only put an end to individual consciousness and desire, but compel the whole world's suicide.

It is but fair to state that pessimism is not necessarily a result of deterministic metaphysics, nor yet of pantheism. Herbert Spencer's meliorism teaches that the world is compelled to evolve desirable existence, and, indeed, that its essential activity is one of betterment; while Nietzsche, originally a disciple of Schopenhauer, finds optimistic inspiration in the Darwinian struggle for existence with its promise of the evolution of finer types of being; the necessity for pain he recognizes, but counts it of small import in comparison.

Consult: Sully, *Pessimism: A History and a Criticism* (London, 1877); Schopenhauer, *The World as Will and Idea* (Eng. trans., ib., 1883-86); Von Hartmann, *The Philosophy of the Unconscious* (Eng. trans., ib., 1884); Saltus, *The Anatomy of Negation* (ib., 1886).

PESTALOZZI, pës'tä-löt'sä, JOHANN HEINRICH (1746-1827). A Swiss educational reformer, and the chief founder of modern pedagogy, born at Zurich, January 12, 1746. As a student in the University of Zurich he allied himself with the young reformers of whom Lavater was the leader, and in a contribution to the *Memorial*, the organ of that faction, he expressed a wish that intelligible principles of education might be disseminated among his countrymen. He studied theology, then law, then, under the influence of the current naturalistic philosophy, and particularly Rousseau, turned to agriculture, with the avowed purpose of improving the condition of his countrymen by setting for them a good example in scientific agriculture, and, finally, when past middle life, began work as a teacher. He undertook to put in constructive form the ideas cast

by Rousseau in a destructive and critical form. He it was who tested the value of 'education according to nature.' Pestalozzi himself was unpractical and a bad organizer and manager, yet through his writings he aroused the Germanic peoples to the importance of social reform through education, and through his personal efforts he inspired a number of disciples who developed and carried out the principles of his practice until they became the basis of the educational movement of the nineteenth century. In 1767 he bought a hundred acres of poor land and erected a house thereon, naming the place Neuhof. Here he brought, two years later, his bride, and here for seven years he sought to demonstrate Rousseau's ideal life in a return to Nature. Though the experiment was a failure, yet in his attempt to educate his one child after the manner of the *Emile* he discovered the deficiencies of Rousseau's teachings, and later rejected the extravagances, and accepted the essential truths of the teachings of his master. Here also he wrote a 'Father's Journal,' which laid the basis of modern child study as an approach to the solution of educational problems. Undaunted by poverty and failure, and moved by the wretched state of the children of the poor, in 1775 he turned the farm into an asylum, where he housed, boarded, and clothed the children, in return for such work as they could give, thus hoping to regenerate his people by striking at the root of the evil through the industrial education of the young. The failure of this enterprise in 1780, due in a measure to the unsympathetic attitude of the parents of his wards, revealed to him the doubtful nature of the principle upon which it had been based, namely, that the reform of the individual and of the race could come through an improvement of the environment. Then followed a period of eighteen years of financial distress, and a corresponding period of great literary activity. During this time he gave up all practical efforts and devoted his energies to thinking out social and educational problems. The solution reached was that individual and social reform can come only through the moral and intellectual improvement of the individual by means of educational effort. In his *Abendstunde eines Einsiedlers* (published 1780) and his *Lienhardt und Gertrud*, the first volume of which was issued in 1781, he first presented this doctrine. The latter work, soon expanded into several volumes, was a novel descriptive of peasant life, which had an enormous popularity, since it fell in with the idealistic and revolutionary tendencies of the times.

The fundamental ideas of *Lienhardt und Gertrud* were that the condition of the people was to be bettered by education, not by revolution; that education was to centre in the home, and not in a separate institution; that this education was to begin at the cradle, and that the first few years were of the greatest importance; that an ignorant mother, by following the method given in his book, could educate her children as well as a teacher in possession of all science; that if homes were thus reformed, misery would disappear, and society would be revolutionized. From 1787 to 1797 Pestalozzi was again engaged in agricultural experiments. During this period he formed the acquaintance of Fellenberg and Fichte, and in 1792 was proclaimed French citizen with Klopstock and Washington. After

the long period of literary work, during which Pestalozzi wrote 20 volumes, the exigencies of war forced him again into active life, and in 1798 he became director of an orphan asylum at Stanz, where he attempted to work out the ideas of *Leonard and Gertrude* (as the work is known in English), of combining learning with hand work, and centring it upon the objects of the child's immediate environment. It was along this line that Pestalozzi thereafter worked, and had his permanent influence. In 1799 he entered upon active schoolroom work at Burgdorf, and later at several other places. In 1802 Pestalozzi went to Paris as a member of the consulta summoned by Bonaparte to settle the fate of Switzerland, and while there memorialized the First Consul upon the educational needs of his country, but received the curt reply that there was no time to bother about A B C matters. He established the Institute at Yverdon in 1805, from which emanated the influence that was to give inspiration to all modern education. Here gathered not only the children of the schools, but great numbers of teachers from most of the leading States in Europe in a sort of normal school; here were sent by the Prussian Government the teachers that were to assist in introducing his ideas into the German Volksschulen. Even here his work as a practical teacher was unsuccessful, and in 1825 he was forced to withdraw as a broken-down and disappointed old man. He died at Brugg, February 17, 1827.

Pestalozzi never systematized his ideas or his method. In 1801 he published *Wie Gertrud ihre Kinder lehrt*, which purports to give a summary of his work, but it contains no definite formulation of either principle or method. His great effort, on the purely educational side, was, to use his own expression, to 'psychologize education.' To this effort is due the great attention that has been given to the study of method, both practical and theoretical, from that day to this. In Pestalozzi's passionate love, however, for his people, and particularly for children, and his readiness to sacrifice all personal interests for them, lies the secret of his powerful influence. This trait in his personality is what made him honored and loved by his contemporaries. The inspiration he affords to the struggling pedagogues is not the least of the benefits he conferred upon posterity.

BIBLIOGRAPHY. In addition to many editions of single works, there is a complete edition in 18 volumes by Seyffarth (Berlin, 1881); *Lienhardt und Gertrud* has numerous translations or abridgments, as also *Wie Gertrud ihre Kinder lehrt*. Consult: De Guimps, *Pestalozzi, His Life and Works* (New York, 1889); Barnard, *Pestalozzi and Pestalozzianism* (ib., 1862); Krüsi, *Pestalozzi, His Life and Works* (ib., 1875); Pinloche, *Pestalozzi* (ib., 1901).

PESTALOZZIAN MOVEMENT. A term sometimes applied to the modern tendency to base schoolroom instruction on psychologic principles. It dates from the days of Pestalozzi (q.v.). This movement began in Germany in the early part of the nineteenth century and was initiated in the United States by Horace Mann (q.v.). See PEDAGOGY; EDUCATION; PESTALOZZI.

PESTH, pést. A city of Hungary, now united with Buda to form Budapest (q.v.).

PESTILENCE (OF., Fr. *pestilence*, from Lat. *pestilentia*, plague, from *pestilens*, infected, from *pestis*, pest). The terms plague and pestilence have until recent times been used indiscriminately to denote any diseases of an epidemic character which affected large masses of the community, and were remarkable for their fatality, such as the Oriental plague, the sweating sickness, cholera, certain virulent forms of fever, etc. The term *loimos* was applied by the Greeks to a species of epidemic remittent fever; and the plague of Athens described by Thucydides is manifestly an epidemic form of the same disease, which is endemic in the summer season on the coasts and islands of the Mediterranean and particularly the Archipelago. We find in the early history of the colonization of the West Indian islands and the United States frequent examples of the term plague being applied to the remittent fever of these regions, and especially to epidemic attacks of yellow fever. During the Middle Ages the term *pestis* was applied to numerous disorders, such as syphilis, smallpox, erysipelas, epidemic sore throat, petechial fever, the sweating sickness, gangrenous pneumonia, ergotism, etc. The Black Death of the fourteenth, fifteenth, and sixteenth centuries was the bubonic plague; and the Great Plagues in China in the fourteenth century were probably also bubonic.

Several Hebrew words are translated *pestilence* or *plague* in the Old Testament. Some of these pestilences are beyond the reach of inquiry; others have the characteristics of modern epidemics. See BLACK DEATH; PLAGUE.

PETAL (from Gk. *πέταλον*, *petalon*, leaf, neu. sg. of *πέταλος*, *petalos*, outspread). One of the individual parts of the corolla (q.v.). See FLOWER.

PET'ALESHA'RO. A Pawnee chief of the Skidi band who distinguished himself by an act of humane bravery in rescuing a captive girl who was about to be sacrificed by his tribe. The captive, a girl taken from the Sioux tribe, was being led to the scaffold when Petaleshoro, who as yet was only a young warrior, broke through the circle, seized the girl, and, throwing her upon one of two horses which he had in waiting, was off with her before the people could recover from their surprise. Distancing pursuers, he escorted her to a safe distance from her own country, and then left her to find her way home on the horse which he gave her. On returning to his village he faced the anger of the tribe with such boldness that he was allowed to go unharmed, and was ultimately able to break up the practice of human sacrifice by procuring the substitution of a vicarious ceremony. On subsequently visiting Washington as a delegate from the Pawnee in 1821 he was presented with a medal by the ladies of the city in recognition of his services to humanity. See PAWNEE.

PETARD (OF. *petard*, *petart*, Fr. *pétard*). A device for demolishing the defenses of an enemy, creating a breach through which the besiegers may force an entry. Under modern conditions it has become obsolete. It consisted of a half cone of thick iron filled with powder and ball, and fastened to a plank which was provided with hooks, by which it could be attached to a gate or wall. The engineers attached the petard, lighted the slow-burning match by which it was to be fired, and retired. When the explosion took effect a

supporting column charged through the breach, and took advantage of the confusion within. A petard would sometimes contain fifteen pounds of powder.

PETA'VIUS, DIONYSIUS, or DENIS PÉTAU (1583-1652). A French theologian and philologist, born at Orleans. His father, a man of learning, encouraged his studies, and he took up mathematics and belles-lettres, also philosophy, which he pursued both at Orleans and Paris. During his student years at Paris he formed a warm friendship with Isaac Casaubon (q.v.), whom King Henry IV. had invited to Paris in 1600. In 1602 he accepted the chair of philosophy in the University of Bourges, but resigned in 1605 and entered the Jesuit Order at Nancy. He studied theology for two years at the College of Pont-a-Mousson, and in 1621 became professor of *theologia positiva* at the University of Paris, and held the post for twenty-two years. He is regarded as one of the greatest scholars the Jesuit Order has possessed. In philology his works include annotated editions of Synesius (1611), Themistius (1613), Julian (1614), Nicephorus (*Breviarium Historicum*, 1616), and Epiphanius (*Opera Omnia*, 1622). In his *Opus de Doctrina Temporum* (Paris, 1627) he presented a new system of chronology, further developed in *Uranologion* (1630). A history of the world, *Rationarium Temporum* (1633), from the earliest times down to 1632, has been reprinted as late as 1849. His great work, a history of doctrines, *Opus de Theologicis Dogmatibus*, 5 vols. (1644-50), was left unfinished. Consult his *Life* by Stanonik (Graz, 1876).

PETCHARY, pēch'ā-rī (West Indian name, onomatopoeitic in origin). An old book name for the large tyrant flycatchers of the West Indies, known elsewhere as kingbirds. The term has survived, however, in Jamaica for the gray kingbird (*Tyrannus Dominicensis*), and especially for *Tyrannus caudifasciatus*, one of the most common birds of the West Indies, often shot in the fall as a table delicacy. See KINGBIRD.

PETCHORA, pā-chō'rá. A river of Northern Russia. It rises on the western slopes of the Ural Mountains, in the Government of Perm, and flows northward through the Government of Vologda and a part of Archangel; then it turns to the southwest and finally resumes its original course at the mouth of its tributary the Tzilma, and enters the Arctic Ocean through an extensive delta, containing numerous islets (Map: Russia, H 1). Its entire length is estimated at from 1000 to 1300 miles, of which about two-thirds is navigable. The chief tributaries are the Koshva, Ishma, Ussa, and Tzilma. The region through which the river flows is known as the Petchora or Arctic steppes, and is very sparsely populated. The Petchora is of considerable importance as a navigable waterway, being used for the transportation of the products of the north—fur, fish, etc.—into the interior, from which grain and other necessities of life are sent in return into the northern districts.

PETECHIA, pē-tēk'ī-ā (Neo-Lat., from It. *petecchia*, spot, scab, from Lat. *petigo*, scab, or from Lat. *pittacium*, from Gk. *πιττάκιον*, *pittakion*, label, plaster). A name given to a spot of a dusky crimson or purple color, quite flat, with a well-defined margin, and unaffected by pressure, which closely resembles flea-bites. Pe-

techie result from a minute extravasation of blood beneath the cuticle. They may occur on any part of the skin or mucous membranes, and when large are called *ecchymoses*. They indicate an altered state of the blood, and are often symptoms of very serious diseases, as of typhus fever, plague, scurvy, etc. They likewise occur in very severe cases of smallpox, measles, and scarlet fever, when their presence must be regarded as indicative of extreme danger. Cerebro-spinal fever is sometimes called 'petechial fever,' from the small hemorrhagic spots which cover the body in certain cases.

PETER (Lat. *Petrus*, from Gk. *πέτρος*, Peter, *πέτρος*, rock), or **SIMON PETER**. The Apostle of Jesus who is named first in each of the lists of the Twelve in the Synoptic Gospels. His original name was the Hebrew *Shim'on*, which was easily shortened to conform to the Greek *Simon*. He was the son of a certain Jona and (cf. John i. 44) was a native of Bethsaida. In his early manhood he was a citizen of Capernaum. Here he had a house, and with his brother Andrew was engaged in the fishing business in partnership with Zebedee and his sons (Mark i. 16-31, and parallels). He was married, but whether he had any children is not known. It is likely that he was a man of some property, not a poor, grossly ignorant laborer, though he was not rich. Of his early education and attainments we know nothing. Galilee, his home, was practically a bilingual country, with a fair degree of Greek culture possessed by the Gentile elements of the population. Hence Peter had opportunity for becoming acquainted with colloquial Greek, and there is no good reason for supposing that he was unable to use his Greek Old Testament intelligently.

When the news of the preaching of John the Baptist reached Galilee Peter and Andrew went to hear him. They were impressed and attached themselves to him as at least temporary disciples. Here they became acquainted with Jesus, who gave to Simon the surname *Cephas*, i.e. *rock*, or, in Greek, *Peter* (John i. 35-42). After continuing with Jesus a while the brothers returned to their accustomed occupation. Soon after He opened His public ministry in Galilee Jesus summoned them from their nets to a permanent discipleship (Mark i. 16, and parallels). They at once left all and followed Him. Into the details of Peter's experiences during his two years' intimate association with Jesus we cannot enter. The many incidents recorded in the Gospels give a fairly adequate idea of his general character and disposition. He was a whole-hearted though often blundering disciple. His willingness to be taught enabled him finally to grasp certain great essentials of Jesus' character and mission, so that Jesus could say that he was the 'rock' on which he would build His Church (Matt. xvi. 18). He was one of the three disciples with whom Jesus was most intimate, who alone witnessed His transfiguration (Mark ix. 2-10) and agony in Gethsemane (Mark xiv. 33). Thoroughly convinced of Jesus' Messiahship, even when the tide of popular favor had begun to ebb, he was yet in great need of enlightenment as to what it really signified (Mark viii. 29-33). His impulsive nature led him to deny his discipleship when Jesus was on trial, but his deeper and more permanent love for his Master soon reasserted it-

self, and he returned to the scene and was an eyewitness of the Passion (cf. I. Peter v. 1. and the article **PETER**, **EPISTLES OF**). He was the first of the Apostles to whom Jesus revealed Himself after His resurrection (I Cor. xv. 5; cf. Luke xxiv. 34), was present at most of the post-resurrection interviews between Jesus and the disciples, and to him in particular Jesus tenderly and suggestively reintrusted his apostolic commission, at the same time intimating the self-denial and suffering that awaited him in his future career (John xxi. 15 sqq.).

After the departure of Jesus Peter was easily recognized as one of the leading spirits of the little company of believers who were hoping for something, just what they did not know, and who formed the nucleus of the Church. It was he who suggested the appointment of Matthias to take the place of Judas Iscariot, and a few days later, on the day of Pentecost, made the first public attempt to explain and set forth the claims of Christianity and urge its acceptance upon his fellow-Jews (Acts i. and ii). During the next few years, when the first converts were being secured and the first steps in organization planned, Peter seems to have been the most influential man in the Church. His fellow-worker and most intimate friend was John. When Christianity spread beyond the bounds of Jerusalem into the various districts of Palestine, Peter and John, and afterwards Peter alone, rendered efficient aid by visiting and further instructing the new converts. In Samaria, on such a visit, he came in contact with the local magician Simon Magus (q.v.), a professed convert, whose ignorant cupidity he sternly rebuked (Acts viii. 20). Another such tour led him as far as Joppa, on the coast, whence, by divine guidance, but against his prejudices, he went to Caesarea to proclaim Christianity to Cornelius, the Gentile centurion. He received him and his house in Christian fellowship, and set aside his prejudices so far as to sit at table with them, something he had never before done (Acts x.). For such conduct an explanation was demanded by some in the mother church. Though it was pronounced satisfactory, it is probable that certain ultra-conservatives did not approve of what had been done (Acts xi.).

Up to the attempt of Herod Agrippa I. to put him out of the way, i.e. near 44 A.D., or for about 15 years (cf. Acts xii. 3 sqq.), it is probable that Peter made his headquarters in Jerusalem. He was the one member of the Apostolic band whom Paul, three years after his conversion (37 or 38 A.D.), went to Jerusalem to consult (cf. Gal. i. 18). Paul was with Peter 15 days, and in that time was doubtless given a full account of the earthly career of Jesus as complete as Peter's memory allowed. This notice from Paul's own letter is weighty evidence as to Peter's influential position in primitive Christian circles.

After his escape from Herod he left Jerusalem. We know nothing more of him until the time of the Council of Jerusalem (49 A.D.). Here he urged a liberal attitude toward Gentile Christians. With James and John he gave Paul and Barnabas the right hand of fellowship. Soon after this he seems to have visited Antioch (Gal. ii. 11 sqq.), and, true to his principles, fellowshiped heartily with the Gentile members of the Church there, making no distinction between them and himself. But when overzealous emissaries from James of Jerusalem came to Antioch

and insisted that the two classes should not eat together Peter vacillated, and weakly submitted to their dictation. This brought forth a sharp and well-deserved public rebuke from Paul (Gal. ii. 14 sqq.). There is no reason to suppose that this resulted in any lasting personal animosity between the two. Of Peter's further career we possess almost no information. It is probable that he was occupied in missionary labors, mainly among Jewish communities, in accordance with the agreement noted in Gal. ii. 9. On his journeys he was accompanied by his wife (I. Cor. ix. 5). If the word 'Babylon' (I. Peter v. 13) is to be taken literally, he must have labored mainly in Eastern Syria and the Tigris-Euphrates Valley. But 'Babylon' may be only another name for Rome. In I. Cor. i. 12 (written about 55 A.D.) reference is made to a 'Cephas' party in the Corinthian Church. But this does not imply necessarily that Peter had personally visited Corinth. On the other hand, the absence of any reference to him in Paul's letter to the Roman Church (of about the same date) does not make it certain that Peter had not been or was not then or soon after in Rome. The Apostles did not promptly inform each other of their respective movements. The view that Peter wrote I. Peter at Rome about 54 A.D. to Jewish and other Christian communities of Asia Minor has no decisive evidence against it, and of the corresponding view that II. Peter was likewise sent from the same city, but at least ten years later and to a different circle, the same may be said. The whole matter of Peter's presence in Rome at any time rests, it must be admitted, on a very insecure foundation. There is no positive evidence to that effect in the New Testament, and the earliest notice of Peter in early Christian literature (I. Clement v.) is equally indecisive. The next earliest notice (Ignatius, *Ep. ad Rom.*, IV. 3), about 110 A.D., is almost as vague. Later writers (Justin Martyr is a notable exception) generally represent Peter as having labored long and suffered martyrdom in Rome. While obviously unhistorical legends, such as those relating to his controversy with Simon Magus, have grown up in order to fill out a complete story, his residence in Rome for a longer or shorter period is usually accepted, not only by Roman Catholics, but by Protestant scholars of high rank. That he was martyred under Nero about the year 64 is probable, though not certain. Tradition relates that he met his death by crucifixion, but at his own request with his head downward, counting himself unworthy to suffer exactly in the same way as his Master. Roman Catholics reckon St. Peter as the first Bishop of Rome and the first Pope. Consult the works referred to under PETER, EPISTLES OF, especially the extensive bibliography by Chase in the Hastings Dictionary of the Bible; also Lightfoot, "Saint Paul and the Three," in his *Commentary on Galatians* (London, 1865); id., *The Apostolic Fathers*, Part I., Clement of Rome (ib., 1890); Lipsius, *Die apostolischen Apostelgeschichten* (Brunswick, 1887); Schmid, *Petrus in Rom* (Lucerne, 1892); Felten, *Die Apostelgeschichte* (Freiburg, 1892); Fouard, *Saint Peter* (London, 1892).

PETER I., ALEXEYEVITCH (1672-1725). Emperor of Russia from 1682 to 1725, generally known as Peter the Great. He was the son of the

Czar Alexei Mikhailovitch by his second wife, Natalia Naryshkin, and was born at Moscow, June 9 (May 30), 1672. Peter's half-brother Feodor, who succeeded his father in 1676, died without issue in 1682, having named Peter as his successor, to the exclusion of his own full brother, Ivan, a feeble-minded prince. The Grand Duchess Sophia, Peter's half-sister, attempted to set aside this arrangement and to obtain control of affairs. To this end she brought about an insurrection of the Streltsi (q.v.), and after much bloodshed Ivan and Peter were crowned as joint rulers and Sophia became Regent (July, 1682). Peter's education was not carefully looked after, and at an early age he gave evidence of those stormy passions which were to characterize his entire life. In February, 1689, Peter married Eudoxia Feodorovna Lapukhin, and soon after he called upon his sister to resign the government. This she would not do without a contest, and Peter was forced to flee from the capital, but the foreigners in the Russian service, led by Lefort and the Scotchman Gordon (q.v.), joined his party, and when the Streltsi deserted her the Regent yielded and was shut up in a convent. On October 11, 1689, Peter made his public entry into Moscow, where he was met by Ivan, to whom he gave a nominal precedence, reserving the sole exercise of power for himself. Ivan died in 1696. Peter was the first of Russian sovereigns to grasp the value and significance of Western civilization. He at once began the slow task of forming out of the barbarous and undisciplined material available an army on the European model. His ambitions were chiefly directed, however, toward creating a navy and developing the commerce of his country. Russia had no practicable seaboard, being shut out from the Baltic by Sweden, which possessed Finland, Ingermanland, Esthonia, and Livonia, and from the Black Sea by Turkey; leaving only the White Sea and the Arctic Ocean, with the solitary port of Archangel, available for a Russian navy. Peter therefore set on foot what has become the established Russian policy, of seeking in every direction an outlet into ice-free seas. The Black Sea seemed to him to be the most available for a first move. He launched Russia upon her career of warfare against the Turks, and succeeded in making himself master of the city of Azov, at the mouth of the Don, in 1696. Peter brought in engineers, naval architects, and ordnance experts from Austria, Venice, Prussia, and Holland; built ships; improved the equipment and discipline of the army; and sent many of the young nobility to study in foreign countries. After repressing a revolt of the Streltsi in February, 1697, Peter put the administration into the hands of a council and left Russia in April, traveling as a subordinate member of an embassy, headed by Lefort, for the purpose of acquiring at first hand the knowledge necessary to develop his Empire. He thus visited the Baltic provinces, Prussia, and Hanover, and subsequently Holland, where at Amsterdam and Saardam he worked as a common shipwright. On the invitation of William III., King of England, he visited that country, remaining for three months. He left England in April, 1698, taking with him about 500 English engineers, surgeons, and artisans, and visited Vienna for the purpose of inspecting the Austrian army. His travels were cut short by a second revolt of the Streltsi, which necessitated his return to Russia in Sep-

tember, 1698. General Gordon had crushed the revolt, but Peter determined to be finally rid of this turbulent soldiery, and the organization was broken up and its members executed in large numbers. Peter divorced the Czarina Eudoxia, who with his sister Martha was suspected of complicity in the outbreak, which had been fostered by the Old Russian Party. The process of introducing Western civilization continued. Printing and education were promoted, the calendar was partially reformed, and Western methods of enumeration introduced. Systematic taxation of commodities was adopted as a source of revenue; foreign commerce was encouraged; and much of the Orientalism in dress, manners, and customs which had grown up during the Mongol supremacy gave place to the ways of the Occident. The Church was reorganized, its government being intrusted to the Holy Synod, of which the Czar was the head.

Having secured to Russia access to the sea on the south, Peter turned his eyes toward the Baltic, the possession of whose shores he determined to dispute with Sweden. That kingdom since the time of Gustavus Adolphus had been the strongest military power in Northern Europe. In 1700 Peter made an alliance with Sweden's enemies, Denmark and Poland, and threw down the gauntlet in the struggle for the Baltic supremacy. He was badly defeated by Charles XII. at Narva, where his raw troops, although vastly superior in numbers, were wholly unable to cope with the Swedish veterans (November 30, 1700); Peter was not disheartened. Taking advantage of the Swedes being employed elsewhere, he seized a portion of Ingermanland, in which he laid the foundation of the new capital, Saint Petersburg (1703). Great inducements were held out to those who would reside in it, and in a few years it became Russia's commercial depot for the Baltic. For a long time in the contest with Sweden the Russians met with defeat, but Peter saw that reverses were administering to his troops a wholesome discipline. In 1709 Charles XII. rashly invaded South Russia, and on July 8th his army was annihilated by the Czar at Poltava. This event marked the collapse of the Swedish power. In the following year Peter was master of Livonia. He now found himself at war with the Turks, whom Charles XII., who had taken refuge among them, had stirred up to hostilities. In 1711 Peter was caught in a trap on the Pruth and was forced to conclude the Treaty of Ilush (July 23d), by which he gave up the port of Azov and the territory belonging to it. On March 2, 1712, Peter's marriage with his mistress, Catharine (see CATHARINE I.), was celebrated at Saint Petersburg, and two months afterwards the central Government was transferred to the new capital. The war against Sweden was prosecuted with energy and success. In 1713 the Swedish general Stenbock was forced by the Danes, Saxons, and Russians to surrender at Tönning, in Schleswig. About the same time the Russians made themselves masters of Finland, and in 1714 the Russian fleet overwhelmed the Swedes near the Åland Islands. In 1716 and 1717 Peter made another tour of Europe. In 1718 a widespread conspiracy looking toward the undoing of Peter's reforms was discovered and among those implicated was the Crown Prince Alexei Petrovitch (q.v.). Peter caused his son to be sentenced to death, but pardoned him later. The unfor-

tunate prince, according to the most probable accounts, died in prison from the effects of the torture to which he had been subjected. In 1721 peace was made with Sweden, which surrendered to Russia Livonia, Esthonia, Ingermanland, Karelia, and a small portion of Finland, together with all the islands along the Baltic coast from Courland to Viborg. In the same year Peter assumed the title of Emperor of All the Russias. In 1722 Peter commenced a war with Persia in order to open the Caspian Sea to Russian commerce. Derbend and Baku were the fruits of this war. The last years of Peter's life were chiefly occupied in beautifying and improving his new capital, and carrying out plans for the diffusion of knowledge among his subjects. In the autumn of 1724 he was seized with a serious illness, the result of his imprudence and habitual excesses; and after enduring much agony, he died, February 8 (January 28), 1725.

Upon the political life of Russia Peter the Great left a powerful impress, and though many of his social reforms proved in the end unadapted to the nature of the Russian people, he nevertheless must be regarded as the creator of modern Russia, which he first brought into the state system of European nations. The 'testament' attributed to him, defining his policy, is probably spurious, but it doubtless expresses, with some elaboration, his ideas. Consult: Schuyler, *Peter the Great* (New York, 1884), one of the best biographies in English; Motley, "Peter the Great," *North American Review* (October, 1845), a notable essay, since republished; Mintzlof, *Pierre le Grand dans la littérature étrangère* (Saint Petersburg, 1872), containing bibliographical notes on 1200 works not Russian relating in some way to Peter; Bergmann, *Peter der Grosse* (Königsberg-Riga-Mittau, 1823-30); Barrow, *The Life of Peter the Great* (London, 1873); Brückner, *Peter der Grosse*, in the Oncken series (Berlin, 1879). Among Russian works, mention should be made of Solovieff, Milionkoff, and Philippoff.

PETER II., ALEXEYEVITCH (1715-30). Emperor of Russia from 1727 to 1730. He was the son of Alexei, heir of Peter the Great, who perished in prison, and was born in Saint Petersburg, October 22 (11), 1715. He ascended the throne on the death of Catharine I., May 17, 1727, and immediately fell under the influence of the ambitious Menshikoff, who affianced the youthful Czar to one of his daughters. Menshikoff, however, was soon overthrown by the Dolgoruki, who succeeded to his power. Peter was crowned in 1728, and in the following year was betrothed to a member of the Dolgoruki family. The marriage was set for February 2, 1730, but a few days previously the Czar was stricken down by smallpox and died on February 9 (January 29). He was succeeded by Anna Ivanovna (q.v.).

PETER III., FEODOROVITCH (1728-62). Emperor of Russia in 1762. He was a grandson of Peter the Great by his daughter Anna, who was married to Duke Charles Frederick of Holstein-Gottorp, and was born at Kiel, March 3 (February 21), 1728. By the Empress Elizabeth Petrovna (q.v.) he was nominated successor to the throne. In 1745 he married Sophia Augusta, a princess of Anhalt-Zerbst, who, on entering the Greek Church, assumed the name of

Catharine. Peter succeeded Elizabeth on her death, January 5, 1762. His first act of authority was to withdraw from the alliance with France and Austria against Prussia, restoring to Frederick II. the province of East Prussia, which had been conquered during the Seven Years' War, and sending to his aid a force of 15,000 men—a line of conduct which seems to have been prompted solely by his admiration for the Prussian sovereign. He also recalled many of the political exiles from Siberia, among whom were L'Estocq, Münnich, and Biron, Duke of Courland; abolished many of the oppressive police laws; reduced taxation; initiated measures for the revival of Russian industries and commerce; and attempted a reorganization of the army and navy. He also attempted to reconquer for the House of Holstein-Gottorp the portion of Schleswig which had been ceded to Denmark in 1713. Peter's pro-German tendencies, however, his liberal policy, his indifference to the Greek Church, and his ill-concealed contempt for Russian manners and customs, made him hated by his subjects. His wife had still deeper cause for dislike; for though he was himself addicted to drunkenness and debauchery, he never ceased to reproach her with her infidelities, and had even planned to divorce her, disinherit her son Paul (q.v.), and elevate his mistress, Elizabeth Vorontsoff, to the throne. A formidable conspiracy, headed by Catharine, and supported by the principal nobles, was formed against him. On the night of July 8, 1762, Peter was declared to have forfeited his crown, and his wife was proclaimed Empress as Catharine II. by the guards, the clergy, and the nobility. Peter, who was then at Oranienbaum, neglecting the counsels of Field-Marshal Münnich, who proposed to march at once on the capital at the head of the regiments which were still faithful, soon found even the opportunity of flight cut off, and was compelled to submit. He abdicated the throne on July 9th, and on the 17th of the same month was put to death by Gregory Orloff to secure the safety of the conspirators.

PETER I., KARAGEORGEVITCH (1846—). King of Servia. He was born at Belgrade in 1846. His grandfather was George Petrovitch, known as Kara (Black) or Czerny George (q.v.), who led the Servians in their struggle for independence against the Turks, and in 1812 was recognized by the Sultan as Prince of Servia. Peter's father Alexander was elected Prince of Servia in 1842, to succeed Michael Obrenovitch, but in December, 1858, he was declared deposed by the National Assembly, and in the following month left the country. With him went Peter, who was put to school in Hungary, made frequent visits to Russia, and finally entered the French military school of St. Cyr. He graduated there and became an officer in the French army. After the outbreak of the Franco-German war he served with distinction under Bourbaki, notably before Villersexel. Three times he was captured by the Germans and as often escaped. For several years he followed a life of extravagance and dissipation in Paris, and then, aroused by the troubles in the Balkans, actively encouraged the rising of 1875-76 in Herzegovina, which culminated in the Russo-Turkish war of 1877-78 and the complete establishment of Servian independence. After a period of roving

he went to Montenegro, and in August, 1883, married the Princess Zorka (born 1864), eldest daughter of Prince Nicholas. Eventually this marriage served to connect him with the Russian and Italian courts, since Zorka's sister Militza married the Grand Duke Peter Nikolaievitch and her sister Helena became the consort of Victor Emmanuel II. The permanent residence of Peter and Zorka was at Cetinje, but frequent visits to Paris were made. After Zorka's death (1890), Peter became estranged from his father-in-law and went to Geneva to educate there his three children, a girl aged five and two boys aged three and two. From that time until 1903, though a recognized 'pretender,' he lived quietly in Switzerland. On June 11, 1903, King Alexander of Servia, of the rival house of Obrenovitch (q.v.), and Queen Draga were murdered, and four days later Peter was elected King of Servia by the Skupshtina. After an absence of forty-four years he entered Belgrade on June 24th and on the following day took the oath of office. He was credited with liberal views and with pro-Russian sympathies. See **SERVIA**.

PETER OF BLOIS, blwī (c.1135-c.1208). An English prelate and author, born at Blois of a Breton family, and well educated at Paris and Bologna. For two years he was tutor to William II. of Sicily and keeper of the royal seal, and about 1173 entered the employ of Henry II. of England, who sent him to Paris and to Rome. Peter became secretary to the Archbishop of Canterbury in 1176, a post he continued to hold under Baldwin, who succeeded to the see in 1184, and in whose behalf he was employed at Rome for a time. After the death of Henry II., Peter acted (1191-95) as secretary to Queen Eleanor. He had been appointed Archdeacon of London in 1192, and, if he be identified with the Canon of Ripon bearing the same name, must have lived as late as 1208. He was a vain and ambitious man, well versed in Latin, and a very able secretary, as he could dictate three letters and write a fourth himself simultaneously. Among his many works the *Epistles*, published in 1480 at Brussels, are of the most worth.

PETER THE CRUEL, King of Castile. See **PEDRO THE CRUEL**.

PETER THE HERMIT, or **PETER OF AMIENS** (c.1050-1115). The preacher of the First Crusade. He was born in the city or at least in the diocese of Amiens about 1050. The stories told of his early life, that he was a soldier, married, and had several children, are fictitious. It is believed that he undertook a pilgrimage to the Holy Land, but did not reach Jerusalem. After the Council of Clermont in 1095 (See **CRUSADE**; **URBAN II.**) Peter appeared as a preacher of the Crusade in Northern and Central France. He rode on a mule, with a crucifix in his hand, his head and feet bare; his dress was a long robe and a hermit's cloak of the coarsest stuff, girt with a cord. He preached with the greatest earnestness in the pulpits, on the roads, and in the market-places, and everywhere aroused his hearers to a high pitch of enthusiasm, and was honored as a saint inspired from heaven. As early as April, 1096, Peter reached Cologne with a following of 15,000 men, and there his army received an accession of 15,000 more. They were mostly from the lower classes, poorly organized, and little fitted for war or the hardships before them. In dis-

orderly bands they made their way through Germany and Hungary toward Constantinople. (See CRUSADE.) Peter himself reached the city in July and accompanied his army across the Bosphorus. But, disgusted by the insubordination of his followers, he returned to Constantinople and gave up the attempt to act as leader. During the siege of Antioch in 1098 he made a cowardly attempt to run away, but nevertheless was soon after trusted with a difficult commission to Kerbuga, King of Mosul, and acquitted himself with credit. During the winter of 1098-99, when many wished to abandon the Crusade, Peter appeared in his old rôle of preacher urging its continuance. He tried to defend the poor against the selfishness of the leaders. On the 8th of July, 1099, he preached on the Mount of Olives. After the capture of Jerusalem (July 15, 1099) he remained in the city, while the army proceeded toward Egypt. He returned home, probably shortly after the battle of Ascalon, and became monk and prior at Neufmoustier, near Huy, in the Diocese of Liège, where he died July 8, 1115. Consult, besides the general works on the Crusades, Hagenmeyer, *Peter der Eremit* (Leipzig, 1879); Franz, *Peter von Amiens* (Hofgeismar, 1891).

PETER THE VENERABLE (c.1094-1156). Abbot of Cluny. He was born at Montboissier, was educated in a Cistercian monastery, took the monastic vows in Cluny (1111), and was chosen prior of the famous monastery there when only twenty-eight years old. He cultivated learning and piety, and exemplified both in his own life. He visited England and Spain, and was in the Council of Pisa (1134). It is related that he reconciled the kings of Castile and Aragon, and that he advocated the claim of Innocent II. to the Papal throne, and secured his general acceptance by the Church. He also befriended Abélard, and gave him a refuge in the Monastery of Cluny for the close of his troubled life. Peter died at Cluny, December 25, 1156. Three of his treatises deserve separate mention: (1) *Against the Jews*; (2) *Two Books of Famous Miracles* (French trans. by d'Avenel, Paris, 1874); (3) *Against the Execrable Sect of the Saracens*. In the last work he shows considerable knowledge of his subject; he had a condensed Latin translation of the Koran made by his secretary, Peter of Poitiers, which was long the only one extant; it was edited by Bibliander and published at Basel in 1543. Unfortunately, only two of the five books of this treatise are extant. He also wrote against the Petrobrusians. (See BRUYS, PIERRE DE.) Peter's letters are important for the history of the period. His writings are collected in Migne, *Patrol. Lat.*, clxxxix. For his life, consult Wilkens (Leipzig, 1857) and D'Avenel (Paris, 1874).

PETER, APOCALYPSE OF. See APOCRYPHA, section on *New Testament*.

PETER, EPISTLES OF. Two of the seven so-called Catholic Epistles of the New Testament.

I. **PETER.** This document, according to its address, signature, and closing paragraph (i. 1-3 and v. 12-14), is a letter written by the Apostle Peter to the Christians of Asia Minor and sent thither by Silvanus, probably the Silas mentioned in Acts (xv. 22 onward). The Epistle was written to admonish and encourage those ad-

dressed to a cheerful, manly patience in persecution, to an orderly life, and to a steadfast hope. The doctrinal teachings are set forth incidentally to give the necessary foundation to the exhortations. The hortatory character of the Epistle makes it difficult to analyze satisfactorily. The following outline is suggested. After the usual address, signature and salutation (i. 1-2), the author fervently expresses his praise to God for the *Christian salvation*, the object and end of their sorely tried faith, foreshadowed in prophecy and now eagerly awaited (i. 3-12). This prepares for the three series of exhortations that follow. In the *first* (i. 13-ii. 10) the readers are exhorted to *earnestness, obedience, and holiness* with *godly fear* in view of the cost of their redemption (i. 13-21), to the exercise of brotherly love, as all of one divine regeneration (i. 22-25), and to a vital union with Christ, the chief corner stone (ii. 1-10). The *second* series (ii. 11-iv. 11) urges to orderly life (ii. 11-12), to all due subjection to constituted authority, even if suffering should ensue, citing the example of such suffering set by Christ (ii. 13-25); then passes to exhort wives to reverence their husbands (iii. 1-7), adding a general exhortation to all to be orderly, forbearing, and forgiving (iii. 8-12). In case this loyalty involves suffering, let them remember Christ's vicarious suffering and its blessed results, conform their conduct to His, and place their faith in Him, the risen Lord, especially since the end is near (iii. 13-iv. 11). The *third* set of exhortations (iv. 12-v. 11) pleads with those who are addressed not to take offense at the trials they are undergoing. If they are for loyalty to Christ, all is well. They must not suffer as evildoers (iv. 1-19). The church officers and members are urged to faithful performance of duties (v. 1-7), and the final exhortation to watchfulness is followed by a benediction (v. 8-11). The Epistle closes by stating that it is sent by Silvanus and with greetings from the church (or wife?) in 'Babylon' and from Mark. A short benediction is added (v. 12-14).

The doctrinal teachings of Peter, compared with those of the Pauline Epistles, are marked by a greater simplicity. They move within the sphere of Jewish-Christian thought and may be accounted for and explained on the basis of the application of the conviction that Jesus was the Messiah to the teachings of the Old Testament. The conception of God is that of the Old Testament, supplemented by the emphasis laid by Jesus on His Fatherhood (i. 3, 17). There is no distinctive Christology. Jesus is spoken of after the same manner as in the first chapters of Acts and in the Synoptic Gospels. The doctrine of redemption is fundamentally the same as that of Paul, but expressed differently, mainly in Old Testament language, and influenced largely by a deep appreciation of the human elements of Jesus' passion. The resurrection is the great fact that crowned the Messianic work of Jesus (i. 3, 11), and faith is fixed on that as well as on His death (iii. 22). The Christian life is founded on a vital union with the now living and glorified Jesus (i. 23-ii. 5). Salvation affects the real life, the 'soul' (i. 9 sqq.), and begins here through the new birth by the agency of the Word (i. 23). It becomes a possibility through *faith*, a word of broad significance in I. Peter, including the whole obedient response to the will

of God expressed in the life and work of Jesus the Messiah. The positive teachings concerning salvation reveal strong convictions concerning sin and its seat in man's being. The eschatology of I. Peter is simple. The future life is of far greater importance than this. We are only pilgrims here, and on that future we should fix our attention. It will be ushered in by a new revelation of Christ and will be an eternity full of glory (i. 7, 10; v. 10). The church organizations appear to have been simple. Elders are at the head and the younger element are urged to obey the older. As to baptism, not the form, but the heart condition is the important element (iii. 21).

The Epistle has been subjected to severe criticism. The central question is that of its genuineness. Is it what it purports to be? The external evidence in its favor is remarkably strong. All the prominent writers at the end of the second century, as well as Papias and Polycarp, early in the first century, used it as Peter's. No doubt as to its genuineness was expressed in the ancient Church.

The internal evidence in favor of Peter's authorship may be stated as follows: (1) The opening and closing sections, in which the writer calls himself the Apostle Peter, addresses a specific circle of Christian communities, states the name of the bearer of the Epistle (Silvanus), and sends greetings from Mark. Both Silvanus and Mark were fellow workers with the Apostles and members of the primitive Christian community of Jerusalem. If these sections state the truth, the genuineness of the Epistle must be admitted. If they are to be rejected as fictitious, strong grounds must be given for the rejection. (2) Incidentally, and without undue display, the writer represents himself as one who was an eye-witness of Jesus' ministry and passion (cf. i. 8, v. 1, and the warm-hearted way in which Jesus' sufferings are spoken of). (3) The independent character of the thought of the Epistle is, at least, not against its genuineness. The brief sketch of the teachings of the Epistle given above reveals this. While the writer comes close to Paul's language at times, he is no mere echo of Paul, nor is he a blundering copyist. (4) There is a genuine and serious tone and purpose to the Epistle, exhorting its readers to all that is good, which makes it difficult to account for as a forgery.

The main objections to Petrine authorship based on internal evidence are: (1) The trials or persecutions referred to imply a date later than the end of Peter's life. In regard to this it may be said that the statements in the Epistle do not imply a regularly organized State persecution of Christians as such. The general opposition of the pagan world and of the Jewish element are sufficient to account for all that is said. That this opposition was severe in Apostolic days the letters of Paul and the record in Acts abundantly testify. It is not necessary to presuppose even the persecution of Nero as implied in the Epistle. Such a passage as ii. 13 sqq. does not point that way: (2) The Epistle is said to manifest great dependence on Paul's writings, which, it is thought, militates strongly against Petrine authorship. In regard to this it may be replied: (a) There is no inherent impossibility in the supposition that Peter may have known and valued Paul's writings and used expressions from them in a writing of his own.

(b) It is probable that a literary relationship exists between our Epistle and Romans and Ephesians. But it may be, as Weiss and Kühl claim, that Paul is here dependent on I. Peter. (c) In any case the author of I. Peter is master of his own thought and language. In this short Epistle he uses at least sixty words not found elsewhere in the New Testament, and gives to many common words a special, peculiar sense. (3) The Greek of I. Peter, though not so good as that of II. Peter, is said to be of a quality far beyond the capability of Peter, an ignorant Galilean fisherman. But the fact is, we know nothing of Peter's knowledge of Greek. That language was largely spoken in Galilee, and Peter may have gained some proficiency in it. He may, however, have used Mark or Silvanus to write the Epistle, dictating the matter in Aramaic and leaving the writer to put it into popular Greek. Other objections hold against certain theories regarding the date, place of writing, and class of Christians addressed, but not against the Epistle *per se*.

We may affirm, then, that the general character of the Epistle and its history in the Church are not opposed to its own claim to be an epistle of the Apostle Peter. It only remains to consider the questions of destination and date. The plain, literal sense of the words, "to the elect sojourners of the dispersion," etc., indicates Jewish-Christian communities in the various provinces of Asia Minor as the parties addressed. The main objections to this view are that, according to Acts and Paul's Epistles, the Christianity of Asia Minor was overwhelmingly *Gentile-Christian*, and that no epistle addressed to Jewish-Christians would have used such language as we find in i. 18 and iv. 3-4. These objections are strong, though not conclusive. The work of Paul covered half of the territory indicated in the address, and many Jewish-Christian workers may have labored in Northeastern Asia Minor and even in the regions traversed by Paul. The second objection is more serious, but it cannot be said that Peter could not have used such language in addressing churches which, though composed mostly of Jewish-Christians, still contained some converts from paganism.

It is possible, however, to take the word 'dispersion' in a figurative sense and consider that the Epistle was addressed to Christians as such, whether of Jewish or pagan ancestry. In some parts of Asia Minor the former may have predominated; in other parts, especially in the western districts, the latter. It was only natural that the Apostle, himself a Jewish-Christian whose experience had been mainly with Jewish-Christians, should address them all as the true Israel. Since Paul had evangelized only a part of Asia Minor, an epistle addressed to churches scattered through the whole vast province had no occasion to mention him. It is probable that by 'Babylon' (v. 13) Rome is intended. Whether the term 'fellow elect' (fem.) means the Church or some individual (the writer's wife?) is a question.

The date to be assigned to the Epistle depends mainly on the answers to two questions: (1) To what do the references to suffering point? If nothing less than a State persecution is implied, the time of the persecution by Nero as the earliest possible date—i.e. c.64 A.D. If no State persecution is implied, the Epistle may well have

been earlier. (2) The question of the relation between I. Peter and the Pauline Epistles. If I. Peter is dependent on Romans and Ephesians, it must be dated either after Paul's first imprisonment, i.e. after 61, while Paul was away from Rome, or during that imprisonment, while Paul also was in the city. Most critics who hold to the genuineness of the Epistle and to its dependence on Paul are inclined to a date near 64 A.D. Ramsay (*The Church in the Roman Empire*, pp. 279-295, Oxford, 1893) advocates 80 A.D. Those who dispute Peter's authorship assign different later dates. But if the dependence is on the side of Paul rather than Peter, the Epistle was written before Romans. This opinion, advocated by Weiss and Kühl, has much in its favor, and appears, on the whole, the most probable. Accordingly the Epistle may be viewed as written at Rome some time between 50 and 55 A.D.

II. PETER. This Epistle purports to be from the Apostle Simon Peter to (an unnamed circle of) Christians. After exhorting them to fulfill their high destiny by a complete, well-developed Christian life (i. 3-11), he declares his purpose ever to remind them of these things, especially as he knows that his death is near, and is certain of the truth of the doctrines of the power and Second Coming of Christ (see **SECOND ADVENT OF CHRIST**), both from his own experience at the Transfiguration, and from the more sure word of prophecy (i. 12-21). He then passes to his main theme, warning against the threatened inroads of false teaching represented by bold, irreverent, reckless Antinomianism and by a skeptical denial of the Second Coming (ii. 1-iii. 13). The Epistle closes with a reference to Paul as teaching the same truths, though often misunderstood, and by an exhortation to constant Christian growth (iii. 14-18).

Unlike I. Peter, this Epistle seems to have been called forth by some very urgent conditions in certain Christian communities. Its scope is not so broad nor its teachings so diversified as is the case with I. Peter. Only in the very condensed passage i. 3-11 is a comparison between the two Epistles possible.

Because of its somewhat unique character, II. Peter has proved an inviting field for biblical criticism, and the questions of its authorship, date, and destination are still open. The external attestation to the Epistle is probably weaker than in the case of any other New Testament writing. There is no distinct trace of its existence before Origen, though it is probable that it was commented on by Clement of Alexandria (c.190). We must then be content with such evidence as the Epistle itself offers. Petrine authorship is, without doubt, claimed, not only in the opening words, but in the reference to the Apostle's death, as revealed by the Lord (i. 14), in the reference to the Transfiguration (i. 16), and in the notice of Paul's letters (iii. 15). Nevertheless, grave objections may be made against this claim. Arguments drawn from the vocabulary and style of the Epistle are not of great weight, because of our imperfect knowledge of Peter's habits and circumstances. The remarkable, almost verbal similarity between II. Peter ii. 1-iii. 3 and the short Epistle of Jude demands explanation. If, with most modern scholars, we hold that this section of the Epistle was copied from Jude, it becomes very difficult to maintain

the Apostolic authorship of II. Peter, not only on general grounds, but also because the errorists combated are spoken of in Jude as already in the community, while in the Epistle their appearance is still future, or at least indicated as very recent. It is much simpler, and more in accordance with the statements of both Epistles, to hold that Jude used II. Peter. If such be the case, Jude is additional evidence for the early date of the Epistle. Arguments based on the marked dissimilarity between I. and II. Peter are of force only as against the view that both Epistles were written near the same date by Peter's own hand, or by the same amanuensis and to the same circle of readers. No one of these suppositions, however, is necessary. The relation between II. Peter and apocryphal writings of Josephus is too uncertain for a basis of argument.

While conceding the great weight of opposing theories and the complicated and uncertain character of the evidence, the most probable view seems to be that the Epistle was written near the close of Peter's life, presumably from Rome, to Jewish-Christian readers, well known to the Apostle, who were threatened with the invasion of new and dangerous heresy. It had a limited circulation, but became known some years later to Jude, who used it as the basis for his hastily written Epistle to the same or nearly related communities.

BIBLIOGRAPHY. The recent and able commentaries by Kühl, in Weiss's series (Göttingen, 1897); Bigg, International Critical Series (New York, 1901); and Von Soden, in the Holtzmann Series (Leipzig, 1899), are full and leave little to be desired. Chase, in the *Hastings Dictionary of the Bible*, gives an exhaustive treatment with a good bibliography. For the theology of I. Peter, consult the standard New Testament theologies of Weiss, Beyschlag, Holtzmann, Stevens, and also Weiss, *Der petrinische Lehrbegriff* (Berlin, 1855). The various introductions to the New Testament, and works on the Apostolic Age contain full discussions of the critical problems. For II. Peter consult also Spitta, *Der zweite Brief des Petrus und der Brief des Judas* (Halle, 1885).

PETER, GOSPEL OF. See **APOCRYPHA**, section on *New Testament*.

PETER, PREACHING OF. See **APOCRYPHA**, section on *New Testament*.

PETER, pā'tēr, HERMANN (1837-). A German classical scholar, son of the following, best known for his work in Roman history. He was born at Meiningen, studied at Bonn and Breslau, taught at Posen, Frankfort-on-the-Oder, and Meissen, and in the last place became rector of the school. His works include important editions of *Scriptores Historiæ Augustæ* (1865; 2d ed. 1884; and critical essays on the same subject, 1892); *Historicorum Romanorum Reliquiæ* (1870); and *Historicorum Romanorum Fragmenta* (1883), as well as Ovid's *Fasti* (1874; 3d ed., 1899); and the critical essays, *Die Quellen Plutarchs in den Biographien der Römer* (1865), and *Die geschichtliche Litteratur über die römische Kaiserzeit bis Theodosius I. und ihre Quellen* (1897).

PETER, KARL LUDWIG (1808-93). A German historian and classical scholar. He was born at Freiburg and studied at Halle. For several years he served as professor of history in the University of Jena. His writings include: *Die*

Epochen der Verfassungsgeschichte der römischen Republik (1841); *Geschichte Roms* (4th ed. 1881); *Studien zur römischen Geschichte* (1863); and *Zur Kritik der Quellen der altern römischen Geschichte* (1879).

PETER BELL. A tale in verse by William Wordsworth (1819) of a man in humble life, with incidents of such exaggerated simplicity as to provoke much ridicule.

PETERBOROUGH. An episcopal city, a Parliamentary and municipal borough, and a civic county, known as the *soke* or liberty of Peterborough, in Northamptonshire, England, on the Nen, 37 miles northeast of Northampton, and 76 miles north by west of London (Map: England, F 4). Its principal edifice is the famous cathedral, which has undergone complete restoration since 1883, and holds a high rank among English cathedrals of the second class, exhibiting all grades of transitional architecture from Norman to Perpendicular. The south transeptal crypt incloses the site of the prior cruciform Saxon church. The west front as a portico is said to be the finest in Europe. A central tower, lantern-shaped, rises at the intersection of the nave and transept. The length of the cathedral is 476 feet; breadth at the great transepts, 203 feet; height of central tower from the ground, 150 feet. The town is regularly laid out, has an excellent grammar-school with an endowment, a public library, a school of art, science, and technology, a corn exchange in the Italian style, a jail and house of correction, a handsome parish church, and a number of charitable institutions. The city owns its water and electric lighting works, markets, sewage farm, bathing place, and isolation hospital, maintains parks and recreation grounds, and provides cottage allotments. Peterborough is an important railway centre and carries on an active trade in corn, coal, timber, bricks, and malt. It has also manufactures of agricultural implements and extensive locomotive works.

Anciently named Medeshamstede, the city had its origin in a great Benedictine monastery, founded in 655. This monastery, reared in honor of Saint Peter, became one of the wealthiest and most important in England, but it was not until after having been destroyed by the Danes in 807, and rebuilt about 966, that the town was called Peterborough. On the dissolution of the monasteries, the magnificent cathedral was spared, owing, it is supposed, to its containing the remains of Queen Catharine of Aragon, but it was vandalized by Cromwell and his troopers in 1643. Population, in 1801, 3400; in 1851, 8700; in 1881, 21,228; in 1901, 30,870. Consult: Poole, *Peterborough* (London, 1881); Davys, *The Cathedral and Abbey of Peterborough* (Peterborough, 1886); Sweeting, *Peterborough Cathedral* (London, 1898).

PETERBOROUGH. The capital of Peterborough County, Ontario, Canada; on both sides of the Otonabee River and on the Canadian Pacific and the Grand Trunk railroads, 76 miles northeast of Toronto (Map: Ontario, E 3). It is connected by a handsome bridge with the village of Ashburnham opposite. The town is lighted with gas, has good water power, manufactures leather, engines, farming tools, wooden ware, and woollens, and carries on a large export trade in grain, pork, and lumber. It is the seat of a United

States consular agent. The town is the centre of a picturesque lake and river district, and is a favorite resort for sportsmen; the Peterborough or Rice Lake canoe was invented here. Population, in 1891, 9717; in 1901, 11,239.

PETERBOROUGH, CHARLES MORDAUNT, third Earl of (1658-1735). An English military and naval commander. He served as a boy in the navy, and then entered the army. For the prominent part that he took against James II., he was made Earl of Monmouth by William III., succeeding afterwards to the earldom of Peterborough, as heir to his uncle. During the War of the Spanish Succession the English expedition to the Iberian Peninsula was placed under his command, and in June, 1705, he arrived in Lisbon with 5000 Dutch and English soldiers. After taking on board the Archduke Charles of Austria, who claimed the Spanish crown, the armament proceeded to Valencia. Mordaunt conceived the idea of making a dash at Madrid, and finishing the war at one blow, but was overruled by the Archduke and the Prince of Hesse, and compelled to besiege Barcelona, which was defended on one side by the sea, and on the other by the strong fortifications of Monjuich. By a *coup de main* he made himself master of Monjuich, Barcelona fell, and Mordaunt pushed his successes into the interior. Several towns submitted. He marched to Valencia and at the head of 1200 men defeated a Spanish force of 4000. The Spaniards sent a large army into Catalonia, and a French fleet appeared off Barcelona. Mordaunt returned to Barcelona, harassed the enemy's army, and, putting himself on board the English squadron, directed a movement which compelled the Frenchmen to put to sea, and Barcelona was saved. Mordaunt again wished to march toward Madrid, but his plan for gaining possession of the capital was once more rejected by Charles. He accordingly left the army in a fit of pique, and went to Italy. In 1707 he returned to Valencia as a volunteer, but the excellent advice which he gave was not followed. He was recalled to England, and from that moment the tide of fortune ran strong against the Austrian cause. On his return he made common cause with the Tories, and received the Garter and other dignities for his services. On the accession of George I. he was appointed commander-in-chief of the naval forces of Great Britain. He died at Lisbon. Brilliant and versatile, he was also eccentric and erratic. His witty yet affectionate letters to Pope, Swift, Prior, etc., give a fine insight into his private character. His character has been sketched by Horace Walpole, in his *Catalogue of Royal and Noble Authors*, and with still greater force and picturesqueness by Macaulay. Attempts have been made to discount the brilliancy of his leadership in the Spanish campaign and to attribute the successes to other officers, but these have signally failed. Consult: Warburton, *Memoirs of Charles Mordaunt, Earl of Peterborough and Monmouth* (London, 1853); Russell, *Memoir of Charles Mordaunt, Earl of Peterborough* (ib., 1887); Stebbing, "Peterborough," in *English Men of Action* (ib., 1890).

PETER CLAVER, SAINT (1580-1654). The apostle of the negroes in Spanish America. He was born in Catalonia of a noble family. After completing his education in the Jesuit college at Barcelona, he joined the novitiate of the Society at Tarragona in 1602, and

was sent to the newly founded college at Majorca. While he was still pursuing his studies, the general, Aquaviva, called for an approved missionary from each Spanish province of the society to go to the newly formed province of Granada in South America. Peter Claver was among those chosen, and arrived at Cartagena, then the centre of the African slave-trade, in 1610. In 1616 he was ordained, and entered on his special work. He won the approval of the authorities for his plan, and secured orders that no slave-owners should be allowed to carry off the newly imported blacks until they had had instruction in the Christian faith. He signed himself the 'slave of the negroes forever,' and practically lived among them, on shipboard and in the hospitals, especially the leprosy hospital, ministering to their wants, as well temporal as spiritual. His exertions during the plague in Cartagena resulted in utter exhaustion and paralysis, and he died September 8, 1654. He was beatified by Pius IX. in 1852, and canonized by Leo XIII. in 1888. Consult his *Life* by Fleuriat (Eng. trans. London, 1847) and Höver (Dülmen, 1888).

PETER DE VIN'EA (c.1190-1249). An Italian statesman and jurist, born at Capua. By his abilities he attracted the attention of Emperor Frederick II., and as early as 1225 he appears as occupying a high judicial position in Frederick's kingdom of Sicily. He soon became the chief judicial officer in the realm, and aided in drawing up the Constitution of 1231 for Sicily, which was far in advance of any other instrument of government of Western Europe at that period. After filling other very high offices, Peter was suddenly arrested on suspicion of having been bribed to poison the Emperor. It is said that, in order to avoid torture and further disgrace, he dashed out his brains against a pillar, to which he had been chained. Dante has sought to clear his good name, and many beautiful legends arose concerning the tragic fate of the great statesman. His letters, poems, and speeches form one of the most useful sources for the history of his time. Consult: Huillard-Bréholles, *Vie et correspondance de Pierre de la Vigne* (Paris, 1865); Kingston, *History of Frederick II.* (London, 1862).

PETERHEAD. A seaport and Parliamentary burgh in the District of Buchan, Aberdeenshire, on a peninsula, the easternmost point of land in Scotland, 44 miles northeast of Aberdeen (Map: Scotland, G 2). Keith Inch, the eastern head of the peninsula and the nucleus of the town, mainly occupied by fish-curing establishments, is now separated by a canal which connects the five spacious harbors. The town is irregularly built, clean, and paved with the reddish granite named after the town, but has no striking edifices. The parish church has a granite spire, 118 feet high, and a granite Tuscan pillar stands on the market-cross. There are Episcopal, Free, Roman Catholic, and other churches; an academy and other schools, and libraries. The town owns its water supply, winter and summer baths, and a municipal lodging house. Formerly the chief British depot of the whale and seal fisheries, it is now noted for its herring fishery, employing over 500 boats and 5000 persons. The general trade is of considerable importance. The chief exports are herrings, cattle, agricultural produce, and granite. Granite and polishing works, ship and boat

building, woolen factories, and breweries are carried on. Peterhead dates from the thirteenth century. The Pretender landed here on December 25, 1715. Population, in 1891, 12,200; in 1901, 11,750.

PETERHOF, pät'ër-hôf. A town in the Government of Saint Petersburg, Russia, situated on the Gulf of Finland, 18 miles west of the capital (Map: Russia, D 3). It is a well laid-out town, occupied chiefly by fine villas and summer residences which extend along the gulf to Oranienbaum on the west and Saint Petersburg on the east. The royal palace, with its extensive gardens, fountains, and statues modeled after those at Versailles, was begun by Peter I. in 1711, and has since been greatly extended and embellished by the successive monarchs, especially by Elizabeth, Catharine II., and Nicholas I. It contains many rare works of art. Peterhof is now one of the most fashionable resorts around the capital, and the Russian Court usually spends there a part of the summer. Population, in 1897, 11,300.

PETER IB'BETSON. A novel by George Du Maurier (1891). It appeared serially in *Harper's Magazine* of that year. The story opens with Peter's childhood in Paris, and his playmate, Mimsey Seraskier. Left an orphan, he is brought up by a disagreeable uncle. He meets Mary, the charming Duchess of Towers, and discovers in a dream that she is Mimsey. Exasperated by his uncle, Peter kills him in a sudden frenzy, and for twenty-five years in prison he leads a dream life in which he has mysterious communication with the Duchess. At her death he becomes insane; she comes to him once afterwards and influences him to write this curious autobiography.

PETER LOMBARD, or **PETER THE LOMBARDO** (c.1100-64). An Italian theologian. He was probably born at Lumello, in Lombardy, about the year 1100. He studied at Bologna, Rheims, and later at Paris, where he was a pupil of Abelard. He became teacher of theology in the cathedral school of Notre Dame, and in 1159 was appointed bishop of Paris. He resigned the see after a year and died at Paris, July 20, 1164. He was very generally styled *Magister Sententiarum*, or *Master of the Sentences*, from his compilation *Sententiarum Libri IV.*, a collection of sentences from Augustine and other Fathers on points of Christian doctrine, with objections and replies also collected from authors of repute. It was intended as a manual for the scholastic disputants of his age, and as such was used for 500 years and made the basis of innumerable lectures and treatises. It was one of the first books printed, and many editions have been issued. It is found in Migne, *Pat. Lat.*, vols. xcxi-cxii., with his *Catena* on the Psalms and on Paul's Epistles. Consult the treatise of Protois, *Pierre Lombard, son époque, sa vie, ses écrits, son influence* (Paris, 1881).

PETERLOO MASSACRE (fanciful name, suggested by *Waterloo*). The name popularly given to the dispersal of a large meeting by armed force in Saint Peter's field, Manchester, England, Monday, July 16, 1819. The assemblage, consisting chiefly of bodies of operatives from different parts of Lancashire, was called to consider the question of Parliamentary reform. The dispersal took place by order of the magistrates. Eleven persons were killed and more than 500 wounded.

PETERMANN, pā'tēr-mān, AUGUST (1822-78). A German geographer. He was born at Bleicherode, in Prussian Saxony; studied at Nordhausen; and from 1839 to 1845 was an assistant in the geographical academy of Professor Berghaus at Potsdam. There he worked upon Berghaus's *Physikalischer Atlas*, and drew the map for Alexander von Humboldt's *Asie Centrale*. In 1845 he went to Edinburgh as assistant to A. K. Johnston in the preparation of his *Physical Atlas*, based upon the publication of Berghaus. In 1847 Petermann founded a cartographic establishment at London, and was elected to the Royal Geographical Society. He then made a special study of the geography of Africa and of the Arctic Zone. In 1854 he returned to Germany to assume the directorship of Justus Perthes's geographic institution at Gotha, and in 1855 founded the *Mitteilungen*, a monthly geographical journal, which remains the authoritative publication in its particular department. Like his father and his brother before him, he died by suicide.

PETERMANN, JULIUS HEINRICH (1801-76). A German Oriental scholar. He was born at Glauchau, was educated at Leipzig and Berlin, and studied Armenian at Venice. In 1837 he became professor of Oriental languages at the University of Berlin. From 1852 to 1855 he traveled through Asia Minor and Persia; in 1867-68 through Palestine and Syria; during the latter year he was German consul at Jerusalem. Petermann published grammars of the Samaritan, Aramaic, and Armenian languages in the *Porta Linguarum Orientalium* series. Among his other works are *Reisen im Orient* (1860-61), and an edition of the *Samaritan Pentateuch* (1872 seq.), continued after his death by Vollers.

PETER MARTYR. The name most commonly applied to PIETRO MARTIRE DI ANGHIERA (c.1457-1526), an Italian writer on American history. He was born at Arona, in Northern Italy, probably on February 2, 1457, although his own letters give almost equally good grounds for the years 1455 and 1459 as the date of his birth. In 1477 he went to Rome, where, through the Cardinal Ascanio Sforza, he secured the position of secretary to Francesco Negro, the Governor of the city, which he held until August, 1487, when he was induced to go to Spain by the retiring Spanish Ambassador, the Count of Tendilla. There he seems to have quickly become a chronicler, and in this capacity he came under the immediate protection of the Queen. In 1494 he was ordained as a priest and became tutor to the children of Ferdinand and Isabella. In 1501 he was intrusted with a diplomatic mission to the Sultan of Egypt, who had threatened to massacre all Christians in his domains in revenge for the expulsion of the Moors from Spain. Martyr's account of his successful visit to Cairo is narrated in his *Legatio Babylonica*, which he dedicated to Pope Leo X. In reward, he received an appointment as apostolic prothonotary. In 1505 he also obtained the post of dean of the chapter of the Cathedral of Granada, which he held until his death. In 1520 he was appointed royal chronicler or historiographer, and subsequently a member of the Council for the Indies. His principal works are the history of the New World, *De Rebus Oceanicis et Novo Orbe Decades*, and the *Opus Epistolarum*. The *Decades* constitute an important source for the

early period of American discovery. The *Opus* is an invaluable collection of 816 letters dealing with contemporary events. Consult: Marićjol, *Pierre Martyr d'Anghiera, un lettré italien à la cour d'Espagne* (Paris, 1887); Bernays, *Petrus Martyr Anglerius* (Strassburg, 1891); Thacher, *Christopher Columbus* (New York, 1903).

PETER MARTYR. Sixteenth century religious reformer. See VERMIGLI.

PETERS, pā'tērs, CHRISTIAN AUGUST FRIEDRICH (1806-80). A German astronomer, born in Hamburg. He studied at Königsberg, was employed in the Altona Observatory, and in 1839 was appointed assistant at Pulkova. Ten years after, Peters became professor at Königsberg, and in 1854 was appointed director of the Observatory at Altona, and undertook the editorship of *Astronomische Nachrichten*. He went to Kiel in 1872, when the Observatory was transferred thither, and in 1873 he was chosen professor of astronomy in the university of that place. His work was almost entirely on stellar astronomy and dealt especially with stellar parallaxes, the constant of nutation, and the study of Sirius.

PETERS, CHRISTIAN HEINRICH FRIEDRICH (1813-90). A German-American astronomer, born at Koldenbüttel, in Schleswig. He studied in Berlin; worked in the observatories of Copenhagen and Göttingen, then under Sartorius von Waltershausen in the survey of Etna, and in the topographic bureau of Naples; and in 1854 came to the United States. For several years he was employed on the coast survey, and in 1858 was appointed professor of astronomy at Hamilton College, and director of the Litchfield Observatory. His greatest services to astronomy were the discovery of about fifty comets and planetoids, and the stellar charts published in 1882. Peters led the United States expedition to New Zealand for the observation of the transit of Venus in 1874.

PETERS, or **PETER**, HUGH (1598-1600). An English churchman and author. He was educated at Cambridge, was ordained, and preached at the Church of Saint Sepulchre, London, until he was silenced for non-conformity; he went to Rotterdam, and became pastor of the Independent Church. He was in New England from the winter of 1635-36 to 1641; was settled pastor of the First Church in Salem, Mass., as successor of Roger Williams. As chaplain in the Parliamentary army he rendered unusual services, for which he was rewarded under the Commonwealth and the Protectorate. After the Restoration, being suspected of complicity in the King's death, he was indicted for high treason, condemned, and beheaded, October 16, 1660. During his imprisonment he addressed to his daughter, Elizabeth, *A Dying Father's Last Legacy to an Only Child*. He published *Peters's Last Report of the English Wars* (1646); *A Word for the Army and Two Words for the Kingdom* (1647); *A Good Work for a Good Magistrate* (1651); and several other pamphlets. Consult Felt, *Memoir and Defense of Hugh Peters* (Boston, 1851).

PETERS, JOHN CHARLES (1819-93). An American physician; born in New York; studied medicine in Columbia and in Europe, and commenced practice in New York as a homœopathist, but afterwards joined the regular school. He published treatises on diseases of the head, of

females, of the eyes, and Asiatic cholera. In connection with Dr. E. F. Snelling and others, he published a *Materia Medica*. Dr. Peters was editor of the *North American Journal of Homœopathy*, and of the *Transactions of the Pathological Society*.

PETERS, JOHN PUNNETT (1852—). An American clergyman and Orientalist, born in New York City. He graduated at Yale (1873), and studied at Berlin and at Leipzig. He became professor of Old Testament languages and literature at the Protestant Episcopal Divinity School in Philadelphia (1884) and professor of Hebrew at the University of Pennsylvania (1885), and from 1888 to 1891 conducted excavations at Nippur. In 1893 he became rector of Saint Michael's Church, New York City. He wrote: *Scriptures, Hebrew and Christian* (1886-89); *Nippur, or Explorations and Adventures on the Euphrates* (1897); and *The Old Testament and the New Scholarship* (1901).

PETERS, pät'ers, KARL (1856—). A German traveler. He was born at Neuhaus, in Hanover, and studied at Göttingen, Tübingen, and Berlin, where in 1880 he became privat-docent. In 1884 he founded the German Colonization Society, in whose interests he traveled through Eastern Africa. Returning to Germany in 1885, he became the head of the German East African Company, and two years later went again to Africa to assume the management of the colonial possessions. In 1888 he took the leadership of an expedition for the relief of Emin Pasha, marched up the Tana River to its source, and penetrated finally to the Victoria Nyanza. He crossed the lake in June, 1890, met Emin, already rescued by Stanley, and thence returned to the coast. In February, 1891, he was sent as Imperial commissioner to East Africa; founded a station at Kilimanjaro, and was active in the settlement of the boundary between German and English possessions. Accusations of cruelty toward the natives were in 1896 preferred against him. They were investigated before a judicial commission, and resulted in his dismissal from the service. In 1898 he went to London and formed a company for the exploration of the gold-fields of Rhodesia, and he himself visited Africa again in 1900-01. His publications include: *Willenswelt und Weltwille* (1883), a philosophical study; *Die deutsche Emin Pascha-Expedition* (1891); *Das deutsch-ostafrikanische Schutzgebiet* (1895); *Das goldene Ophir Salomos* (1895); and *Aequatorial und Südafrika nach einer Darstellung von 1719* (1895).

PETERS, MADISON CLINTON (1859—). An American clergyman, born in Lehigh County, Pa. He was educated at Franklin and Marshall College, and at Heidelberg Theological Seminary, Tiffin, Ohio, whence he entered the ministry of the Reformed Church, becoming pastor of the Bloomingdale Congregation in New York City. After a pastorate of eleven years he resigned, joined the Baptist Church, and became pastor of the Sumner Avenue Baptist Church, Brooklyn, N. Y. He defended this change of denomination in *Why I Became a Baptist* (1901). Among his other works are: *Justice to the Jew* (1899); *The Wit and Wisdom of the Talmud* (1900); *The Birds of the Bible* (1901); *The Jew as a Patriot* (1902); and several devotional books.

PETERS, PHILLIS. The name, after marriage, of the colored poet Phillis Wheatley (q.v.).

PETERS, RICHARD (1744-1828). An American jurist, born in Belmont, Pa. (now part of Philadelphia). He graduated at Philadelphia College (now University of Philadelphia) in 1761, studied law, and soon rose to eminence at the bar. During the Revolutionary War he was captain of a militia company in 1775-76, was secretary of the Board of War from 1776 to 1781, and was instrumental in having Benedict Arnold tried before a court-martial in January, 1780. He was a member of Congress in 1782-83, sat in the State Assembly in 1787-91, and was a United States district judge from 1792 to 1828. He was one of the founders of the Philadelphia Agricultural Society and its president for more than thirty years, wrote many valuable papers on agricultural subjects, and in 1797 demonstrated by a series of experiments the agricultural value of gypsum. He published *Admiralty Decisions in the United States District Court of Pennsylvania* (2 vols., 1807). His son, **RICHARD PETERS, JR.** (1780-1848), was successor of Henry Wheaton as reporter of the United States Superior Court, and published *Reports of the United States Circuit Court, 1803-18* (1819); *Reports of the United States Supreme Court, 1828-43* (17 vols., 1828-43); *Condensed Reports of Cases in the United States Supreme Court from Its Organization till 1827* (6 vols., 1835); and *Case of the Cherokee Nation Against the State of Georgia*. He was also editor of *Chitty on Bills*; Bushrod Washington's *Circuit Court Reports, Third Circuit* (4 vols., 1803-27); and of the *United States Statutes at Large*.

PETERS, SAMUEL (1735-1826). An American clergyman, the author of a well-known history of Connecticut. He was born in Hebron, Conn., graduated at Yale in 1757, and in 1759 was ordained in London as a minister of the Church of England. Returning to Connecticut in 1760, he was placed in charge of the churches of Hebron and Hartford. In the pre-Revolutionary controversies he embraced the Tory cause, and was so pronounced in his loyalty to the Crown that in 1774 he was forced by the 'Sons of Liberty' to abandon the colony and take refuge in England. Here in 1781 he published anonymously his celebrated *General History of Connecticut, from Its First Settlement Under General Fenscyck, Esq., to Its Latest Period of Amity with Great Britain* (republished in New York, 1877), in which he gave a code of so-called 'blue laws' which attracted widespread attention. These laws were formerly supposed to have been pure forgeries and fabrications, but recent investigations have shown them to have been taken in part from an earlier writer (Neal) and in part (with modifications) from actual laws, only two or three of the forty-five having been apparently invented out of hand. In 1805 Peters came to New York. In 1817 he visited the Falls of Saint Anthony, taking up a large claim there, but again settled in New York (1818) and died there in great poverty eight years later. He published a number of books and pamphlets, characterized by a slovenly and uncritical scholarship, and by a general uniformity of misstatement and reckless assertion. Consult: Trumbull, *The Rev. Samuel Peters, His Defenders and Apologists* (Hartford, 1877); id., *The True Blue Laws of Connecticut and New*

Haven (Hartford, 1876); and "Examination of Peters's Blue Laws," by Prince, in *Annual Report of the American Historical Association* for 1898.

PETERSBURG. A city and the county-seat of Menard County, Ill., 20 miles northwest of Springfield; on the Sangamon River, and at the junction of the Chicago, Peoria and Saint Louis and the Chicago and Alton railroads (Map: Illinois, C 4). It is surrounded by a farming and stock-raising district, having deposits of coal. There are several coal mines and various manufactories, including flouring mills, a canning factory, brick and tile plant, etc. Population, in 1890, 2342; in 1900, 2807.

PETERSBURG. A town and the county-seat of Pike County, Ind., 44 miles north by east of Evansville; on the Evansville and Terre Haute Railroad (Map: Indiana, B 4). It has manufactures of flour, brick and tile, lumber, etc., and considerable trade in coal, which is mined extensively in the vicinity. Agriculture and stock-raising also are important industries in the fertile region adjacent. Natural gas is found here. Population, in 1890, 1494; in 1900, 1751.

PETERSBURG. A city, independent of county authority, at the junction of Chesterfield, Dinwiddie, and Prince George counties, Va., 22 miles south of Richmond, on the Appomattox River and the upper Appomattox Canal, and on the Norfolk & Western, the Atlantic Coast Line, and the Seaboard Air Line railroads (Map: Virginia, G 4). There are two steel bridges across the river, and two public parks. Petersburg is the seat of the State Central Hospital for the Insane, with 1000 colored patients; the Virginia Normal and Collegiate Institute, for the higher education of colored students of both sexes; Southern Female College; and the University School for young men. It has a Benevolent Mechanics' Association, with a library and museum. There are also the Young Men's Christian Association; the Home for the Sick; and fine Masonic, Odd Fellows', and Red Men's buildings. Petersburg carries on an extensive trade in tobacco, and is an important industrial centre, its manufacturing interests being promoted by excellent water power. The products of the principal industries are cotton, tobacco, machinery, trunks, clothing, silk and knit goods. Under a charter of 1875, the government is vested in a mayor, elected every two years, and a council which controls elections of all officials governing the administrative departments. The water works are owned and operated by the municipality. Population, in 1890, 22,680; in 1900, 21,810.

Petersburg was founded in 1733 on the site of an Appomattox Indian village destroyed in 1676 by Nathaniel Bacon; was incorporated as a town in 1748, and was chartered as a city in 1850. During the Revolution it was twice occupied by the British under General Philips, and in the War of 1812 the Petersburg volunteers served with conspicuous gallantry. Being a great railway centre of supply from the south, Petersburg was the scene of much of the fighting in the famous Virginia campaign of 1864-65. (See CIVIL WAR.) After his disastrous failure at Cold Harbor June 3, 1864 (q.v.), Grant marched his army of more than 100,000 men to the James River, with the idea in part of taking Petersburg and thus of forcing the evacuation of Richmond. General

Butler, at Bermuda Hundred, was hastily reinforced by a corps under General W. F. Smith, and was ordered to attack Petersburg, then defended by only 2500 Confederates. But though his force numbered 16,000, he carried out his orders (June 15th) half-heartedly and inefficiently and thus allowed Confederate reinforcements to be thrown into the city. Grant, arriving on June 16th, made bloody but unsuccessful assaults on the 16th, 17th, and 18th, his losses for the three days being fully 10,000. He then settled down for a siege. On July 30th the famous Petersburg mine—a shaft 520 feet long with lateral branches (near the end) extending 40 feet on each side—was exploded with terrific effect, a Confederate regiment being destroyed and a huge crater produced, through which an inefficiently commanded force of Federals tried to fight its way. The Confederates quickly recovered, poured a deadly artillery fire into the crater, and the Federals were forced back with a loss of more than 4000. Lee repeatedly foiled the manœuvres of Grant, but finally, on April 2, 1865, after a week's bombardment, was compelled to evacuate both Petersburg and Richmond. Consult Humphrey, *The Virginia Campaign of 1864 and 1865* (New York, 1883).

PETER SCHLEMIHL, pä'tër shlë-mäl'. A widely popular tale by Chamisso (1813), relating the adventures of a man who sells his shadow to the Evil One in return for an inexhaustible magic purse. His wealth, however, does not save him from the suspicion and horror with which his fellows regard his strange condition. He is unwilling to buy back his shadow at the stipulated price, his soul, and in despair throws away the purse, buying with his last money a pair of seven-league boots. With these he traverses the whole earth and by his study and knowledge of the world at last gains contentment.

PETERSEN, pä'tër-sen, EUGEN (1836—). A German archæologist, born at Heiligenhafen, in Holstein. He studied at Kiel and Bonn, in 1873 was appointed professor of archæology at Dorpat, and in 1879 at Prague. He was a member of the Austrian archæological expeditions to Greece in 1880 and to Asia Minor in 1882-85. In 1886, after removing to Berlin, Petersen was sent to Athens as secretary of the German Archæological School, and in 1887 was transferred to a corresponding post in the German School at Rome. He edited Theophrastus's *Characters* (1859), and wrote: *Die Kunst des Pheidias am Parthenon und zu Olympia* (1873); *Reisen in Lykien* (with others, 1889); *Städte Pamphylens und Pisidiens* (with Niemann and Count Lanckoronski, 1890-92); *Vom alten Rom* (1898; 2d ed. 1900); and *Trajans dakische Kriege nach Säulenrelief* (1899 sqq.).

PETERSEN, JOHANN WILHELM (1649-1727). A Lutheran mystic. He was born at Osnabrück, taught at Rostock and Giessen, and preached acceptably at Hanover. In 1678 he became superintendent of Lübeck. Ten years later he was chosen to a similar position at Lüneburg, but his millenarian views led to his summary removal and banishment in 1692. He went to Magdeburg and spent the rest of his life preparing pamphlets and treatises explaining and defending his views. Petersen was the leading Lutheran mystic and premillenarian of the seventeenth century. He was entirely orthodox and conventional except

upon a few points, such as the thousand years' reign of Christ upon earth and the apokatastasis or doctrine of universal restoration. Petersen wrote his autobiography, *Lebensbeschreibung* (2d ed., Frankfurt, 1719). One of his treatises, *Die Stimmen aus Zion*, appeared in Ebenezer, N. Y. (1851-52).

PETERSEN, NIELS MATTHIAS (1791-1862). A Danish scholar and historian of literature, born at Sandown, on the island of Fünen. He was appointed professor in the Normal School of Brabeholteborg, was employed in the State archives, and in 1845 was chosen professor of Scandinavian languages in the University of Copenhagen. Petersen wrote on mythology, history, geography, and above all literary history. His most important works are *Bidrag til den old Nordiske Literaturs Historie* (1866), and *Bidrag til den Danske Literaturs Historie* (1853-64; 2d ed. 1867-71), a valuable work which stops with the beginning of the nineteenth century.

PETER SIMPLE. A novel by Captain Marryat (1834). This rollicking sea-tale gives the adventures of a clergyman's son, a midshipman on a man-of-war. He cruises in the Mediterranean and the West Indies. A scheming uncle tries to injure him, finally consigning him to an insane asylum. But he escapes and succeeds his grandfather as Lord Privilege.

PETERSON, FREDERICK (1859-). An American neurologist and alienist, born at Fari-bault, Minnesota. In 1879 he was graduated from the medical department of the University of Buffalo. After several years in Europe, he became, in 1882, professor of general pathology and director of the laboratory of the University of Buffalo. In 1888 he established himself in New York City as a specialist in nervous and mental troubles. In 1893-94 he was professor of neurology at the University of Vermont. For several years he was professor of neurology in the Women's Medical College, pathologist in the New York City Insane Asylum, and attending physician to the New York Hospital for Nervous Diseases and to the St. Xavier's Sanatorium for Inebriate Women. He also became chief of clinic in the Department of Nervous Diseases of the College of Physicians and Surgeons of Columbia University, New York City. He became president of the New York State Commission in Lunacy in 1900. Dr. Peterson is one of the editors of the *New York Medical Journal* and the *Journal of Mental and Nervous Diseases*. For many years he was an editor of the *American Medico-Surgical Bulletin*. Besides monographs, he has written a book on *Mental Diseases* (1899), which is a part of Church and Peterson's *Nervous and Mental Diseases* (1899).

PETER'S PENCE. The name given to offerings made for the support of the Pope. As a definite historical tribute, it seems to have had its origin in England, from which it spread to Denmark and Norway under Canute. The origin of the payment has been attributed to Ina, King of the West Saxons, and by others to Offa and to Ethelwulf; but the question is still obscure; Lingard is disposed not to trace it further back than the time of Alfred. It was collected annually in the month of July, or between the feasts of Saints Peter and Paul and of Saint Peter's chains. It consisted in the payment of a silver penny by every family that possessed land

or cattle of the yearly value of thirty pence. The payment was finally abolished under Henry VIII. Latterly the name has been often applied to the voluntary offerings for the support of the Holy See made by its subjects in all parts of the world, since the loss of its territorial possessions has made other support necessary.

PETERSEN, pät'er-sen, EILIF (1852-). A Norwegian painter, born in Christiania. He was a pupil of Riefstahl and Descoudres at Karlsruhe and of Dietz in Munich. He first painted costume pictures, such as "Christian II. Signing a Death Warrant" (1876, Breslau Museum); then religious subjects, in which he was influenced by the Venetians, whom he studied in Italy; and finally genre and landscapes. "The Laundresses" (1889) and "Woodland Lake" (1891) are examples of his fine and harmonious color, in the genre in which he is most successful. The Museum at Christiania contains a "Siesta," and the New Pinakothek at Munich a "Summer Night in Norway."

PETERWARDEIN, pät'er-vär-din' (Hung. *Péterrád*). A free town and strong fortress of Croatia and Slavonia, Hungary, situated on a promontory on the right bank of the Danube opposite Neusatz, with which town it is connected by two bridges (Map: Austria, G 4). The fortifications consist of the old fortress on the lofty rock and the lower fortress at its base. Population, in 1900, 5019. Peterwardein is believed to occupy the site of the Roman *Acumincum*. The fortress was captured by the Turks in 1526 and was the scene of the defeat of the Grand Vizier Ali by Prince Eugene in 1716, after which it was awarded to the Emperor by the Peace of Passarowitz in 1718.

PETIGRU, JAMES LOUIS (1789-1863). An American jurist, born in Abbeville District, S. C. He graduated at the College of South Carolina in 1809, and taught until his admission to the bar in 1812. He began practice in this district, volunteered for the defense of Port Royal against a threatened British attack in 1813, and soon afterwards was elected solicitor of the district. In 1819 he accepted an advantageous partnership in Charleston, and was elected Attorney-General of the State in 1822. When the issue of nullification (q.v.) was presented he was prominent in the Union Party, and resigned his office in 1830 to become a candidate for the State Senate. He was defeated, and incurred much unpopularity. From 1850 to 1853 he was United States District Attorney, and later was selected to codify the laws of South Carolina, which task was finished in 1862. He vigorously opposed secession, but preserved the respect of his fellow citizens. His bust was placed in the City Hall of Charleston in 1883. Consult Grayson, *James Louis Petigru* (New York, 1866).

PETIOLE (from Lat. *petiolus*, stalk or stem of fruits, irregular diminutive of *pes*, foot). The stalk-like portion of a leaf (q.v.).

PÉTION, pät'yôn', ALEXANDRE SABES (1770-1818). A Haitian general and politician, born at Port-au-Prince, April 2, 1770, the son of a white father and a mulatto mother. He received a good education and fought for his country's independence under Toussaint L'Ouverture. Later he joined General Rigaud against L'Ouverture, went to France in 1800, and returned in 1802 with General Leclerc. He subsequently served under

Dessalines (q.v.) against the French. Upon the death of Dessalines and the succession of Christophe (q.v.) the southern part of the island set up an independent republic and Pétion, who was Governor of Port-au-Prince, was chosen President in 1807. There followed a civil war with Christophe, which desolated the country for many years. Pétion remained at the head of the Government in the southern part of the island until his death. While in power Pétion displayed an amount of moderation strange in a Haitian politician. He protected the foreigners in the country and made some attempts to preserve the national credit. A sketch of his military and political career is given in St. John's *Haiti; or, The Black Republic* (London, 1884).

PÉTION DE VILLENEUVE, de vél'něv', JÉRÔME (1756-94). A French revolutionist. He was the son of a procurator at Chartres, and was practicing as an advocate in his native city when he was elected in 1789 a Deputy to the States-General. He became a prominent member of the Jacobin Club, and an ally of Robespierre. He was sent as one of three commissioners to bring back the royal family from Varennes after their attempted flight, and in the execution of this commission he acted in a harsh and unfeeling manner. In November, 1791, he was elected Mayor of Paris to replace Bailly. He became a member of the Convention, and on September 20, 1792, its first president. He favored the Girondists, and although at the trial of the King he voted for his death, he was suspected of being a Royalist, and of complicity in the treason of Dumouriez. He was thrown into prison, June 2, 1793, on the fall of the Gironde, but escaped and joined the other Girondists at Caen. In company with Buzot he reached the neighborhood of Bordeaux. A short time after, their dead bodies were found in a field near Saint Emilion, and they were supposed to have committed suicide. The public career of Pétion shows him to have been weak, shallow, ostentatious, and vain. The *Œuvres de Pétion*, containing his speeches and some small political treatises, were published at Paris, in 4 vols. (1793). Consult also *Mémoires inédites*, edited by Dauban (Paris, 1866), and Vatel, *Charlotte Corday et les Girondins* (ib., 1872). See FRENCH REVOLUTION.

PETIT DE JULLEVILLE, pe-tě' de zhyl'-vél', LOUIS (1841—). A French historian, born in Paris. From the Ecole Normale (1860-63) he went to the French School in Athens, was made doctor of letters in 1868, and, after teaching rhetoric in the College Stanislaus, Paris, removed to Dijon. Thence he returned to Paris, where he became professor of French mediæval literature and of the history of the French language in the Faculty of Letters (1886). Three of his works were crowned by the Academy, and besides text-books on his subject, he published *Histoire de la Grèce sous la domination romaine* (1875); *Histoire du théâtre en France: Les mystères* (1880); *Les comédiens au moyen âge* (1885); *La comédie et les mœurs en France au moyen âge* (1886); *Le théâtre en France* (1889). In 1896 he began the publication of a *Histoire de la langue et de la littérature française*, in eight volumes.

PETITION (Lat. *petitio*, from *petere*, to seek; connected with Gk. *πτεσθαι*, *petesthai*, Skt. *pat*, to fly). A supplication preferred to one capable of granting it. The right of a British

subject to petition the sovereign or either House of Parliament for redress of grievances is a fundamental principle of the English Constitution and has been exercised from very early times. The right was so generally exercised in the time of Edward I. and Edward II. that it became necessary to formulate rules and methods by which the task of hearing petitions could be facilitated. Those which could not be answered without special reference to the King formed a special branch of business, and it was from the share of the Chancellor in examining and reporting on petitions for clemency and favor that his equitable jurisdiction grew up in the fourteenth century. The nomination of 'receivers' and 'triers' of petitions became a part of the opening business of every Parliament, and proclamation was made inviting all persons to resort to the receivers. The receivers were clerks or masters in chancery; the triers were selected by the King from the Lords, spiritual and temporal, and from the justices. The triers could call to their assistance the Chancellor, Treasurer, Steward, and Chamberlain. After examining into the nature of the grievances for which redress was sought, they referred the petitions to certain of the courts or to Parliament for further action.

In the time of Richard II. the work of receiving and hearing petitions was divided into three parts; one part for the consideration of the King, one for the Council, and one for Parliament. The increasing power of the Commons over taxes and expenditures vastly augmented the importance of the right of petition to the Crown. In the fourteenth century they began the policy of accompanying their grants with petitions for redress in the name of the whole community. Later the petition for redress preceded the grant, and the latter was made conditional upon the promise of the King to provide the desired relief.

Since the revolution of 1688 the practice has been gradually introduced of petitioning Parliament, not so much for the redress of specific grievances as regarding general questions of public policy. Petitions must be in proper form and respectful in language; and there are cases where petitions to the House of Commons will only be received if recommended by the Crown. A petition must, in ordinary cases, be presented by a member of the House to which it is addressed; but petitions from the Corporation of London may be presented by the sheriffs or Lord Mayor. Petitions from the Corporation of Dublin have also been allowed to be presented by the Lord Mayor of that city.

The practice of the House of Lords is to allow a petition to be made the subject of a debate when it is presented; and unless a debate has arisen on it, no public record is kept of its substance, or the parties by whom it is signed. In the House of Commons petitions not relating to matters of urgency are referred to the Committee on Public Petitions, and in certain cases ordered to be printed.

The Constitution of the United States, like that of Great Britain, guarantees to every citizen the right of petition for a redress of grievances.

This constitutional right was practically nullified once in our history by the action of the National House of Representatives in the case of those petitions which related to the abolition of negro slavery. This was the so-called 'gag' resolution of January, 1840, which pro-

vided that no anti-slavery petition should be received or heard by the House of Representatives.

PETITION AND ADVICE, THE HUMBLE. A written constitution of England during the Protectorate. The first Parliament elected according to the Instrument of Government (q.v.) was dissolved because it assumed the function of altering the Constitution under which it was called. A second Parliament was summoned by Cromwell, who was in urgent need of money, to meet on September 17, 1656, but nearly one hundred of its members had to be excluded as hostile to the Protector's Government. After this purge the assembly was ready to carry out Cromwell's wishes asked him to take the title of King, and laid before him for approval a 'Humble Petition and Advice.' This may be regarded as practically an amended constitution, although it did not entirely supersede the Instrument of Government. The Protector declined the royal title, but after some alteration the Humble Petition and Advice was passed, and received his assent on May 25, 1657. On the 26th of the following month it was somewhat modified by the 'Additional Petition and Advice,' designed mainly to explain certain doubts and questions which had arisen. As a result of the two instruments the powers of the Council of State were lessened and those of the Parliament were increased. Henceforth the latter was to consist of two Houses, and the Protector was not again to exclude from sitting therein those who had been legally elected. As some compensation for this loss of authority, he was allowed to appoint his successor and to nominate the life members of 'the other House,' which was substituted for the House of Lords. The text of the Petition is contained in Gardiner, *Constitutional Documents* (Oxford, 1889), and Scobell, *Acts and Ordinances* (London, 1658). Consult also: Masson, *Life of Milton* (ib., 1873-94); Lingard, *History of England*, vol. viii. (ib., 1883). See CROMWELL, OLIVER.

PETITION OF RIGHTS. A declaration of certain rights and privileges of the subject obtained from King Charles I. in his third Parliament (1628). It was so called because the Commons stated their grievances in the form of a petition, refusing to grant the supplies till its prayer was heard. The petition is supposed to be a mere corroboration and explanation of the ancient Constitution of the kingdom; and after reciting various statutes, recognizing the rights contended for, prays "that no man be compelled to make or yield any gift, loan, benevolence, tax, or such like charge, without common consent by act of Parliament; that none be called upon to make answer for refusal so to do; that freemen be imprisoned or detained only by the law of the land, or by due process of law, and not by the King's special command, without any charge; that persons be not compelled to receive soldiers and mariners into their houses against the laws and customs of the realm; that commissions for proceeding by martial law be revoked." The King at first eluded the petition, expressing in general terms his wish that right should be done according to the laws, and that his subjects should have no reason to complain of wrongs or oppressions; but at this reply the Commons expressed dissatisfaction and prepared a remonstrance against the advisers of the King. The King thereupon ordered them not to meddle with affairs of State.

The Commons then took up the charges against Buckingham, when the King yielded to their demands and gave his assent to the petition, June 7, 1628.

PETITIO PRINCIPII, pè-tish'ī-ō prin-sip'ī-ī (Lat., begging of the question). The name given in logic to that species of vicious reasoning in which the proposition to be proved is assumed in the premises of the syllogism.

PETIT JOURNAL, pè-tè' zhōōr'nāl', LE. A daily paper, founded at Paris in 1863, republican in politics. Its low price commands for it an immense circulation throughout the country as well as in Paris.

PETITOT, pè-tè'tò', JEAN (1607-91). A French painter in enamel, born in Geneva. He learned the jeweler's trade and early began to use enamel in connection with his work. About 1634 he went to England and there met Van Dyke, who introduced him to the notice of Charles I. He had apartments in Whitehall and made various portraits of the King and his Court. One of the Duchess of Southampton (1642), in the collection of the Duke of Devonshire, is called his masterpiece. After the King's death he went with the royal family to Paris, where he enjoyed the favor and patronage of Louis XIV. He lived in the Louvre and painted the King, Anne of Austria, Madame de Maintenon, La Vallière, and others of the time. These are included in the collection of his works in the Gallery of Apollo, in the Louvre. They are done with great delicacy and particularly harmonious color. The Revocation of the Edict of Nantes in 1685 sent him back to Geneva, despite the fact that Louis had Bossuet himself try to convert him. He died in Vevey. His works are scarce and of high value.

PETIT-QUEVILLY, pè-tè' ke-vè'yè'. A town of France in the Department of Seine-Inférieure, situated two miles southwest of Rouen. Its principal industries are cotton and linen spinning and the manufacture of shoes, chemicals, starch, and soap. Population, in 1901, 13,948.

PETIT-THOUARS, tōō'r', ABEL AUBERT DU. See DUPETIT THOUARS, ABEL AUBERT.

PE'TO, Sir SAMUEL MORTON (1809-89). An English contractor and politician, born in Woking, Surrey. He was apprenticed to his uncle, a builder, at whose death in 1830 he and his cousin, Thomas Grissell, inherited the business and established the firm of Grissell and Peto. They secured a number of important contracts, among them those for the Conservative and other club-houses, several London theatres, the Nelson Column, the Houses of Parliament, and a large part of the Great Western and the Southeastern railroads. In 1846 they dissolved their partnership, Grissell taking the building and Peto the railroad contracts. The same year Peto took Edward L. Betts into partnership with him, and the new firm secured contracts for railroads in England, France, Norway, Denmark, Russia, Canada, and Australia. During the Crimean War Peto constructed a railroad between Balaklava and the intrenchments, which proved of great service and for which he was created a baronet in 1855. He served several terms in Parliament, but in 1868 was obliged to resign because of the failure of his firm during the financial panic of 1866. Consult *Sir Morton Peto, a Memorial Sketch* (1893).

PETŐFI, pè'tě-fi, SÁNDOR (ALEXANDER) (1822-49). The national poet of Hungary, born

at Kis-Kőrös, in the County of Pesth, December 31, 1822. His father was a butcher and a small landowner in Little Cumania, and bore the name of Petrovics—a name indicating a Slavic origin. In 1838 his father was impoverished by an overflow of the Danube, which destroyed his little estate; and it was only by the help of kinsmen that he was able to rear his son for a profession. Petöfi was sent to the lyceum of the town of Schemnitz. He ran away with a band of German strollers, and again from school at Oedenburg, this time enlisting as a common soldier. After two years in the army, a physician brought about his discharge, and he went home. He afterwards went to Pápa, to complete his education. In 1842 he left Pápa to join a troop of comedians, but he soon parted from them. He made his way to Pressburg, and afterwards to Pesth, where he got some employment as a translator from the English and the French. Going to Debreczin, he made another venture as an actor, playing the part of Othello, but again failed. At last he had the good fortune to be invited to contribute to a newspaper at Pesth. On his arrival at that city he exchanged the name of Petrovics for Petöfi, and it was not long before he became famous as a lyric poet.

Petöfi introduced himself to Vörösmarty, then the poet of Hungary, who received the shabby stranger coldly, but when he had listened to his verses he exclaimed, "Hungary never had such lyrics; you must be cared for." And from that time he treated Petöfi as a son. Petöfi was almost at once received into the literary national circle, at the expense of which was published his *Versek*, which appeared in 1844. This was rapidly followed by other volumes, which won boundless popularity. In March, 1848, he was the leader in the first movement of the Hungarian revolution at Pesth, and he became, by speech and pen, the advocate of the independence of Hungary. His poem, *Talpra, Magyar!* (Up, Magyars!), like later stirring lyrics, excited great patriotic enthusiasm. He enlisted in the National Army, and in the beginning of 1849 he was appointed adjutant and secretary to General Bem. Petöfi was at the battle of Schässburg (Segesvár), fought on July 31, 1849, in which Bem's army was overwhelmed. He was never heard of after that day. It is believed that he was killed by a Cossack in the flight, and that his body, so mangled as to escape recognition, was buried with the multitude of Magyar dead left upon the field. His countrymen at first believed that he was not dead, but a prisoner in an Austrian dungeon. In 1877 a rumor gained currency that Petöfi was still living as a Russian prisoner in one of the mines of Siberia, and the Austrian Government was forced by public opinion to institute official inquiries in order to prove the groundlessness of the report. On October 15, 1882, a monument to the poet was unveiled in Petöfi Square at Budapest, and the house in which he was born at Kis-Kőrös was purchased with the intent to preserve it. He left a widow and one son.

Petöfi is the greatest literary genius of Hungary, and he ranks, by common critical consent, among the greatest lyric poets of the last century. The most beautiful of his poems are his impassioned shorter lyrics, of which he published several collections, under the titles *Cypress Leaves on Etelka's Grave*; *Pearls of*

Love; *Starless Nights*; *Clouds*. The most celebrated of his narrative poems—also the longest—are: *János, the Hero*; *Istok, the Fool*. His earliest work was *The Wine-Drinkers*, published in 1842; his latest, *The Assessor of the Judgment-Seat*, which appeared in 1849. Petöfi translated Shakespeare's *Coriolanus* in 1848. A volume, containing a poem entitled *The Apostle*, was suppressed by the Austrian Government after the pacification of Hungary. Petöfi published a novel, *The Hangman's Rope*, which failed, like his play *Tiger and Hyena*, and he wrote several volumes of tales, criticisms, and sketches of travel; he also translated largely from English and French into Magyar.

A selection from his earlier pieces, translated into German, was published in 1845; and several volumes of translations from his writings have since appeared in Germany. His poems have also been translated, in part, into French, Flemish, Polish, Danish, and Italian; and an English version, comprising his finest poems, was published in London in 1866 by Sir John Bowring. A critical edition of his works is in preparation by A. Haras, who has already published a number of volumes. Consult: Fischer, *Petöfi's Leben und Werke* (Leipzig, 1889); Bubenik, *A. Petöfi, eine Skizze seines Lebens und Dichtens* (Vienna, 1882); and the biographies in Magyar by Zilahy (Pest, 1864) and A. Vutkovics (Pressburg, 1883).

PETOSKEY. A city in Emmet County, Mich., 43 miles southwest of Cheboygan; on Little Traverse Bay, an arm of Lake Michigan, and on the Grand Rapids and Indiana and the Pere Marquette railroads (Map: Michigan, H 3). Steamers ply to several of the important lake ports. Petoskey is an attractive summer resort, and has a public library and the Petoskey Normal School. There are iron works, a foundry and machine shops, lime kilns, lumber and flour mills, a leather factory, rug and carpet factory, etc. The water-works and electric light plant are owned by the municipality. Petoskey was incorporated as a village in 1878 and in 1896 became a city. Population, in 1890, 2872; in 1900, 5285.

PE'TRA (Lat., from Gk. πέτρα, rock). An ancient city of Northern Arabia, in the 'desert of Edom,' about 70 miles northeast of Akabah (Map: Turkey in Asia, F 7). It occupied a narrow rocky valley, overhung by mountains, the highest and best known being Mount Hor, directly to the west. Petra owes its name to its peculiar character as a 'rock-city,' which also gave it the Hebrew name, *Sela'*, 'rock' (II. Kings xiv. 7; Is. xvi. 1). Its importance was due to its location on the great highway from the Red Sea and Arabia northward, while its situation protected it from Bedouin raids. It thus became an important centre of trade. In the ninth century B.C. it was captured by King Amaziah of Judah, who changed the name to Joktheel, according to II. Kings xiv. 7. In the second or third century B.C. it fell into the hands of the Nabateans (q.v.). From the time of Pompey it was tributary to the Romans. In 105 Trajan made a province of Arabia Petrea (the name being taken from the city) and Hadrian granted certain privileges to the town. Christianity was introduced at an early period and Petra became the seat of a bishop. In the fourth or fifth century trade began to follow other channels and the importance

of Petra declined. After the Mohammedan conquest the very site was unknown to Europeans until early in the nineteenth century, when it was visited by Seetzen and Burekhardt. Since then the remarkable remains of Petra have become well known. They stand in a small open irregular basin, about half a mile square, through which runs a brook, and are best approached by an extraordinary chasm or ravine called the *Sik* (or Wady Musa), narrowing as it proceeds till in some places the width is only 12 feet, while the rocky walls of red sandstone tower to the height of 80 to 200 feet. Hardly a ray of sunlight can pierce this gloomy gorge, yet it was once the highway to Petra, and the remains of an ancient pavement can be traced beneath the brilliant oleanders that now cover the pathway. All along the face of the rocky walls are rows of cave tombs, hewn out of the solid stone, and ornamented with façades. These are also numerous elsewhere in and about the city. The principal ruins are: (1) *El-Khazneh* ('the treasure house'), believed by the natives to contain, buried somewhere in its sacred inclosure, the treasures of Pharaoh; it directly faces the mouth of the gorge of Wady Musa and was probably the great temple of the Petreans; (2) the amphitheatre, capable of containing from 3000 to 4000 spectators; (3) certain remarkable tombs; (4) the *Dair* or convent, a huge monolithic temple, hewn out of the side of a cliff and facing Mount Hor; (5) the citadel; (6) *Kasr Fir 'aun*, or Pharaoh's palace, the best preserved ruin of Petra, east of which are the remains of a triumphal arch. Most of the architecture is Greek of the third or fourth century, but forms of native art are intermixed, and there are also traces of Egyptian influence, pyramidal forms being not unknown. Consult: Laborde and Linant, *Voyage dans l'Arabie Pétrée* (Paris, 1830); De Luynes, *Voyage aux bords de la Mer Morte, Petra*, etc. (ib., 1875); Palmer, *The Desert of the Exodus* (Cambridge, 1871); Visconti, *Diario di un viaggio in Arabia Petrea* (Rome, 1872).

PETRARCH (It. **PETRARCA**, pâ-trär'ká), FRANCESCO (1304-74). An Italian poet and humanist, born at Arezzo, July 20, 1304, of a family then in exile from Florence, because of its affiliation with the party of the Bianchi. Francesco changed his father's name Petracco to Petrarca. The wanderings of the family took the lad to Pisa in 1310 and in 1313 to Avignon in France. After some preliminary training he was sent to Montpellier in 1319 to study law. After some four years there he went to Bologna unwillingly to continue his studies in jurisprudence, for he shrank from pettifoggery, though he admired the majesty of Roman law. He had an unbounded love for classical lore, and to this he devoted himself after the death of his father (1326), who had once flung his son's books of poetry and rhetoric into the flames, allowing the half-burnt manuscripts to be rescued at Francesco's passionate entreaty. In 1326 he returned to Avignon and took minor orders as an ecclesiastic. Thus he was not bound by the stricter laws of ecclesiastical discipline, and yet he could enjoy the numerous religious benefices accorded to him. It may be said here that Petrarch was no skeptic like Boccaccio and that his piety was of a worthy kind. He entered into the gay and fashionable life of Avignon, and there he met in 1327 that Laura who was to inspire his

imperishable lyrics. The historical reality of this personage has often been doubted. On the other hand, many endeavors have been made to identify her with this or that woman. The only probable identification seems to be that with Laura de Noves, wife of Hughes de Sade and mother of eleven children at the time of her death by the plague of 1348. However unpoetical the circumstances of her life may have been, she aroused in the poet that spirit of devotion which stirred him in the composition of sweeter lyric verse than had yet been heard in Italy.

Yielding to his nomadic impulses, Petrarch roved about for a while, traveling through Southern France and Germany in 1333, and entering Rome for the first time in 1337. In 1337, eleven years before Laura's death, some unknown woman bore Petrarch a son, Giovanni, and probably it was she who gave him a daughter Francesca in 1343. These children were legitimized by Papal bulls. At intervals he was back again in Avignon, and thence he withdrew for a while to the solitude of Vacluse (Valchiusa). It was here that he received in 1340 from the universities of Paris and of Rome invitations to visit those places and receive the crown of the poet laureate. He decided in favor of the University of Rome, and on Easter Sunday, 1341, he was publicly crowned on the Capitol. He now visited many Italian cities and in 1343 was sent by Pope Clement VI. on an embassy from Avignon to Naples. Resuming his rambles about Italy, he had the good fortune to discover some of the letters of Cicero, just as he had earlier brought to light two of Cicero's orations. He may also have found a part of the *Institutiones* of Quintilian. At Parma he got tidings in 1348 of Laura; in 1350 he was in Florence with Boccaccio, and in 1351 Boccaccio visited him at Padua. Having refused several offers of apostolic secretaryships from the Holy See, he left Avignon for good in 1353. About this time began his connection with the Visconti in Milan, who in 1356 sent him to Prague as ambassador to Charles IV. of Germany, and in 1360 he undertook a similar mission to Paris. The remaining years of his life were mainly spent in scholarly pursuits at Arqua, near Padua, and there he died July 18, 1374.

Petrarch wrote much more in Latin than in Italian, and prided himself more on his Latin writings than on those in Italian. His works in Latin consist chiefly of a poem in hexameters, the *Africa*, dealing with the undertakings of Scipio Africanus, and of moral, historical, and other scientific treatises, as well as of letters. All his Latin compositions are now forgotten, yet mention may be made of the *Carmen Bucolicum* and the *Epistola Metrica*, which contain many allusions to events of his time and life, as do also his *Letters*, for which reference may be made to Voigt, "Die Briefsammlungen Petrarca's," in the *Abhandlungen der historischen Classe der bayerischen Akademie der Wissenschaften*, vol. xiii. (Munich, 1883). Petrarch's Latin shows the influence of Seneca and of his beloved Saint Augustine, rather than of the best classics. Indeed, Petrarch still belongs to the mediæval school, and it remained for a Poliziano and a Bembo to prepare the way for an Erasmus. The *Canzoniere*, containing his Italian verse, is the work for which Petrarch is now remembered. It comprises sonnets, *canzoni*, *sestine*, *ballate*, and madrigals, mainly of an amorous nature, and de-



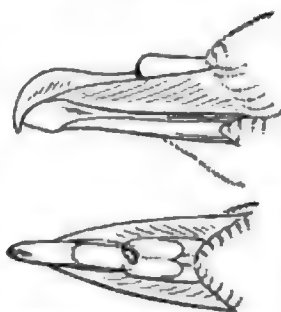
PETRARCH

FROM AN ENGRAVING BY RAFFAELLO MORGHEN AFTER A PAINTING BY TOFANELLI

voted to an account of his love for Laura, although some deal with political and other subjects. On the formal side Petrarch shows a considerable advance over his forerunners, whose methods he developed. As to the love that he sang, it can hardly be doubted that its object was a single and concrete one, even though the description of the passion often takes a highly symbolized and idealized form. Certainly Laura is not a woman, but woman in general. She has no strongly individualized traits. She is rather the noblest abstraction of fair womanhood to be found in literature between Dante's Beatrice and the period when poets began to sing of women undeniably flesh and blood. In the minute psychological examination of his own sentiments Petrarch shows some knowledge of the human heart, but, after all, his sonnets lack striking individuality. What one notices most is the poet's astounding ability to vary a few lovely or noble themes. In his pictures of natural scenery he displays an observation of the external phenomena of the world not to be found in other writers of his time. Yet Petrarch's descriptions of the beauties of Valchiusa might fit many another place as well. Valchiusa is not more individualized than Madonna Laura. The *Trionfi*, published with the other Italian verse of the *Canzoniere*, are an imitation of the allegorical vision of Dante. The vogue of the lyrics of Petrarch became enormous almost at once after the appearance of the first edition of the *Canzoniere* (Venice, 1470). It continued for many generations and spread abroad. Thus a very marked influence of his poetical methods is to be noted in Spanish verse of the sixteenth and seventeenth centuries. As a humanist, Petrarch went far to revive the study of Greek literature, although he was himself ignorant of the language; he was most successful, however, in the impulse which he gave to the study of Latin letters. As a writer of Italian, he shows in his style a degree of precision and refinement which indicates an improvement upon the art of Dante. But his style is marked by artificiality and many conceits such as we find in the troubadours.

Consult the edition of Petrarch's Latin and Italian works, published at Basel in 1554; also a critical edition of the *Africa* by Corradini (Padua, 1874, with an Italian translation by Gaudo, Oneglia, 1874); the *Poemata Minora* (Milan, 1829-34); the editions of the *Canzoniere* by Mestica (Florence, 1895), and by Carducci and Ferrari (Florence, 1899); the editions by Fracassetti (Florence, 1859-63) of the *Epistolæ de Rebus Familiaribus et Variæ*, published in Italian as the *Lettere di Francesco Petrarca (familiari e varie) volgarizzate e dichiarate* (Florence, 1863-67), and *Lettere senili, etc.* (ib., 1869-70); Marsand, *Biblioteca petrarchesca* (Milan, 1820); Hortis, *Catalogo delle opere di Francesco Petrarca, etc.* (Triest, 1874); Ferrazzi, *Bibliografia petrarchesca* (Bassano, 1887); Fiske, *A Catalogue of Petrarch Books* (Ithaca, N. Y., 1882); id., *A Hand-List of Petrarch Editions in the Florentine Public Libraries* (Florence, 1886); Mézières, *Pétrarque, etc.* (Paris, 1867); Geiger, *Petrarca* (Leipzig, 1874); P. de Nolhac, *Pétrarque et l'humanisme* (Paris, 1892); Körting, *Petrarca's Leben und Werke* (Leipzig, 1878); D'Ovidio, "Madonna Laura," in the *Nuova Antologia* (July-August, 1888); Segre, *Petrarca e Chaucer* (ib., 1899).

PETREL (Fr. *pétrel*, from ML. **Petrellus*, diminutive of Lat. *Petrus*, Peter; so called in allusion to its walking on the sea, like the Apostle Peter). A sea-bird of the family Procellariidæ, containing several genera, and distinguished by having the bill hooked at the tip, and hard, and the nostrils united into a tube along the culmen, and the hind toe merely rudimentary. Petrels have very long and pointed wings, and the



TYPE OF PETREL BILL.

Side and top views of bill of pintado petrel (*Daption Capensis*); showing the tubular nostrils.

tail square or slightly forked. They possess great power of wing, and are among the most strictly oceanic of birds. Among the 70 species of the Procellariidæ are reckoned the fulmars and shearwaters (qq.v.), besides the many petrels proper, of which the stormy petrel is an example. They run along the surface of the waves in a remarkable manner, and with great rapidity

—particularly when the sea is stormy and the mollusks and other animals that form their food come in abundance to the surface. From the frequency with which flocks of these birds are seen in windy weather, or as heralds of a storm, they are superstitiously regarded by sailors. They are to be seen in the seas of all parts of the world, but are more abundant in the Southern than the Northern Hemisphere.

The names 'stormy petrel' and 'Mother Carey's chicken' are sometimes more particularly given to *Procellaria pelagica*, a bird scarcely larger than a lark, 5½ inches long, and the smallest web-footed bird known. It is sooty black in color, with a little white on the wings and some near the tail. Two other species of petrel are of frequent occurrence in the North Atlantic, Leach's petrel (*Oceanodroma leucorhoa*) and the better known Wilson's petrel (*Oceanites oceanicus*). The former may be recognized by its larger size (eight inches long) and its forked tail. It breeds among the islands in the Bay of Fundy, and in similar places in the North Pacific. The Wilson's petrel, on the other hand, is a bird of the Antarctic regions, and migrates during its winter (our summer) into the Northern Hemisphere. It is easily distinguished by its small size (seven inches long), the yellow on the webs of the feet, and the white upper tail-coverts. Besides these three species, no less than a dozen others have been recorded from the coasts or inland waters of the United States. Of these, one is a common Pacific Coast species, two others are known only from the coast of southern California, while the remaining nine are stragglers from the Southern Hemisphere. The 'cape pigeon' (*Daption Capensis*), or 'pintado,' is a very large species, well known to voyagers about the Cape of Good Hope; and in the Indian Ocean and about the shores of Australia occurs the giant of the family, the huge 'bone-breaker' (*Ossifraga gigantea*), which sailors call 'stinkpot,' and by other names referring to its vile odor. Petrels generally breed in holes and clefts of rock, or secluded coasts, and are likely to visit their nests (except when the female is sitting) only at night. Only a single egg is laid, as a rule, which is

white, or with a few fine reddish dots. See Colored Plate of EGGS OF AMERICAN WATER AND GAME BIRDS.

Consult: Evans, *Birds* (London, 1901); Baird, *Water Birds of North America* (Boston, 1884).

PETRI, pā'trē, OLAUS (1493-1552). A Swedish reformer, born at Orebro, in the Province of Nerike. He studied at Upsala and the University of Leipzig, and afterwards at Wittenberg, where he continued his theological studies under Luther and Melancthon. Upon the recommendation of King Gustavus I. he was appointed town clerk of Stockholm and at the same time preached in the cathedral, where he fearlessly expounded and urgently pleaded for the introduction of the reformed religious service. He wrote the first hymn-book in Swedish, also a Swedish chronicle (to 1520). This was published in the *Scriptores Rerum Suecicarum Medii* (1818). From 1531 to 1533 he was chancellor of the King, but his enthusiasm got him into trouble with his sovereign, and at one time seemed likely to cost him his life.—His brother, LAURENTIUS (c. 1499-1573), was first Lutheran Archbishop of Sweden, and was born at Orebro. About 1527 he was appointed professor of theology at Upsala, and in 1551 he was elected first Lutheran Archbishop. He devoted his life to establishing the Reformed Church in this country. He drew up the first Swedish Evangelical Church order that was printed (1571), and with his brother translated the Bible into Swedish. He also wrote many theological treatises defending the principles of Church reform.

PETRIE, pē'trī, WILLIAM MATTHEW FLINDERS (1853—). An English Egyptologist, born at Charlton, June 3, 1853, the son of William Petrie and Anne, daughter of Captain Matthew Flinders, the Australian explorer. He was educated at private schools, and at first turned his attention to the study of British archaeology. His earliest works were *Inductive Metrology* (London, 1877), and *Stonehenge: Plans, Descriptions and Theories* (London, 1880). After 1880 he occupied himself with the investigation of Egyptian antiquities, and made many valuable discoveries. Between 1884 and 1886 he excavated the site of Tanis, Naukratis, and Daphne and revealed the existence of ancient Greek settlements at the two latter places. From 1888 to 1890 he worked in the Fayūm, finding a number of interesting funeral portraits at Hawara, and gathering an extensive collection of valuable papyri, chiefly from the ruins of Kahun and Gurob. In 1890 he discovered and excavated for the Palestine Exploration Fund the site of ancient Lachish at Tell el-Hesi, in Palestine. In 1893 he received the degree of D.C.L. from the University of Oxford and was appointed to the newly founded professorship of Egyptology at King's College, London. In 1895 he discovered the remains of a prehistoric race at Nagada, and the following year found at Thebes the stele of Menepfah, containing the sole mention of Israel occurring in the Egyptian inscriptions. After 1899 he investigated the very interesting tombs of the First Dynasty at Abdos. Among his more important works may be mentioned: *The Pyramids and Temples of Gizeh* (1883); *Tanis, Memoirs II. and V. of the Egyptian Exploration Fund* (1885-87); *Hawara* (1889); *Kahun* (1890); *Ten Years' Diggings* (1893); *A History of Egypt* (2d ed. 1897); *Egyptian Tales* (1895-99); *Religion and Conscience in Ancient Egypt* (1898); *Royal Tombs of the First Dynasty* (1900-01).

PETRIFICATION (from Lat. *petra*, from Gk. πέτρα, rock + *facere*, to make). A name given to organic remains found in the strata of the earth, because they are generally more or less mineralized or made into stone. The word has fallen into disuse, having given place to the term fossil (q.v.).

PETRIFIED FORESTS. The same as fossil forests (q. v.).

PETROBRUSIANS. See BRUYS, PIERRE DE.

PETRIFIED WOOD. Plant remains in which the woody tissue has been replaced by mineral matter, usually some form of silica. The name dendrolites has been given to petrified fragments of plants that are commonly found in the coal measures. See FOSSIL FORESTS.

PETROGRAPHIC PROVINCE (from Gk. πέτρα, *petra*, rock + γράφειν, *graphein*, to write). A region within which the igneous rocks reveal a relationship (so-called consanguinity) in chemical composition, which may be referred to a community of origin. This relationship may be chemically a close one, but the rocks have widely varying mineralogical composition, or the kinship may be restricted to one or more of the chemical components in the rocks.

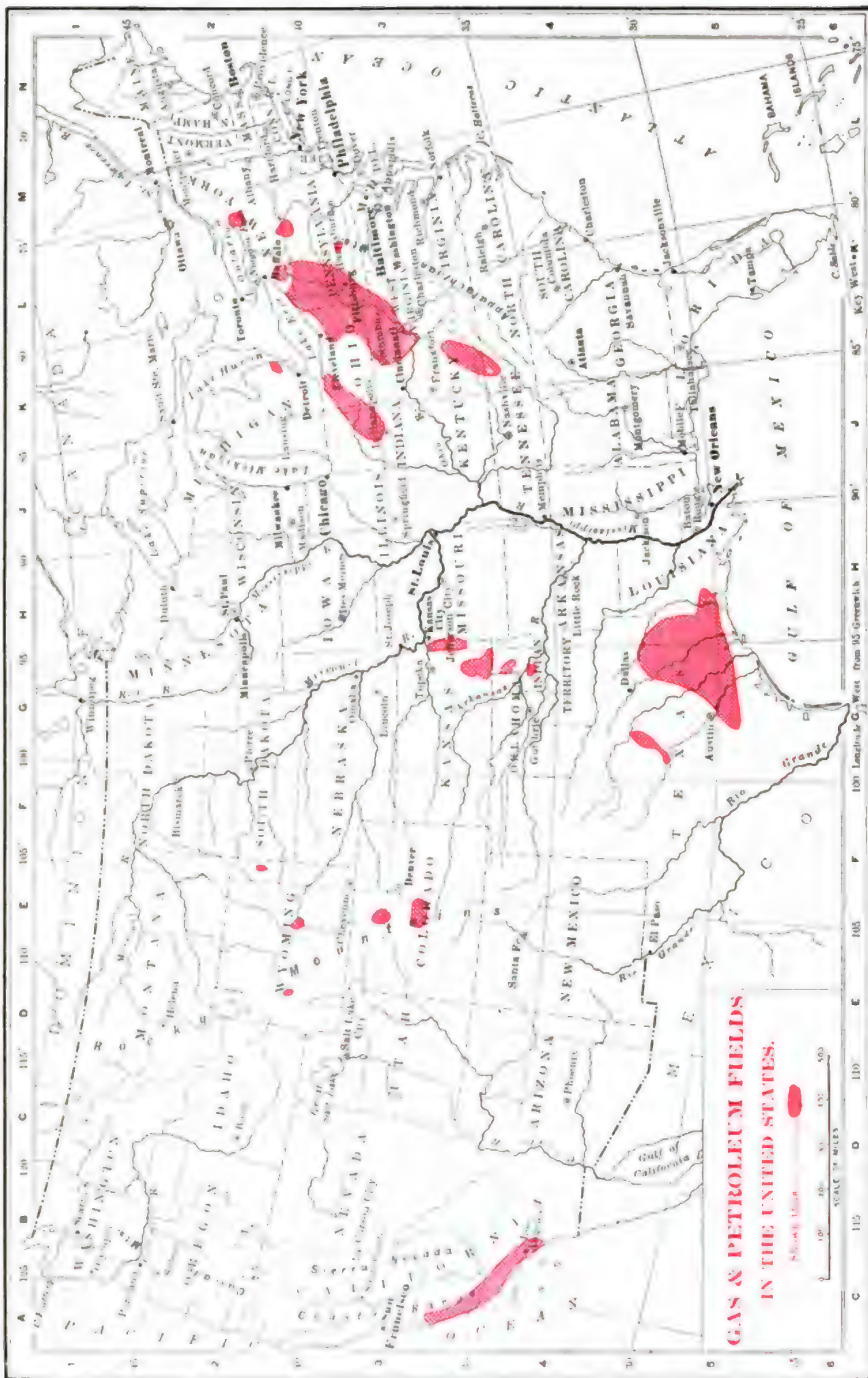
PETROGRAPHY. See PETROLOGY.

PETROLATUM (Neo-Lat., from ML. *petroleum*, rock oil, from Lat. *petra*, from Gk. πέτρα, rock + *oleum*, from Gk. έλαιον, *elaion*, oil). A residue from the distillation of petroleum, prepared by filtration, and known to the trade by different names, as petroleum jelly, vaseline, and cosmoline. It is an amber-colored, translucent, semi-solid substance, slightly soluble in alcohol, and readily so in ether. It does not become rancid, and is largely used in pharmaceutical preparations, especially ointments, instead of the ordinary fats. It is taken inwardly as a remedy for coughs and colds; it is an excellent lubricant, and will protect polished steel from rust. The term vaseline, while often applied to petrolatum in general, is really a trade name, protected by copyright, belonging to one particular preparation. See PETROLEUM.

PETRO'LEA. A town of Lambton County, southwestern Ontario, Canada, situated on a branch of the Grand Trunk Railroad, 16 miles east of the Saint Clair River. In the neighborhood are numerous oil wells producing yearly about 20,000 barrels of crude petroleum. Population, in 1891, 4357; in 1901, 4135.

PETROLEUM (ML., rock oil). A natural rock oil composed of hydrocarbons. It is classed with natural gas and asphalt as a bitumen; natural gas containing the more volatile members of the series, asphalt the solid, while petroleum is composed chiefly of the liquid members, although it contains a small proportion of both solid and gaseous compounds. Other names for petroleum are mineral oil, rock oil, and naphtha, the last being employed especially in Europe for the Russian oils.

HISTORY. Petroleum has long been known in various parts of the world by its appearance in the form of bituminous springs or as a floating scum on the surface of pools. It was used at a very early period in the walls of Babylon and Nine-



veh, and Herodotus has described the occurrence of oil springs in the island of Zachynthus, now Zante. In Roman times petroleum was obtained from Sicily and burned in lamps. The first mention of petroleum in America (about 1635) is in a letter written by the Franciscan missionary Joseph de la Roche d'Allion, who refers therein to springs found in the region of what is now southwestern New York or northwestern Pennsylvania. The early settlers of Pennsylvania obtained small quantities of oil by digging wells and scooping out the liquid which seeped in from the surrounding rocks. The drilling of brine wells on the western slopes of the Alleghenies in the early part of the nineteenth century led to the discovery of petroleum at greater depths. A well sunk near Burkeville, Ky., in 1829, yielded great quantities of oil, which flowed to the surface and was drained into the Cumberland River, where at one time it was set on fire. The most important application of petroleum in the early days was in medicine; it was utilized as an illuminant only to a small extent, owing to its offensive odor. In the year 1853 Dr. Brewer suggested the use of petroleum for lubricating and illumination purposes, and set to work devising means for purifying the crude product. The Pennsylvania Rock-Oil Company was organized in 1854 to drill for oil; although its first well yielded from 400 to 1000 gallons a day, the company was not successful in its business ventures. Five years later, however, Col. E. L. Drake put down a productive well on land leased from this company, and the successful outcome of this undertaking may be said to mark the beginning of the oil industry in the United States. The news of the discovery was followed by a rush of adventurers from all parts of the country, so that by 1860 more than 100 square miles of territory in the vicinity of Oil Creek had been shown to be productive. Much of the oil which reached the surface was allowed to escape, owing to the lack of storage and transportation facilities. As the explorations were extended new fields were opened along the Allegheny River in Pennsylvania, also in Ohio and West Virginia. The Lima field of Ohio and Indiana was first developed in 1885, while the California fields have become large producers only in the last few years. The discovery made in the Beaumont region of Texas early in 1901, which has been followed by extraordinary development, is the most important event in the recent history of petroleum.

Among foreign countries, Russia is the largest producer of oil and the strongest competitor of the United States in supplying the world's markets. Operations have been conducted in this country since 1873. The largest fields are located on the Apsheron Peninsula, Baku being the chief centre of the industry. The distillation of petroleum from shales was first undertaken in France in 1834, and was successfully introduced into Scotland in 1850. The importation of shale oil into America led to the use of cannel coal for distilling; this industry gained considerable importance in the United States previous to 1860, but quickly succumbed when the first wells became productive.

ORIGIN AND GEOLOGICAL OCCURRENCE. The geological history of petroleum and natural gas are closely connected, so that what is said of one practically holds true of the other. Petroleum is always found in sedimentary rocks. For many

years it was known only in sandstones or shales, and the term oil-sand was applied to the containing strata. Subsequently oil was struck in limestone in Ohio, thus forming a new type of occurrence, although one which has since proved to be rather unique.

Petroleum is considered by most geologists to have been derived by the destructive distillation of either animal or vegetable matter contained in the rocks. The products of this distillation have in some cases accumulated in the strata in which they were formed, while in others they have escaped upward into the overlying beds, in some instances even reaching the surface.

Petroleum occurs in all geological formations, from the Lower Silurian or Ordovician up to the Tertiary; it is chiefly of importance in the Silurian, Devonian, and Tertiary rocks. The relation of the distribution of oil to geological structure was not recognized until as late a date as about 1880, at which period geologists began to find the cause of oil accumulation and pressure. Prof. Edward Orton, of Ohio, was the most prominent investigator in this field. In all regions where petroleum occurs the strata are not only disturbed, but they are bent into anticlinal or arch-shaped folds. If the rocks are porous the gas tends to collect at the summit of the anticlinal fold or arch, while the oil collects in the flanks of the fold. Salt water is usually associated with the gas and oil, and, being heavier, accumulates in the flanks of the anticlinal or in the neighboring synclinal folds. There is little use of searching for oil in regions where the strata are flat; and it is rarely found in highly folded regions, for where the flanks of the fold have a dip of more than 10° the bending of the rocks is often sufficient to create cracks through which the oil or associated gas will escape to the surface. The rock in which the oil is found is spoken of as the reservoir, or oil-sand, and it is essential that this rock should be porous. The degree of porosity not only influences the quantity of oil which the rock can hold, but it may also influence the rate of flow of the well. Some wells may yield as little as 15 barrels per day; others may reach a production of 50,000 or 60,000 barrels per day. The porosity of the oil-bearing formation may also change from place to place and would account for the location of a profitable well at one point and a barren one a short distance from it. In order to prevent the escape of oil from the containing stratum it should also be overlain by a rock of more or less impervious nature. In many wells the petroleum flows to the surface under pressure. Professor Orton believed that the oil was under hydrostatic pressure; according to his theory, the pressure in different wells of the same basin or pool ought to be nearly constant. In any region, however, the pressure usually diminishes with time. While Orton's theory may be true for Ohio, it seems doubtful whether hydrostatic pressure will account for the great oil and gas pressure found in some regions. The quantity of oil which a given territory can yield is often very great, since some sand will hold as much as one-eighth of its bulk in oil under pressure. This means that there is 1.5 inches of oil to every vertical foot of oil-sand, or about 5000 cubic feet per acre.

CHARACTER AND COMPOSITION. Petroleum is a liquid of varying color, being black, brown, red, amber, or straw, and by reflected light often ap-

pearing greenish in tint. The black oils in the United States are obtained from the Trenton limestone of Ohio and from California; the Pennsylvania oils are of amber tint. In addition to the hydrocarbons, which are the chief constituents of petroleum, the following substances may be present: Sulphur, nitrogen, hydrogen sulphide, carbon disulphide, arsenic, and phosphorus. The carbon percentage may vary from 79.5 to 88.7 per cent.; the hydrogen from 9.6 to 14.8 per cent.; the sulphur from 0.7 to 2 per cent., and in rare cases even 3 per cent.; nitrogen from 0.008 to 1.1 per cent. The hydrocarbons of all crude petroleum fall either into the paraffin or olefin group, those of America belonging chiefly to the first and those of Russia to the second group. The number of different members of the paraffin series present may be very large; some Pennsylvania oils, for example, have yielded 18 different paraffin compounds, as well as a number of substances belonging to the ethylene group. The hydrocarbons of the olefin series predominate in the Russian oils and many others. The composition of crude petroleum from a number of different localities is given below:

boniferous, the latter being especially important in West Virginia. Four fields are recognized in Pennsylvania, the oil varying from amber to dark green. Ohio contains two districts. One of these, the Mecca-Belden field, is of minor importance; a second in eastern Ohio is a westward extension of the West Virginia area. The Lima-Indiana field extends from Lima southwestwardly into Indiana, lying without the Appalachian region as usually defined. The oil here is carried by the Trenton limestone of the Lower Silurian, the depth being about 1300 feet; it was first discovered near Findlay, Ohio. The oil is dark and heavy and resembles the Tennessee and Canada oils in its sulphur contents. Farther south oil is obtained from the Carboniferous in eastern Kentucky and in Tennessee. While new pools are discovered occasionally in the Eastern fields, the most important developments in recent years have been in the Southwestern and Western States.

Oil has been found at a number of localities in the Tertiary rocks of eastern Texas, and several fields, including the Corsicana, Nacogdoches, Beaumont, Elgin, San Antonio, and Sugar

THE CHEMICAL COMPOSITION OF PETROLEUM.

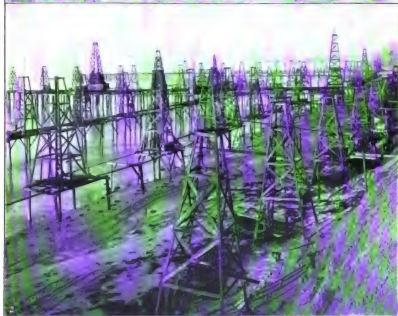
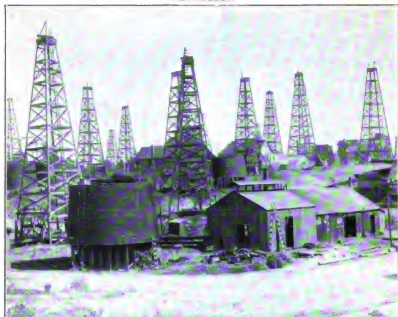
LOCALITY	C	H	O	Specific gravity H ₂ O = 1
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	
Heavy oil, West Virginia.....	83.5	13.3	3.2	.873
Light oil, West Virginia.....	84.3	14.1	1.6	.8412
Heavy oil, Pennsylvania.....	84.9	13.7	1.04	.866
Light oil, Pennsylvania.....	82.0	14.8	3.2	.816
Parma, Italy.....	84.0	13.4	1.8	.786
Hanover, Germany.....	80.4	12.7	6.9	.892
Gallcia, Austria.....	82.2	12.1	5.7	.870
Light oil, Baku, Russia.....	86.3	13.6	0.1	.864
Heavy oil, Baku, Russia.....	86.6	12.3	1.1	.868
Java.....	87.1	12.0	0.9	.923
Beaumont, Texas.....	86.8	13.2	.....	.920

The gravity of an oil is most commonly expressed in the degrees of the Baumé (B.) scale, on which water has a specific gravity of 10 degrees. The oils from Allegany County, N. Y., run from 38° to 41° B.; from Venango County, Pa., 46° to 48° B.; Warren County, Pa., 43° B.; Lima County, Ohio, 36° to 38° B.; Florence, Colo., 30° B. Russian oils average about 32° B. The lighter oils yield a better quantity of illuminants, while the heavier ones often serve well for lubricating purposes, etc. On exposure to the air many petroleum lose their more volatile constituents and change to a viscous or even solid condition resembling asphalt. The lighter colored varieties are often quite liquid, while the black or dark oils may be slightly viscous. The temperature at which crude petroleum solidifies ranges from 82° F. in some Burma oils to several degrees below zero in certain Italian oils. The flashing point may be equally low in the latter, but in others found on the Gold Coast it rises as high as 370° F. The boiling point likewise shows considerable variation, from 180° F. in some Pennsylvania oils to 338° F. in certain oils found at Hanover, Germany.

DISTRIBUTION OF PETROLEUM. The most noted and most productive field in the United States is the Appalachian, which extends along the western slope of the Appalachian Mountains, from southwestern New York (and eastern Ohio), through western Pennsylvania into West Virginia, Kentucky, and Tennessee. The oil-bearing sandstones are partly Devonian and partly Car-

Lake, are now being exploited. The first mentioned supplies both light and heavy oils, which are obtained from depths of 950 and 1175 feet respectively. The first well put down in the Beaumont field yielded 75,000 barrels of oil a day, spouting the liquid in a six-inch column to a height of 160 feet; nine days elapsed before the flow was brought under control. The Beaumont oil is a dark asphaltic oil with much sulphur, and is obtained at a depth of 1000 feet. Petroleum has also been discovered in western Louisiana, especially near Jennings, where it is found at a depth of 1800 feet. Southeastern Kansas and northeastern Indian Territory produce some oil from the Cherokee shales and sandstones of the Carboniferous. In Wyoming petroleum occurs in 18 scattered fields, and in formations ranging from the Upper Carboniferous to the Upper Tertiary, but mostly in those of Mesozoic age. The Cretaceous sandstone at Florence, Colo., yields a heavy oil which resembles that of Wyoming in being valuable as a lubricant. Oil has also been obtained in moderate quantities at Boulder, Colo. It is obtained at depths of as much as 2850 feet, and has a gravity of 42.5° B. California contains several oil fields in the southern part of the State. The rocks are of Cretaceous to Neocene age. The oil has an asphaltic base, and is chiefly valuable as a fuel. Petroleum is also known to occur in Washington, Arizona, New Mexico, Montana, and Utah. A moderate amount of oil is obtained from Lambton County, Ontario, at a depth of 400 to 500 feet. Cuba is known to have at

PETROLEUM



1. OIL WELLS AT LOS ANGELES, CALIFORNIA

2. OIL WELLS ON THE BEACH AT SUMMERFIELD CALIFORNIA



least small supplies of oil, and a limited quantity has been exported from Porto Rico. In Mexico active exploration has been carried on at several points in the Gulf Coast region with the result of finding supplies of good oil around Tampico. It has an asphalt base. Of the South American countries, Peru is the most important petroleum producer, most of the output coming from the Zorritos field. Petroleum is also said to occur in Venezuela, Argentina, and Ecuador, but it is not taken out of the ground to any extent.

Russia is not only the most important foreign producer of petroleum, but the largest producer in the world, the fields in the Baku region of South-eastern Russia supplying enormous quantities annually. The greater part of the output comes from the Baku field proper, although important quantities are obtained from the Grosni field, 500 miles north of Baku. Rumania contains several promising oil fields, which occur in the same formations as the Russian fields. In Germany oil is obtained near Hanover, and also in Alsace, while some is supplied by the Carboniferous rocks of Great Britain, but does not begin to supply the local demand. In Japan petroleum is obtained on the northwestern coast, and some of it is refined. The crude material sometimes yields 60 per cent. of illuminating and lubricating oils. A high paraffin oil is found in Java, and Sumatra, Borneo, and the Burma field of India are important producers. While petroleum is known to occur in the Philippines, little is obtained, and that by primitive methods; the islands of Panay, Leyte, Guimaras, Negros, Bohol, Mindanao, and Cebu all carry some petroleum.

MINING AND TRANSPORTATION OF PETROLEUM. The modern method of drilling for petroleum is similar to that used in sinking gas and artesian wells. The most prominent feature of the oil-drilling outfit is the derrick, which is a tall, pyramid-like wooden frame about 75 feet high, 12 feet square at the base and about 3 feet at the top. The cost of a rig, as it is called, ranges from \$200 to \$275. The diameter of the well hole is 10 or 12 inches at the surface, decreasing with depth to 5 or 6 inches. In Russia wells are drilled of much greater diameter, and 26 inches is not an unusual size for the beginning of the bore-hole. In many cases the oil does not flow when the oil-bearing rock is struck, and it is customary in this instance to explode a torpedo at the bottom of the drill-hole, whereupon the oil almost immediately begins to pour out of the well, sometimes with tremendous velocity. For details of petroleum mining, see WELL-SINKING.

The question of cheap and rapid transportation of crude petroleum from the wells to the refineries is one of great importance. At first the oil was transported on carts, later it was carried in barges or by railway in tank cars, but these methods gave place to the system of pipe lines. At the present day the total length of pipe lines transporting Pennsylvania crude oil is probably over 25,000 miles. The pipes, which have a diameter of from 4 to 8 inches, are usually laid underground and have bends at regular intervals to allow for contraction and expansion. Stations with pumps and storage tanks are placed from 28 to 30 miles apart, the oil being received into the tank at one pumping station and then forced through the pipe to the next one. Since all petroleum contains more or less paraffin or wax, much trouble is often experienced in the clogging

of the pipes, especially in cold weather, and to clear them out an instrument known as the 'go-devil' is sent through the pipe. This is so constructed that it is forced along by the moving current of oil and scrapes the paraffin off from the inside of the tube. Pipe lines have been built from the Appalachian oil region to Jersey City, Philadelphia, Baltimore, Chicago, and Cleveland.

REFINING. The refining of petroleum is based upon the separation of the component hydrocarbons by a process of fractional distillation. This is usually carried out in horizontal cylindrical iron stills, which are surmounted by a dome that connects with a vapor pipe. A common size of still is 30 feet long by 12½ feet in diameter, with a capacity of from 650 to 700 barrels of crude oil. When the latter is placed in the still and subjected to increasing temperature, the oils pass off in the order of their volatility; the separation is not absolutely perfect, however, as oils of lower boiling point may carry over some higher ones. As the vapor rises it passes to the condenser, a series of iron pipes surrounded by cold water. The distillates are led off into their respective tanks. This process of distillation, which is known as the intermittent system, is the one commonly followed in the United States, and the still requires periodic refilling. In Russia a continuous system is employed, involving a series of stills, which are heated to successively higher temperatures. The crude oil then flows slowly from one to the other, and from each one there passes off the product volatilizing at the temperature to which the still is heated.

The process of fractional distillation can be divided into two parts. In the first part of the process the more volatile products, such as gasoline and other naphthas, are evolved. The residue is then transferred to another still in which the second part of the operation is carried on, the oil being heated to a still higher temperature for the purpose of separating the illuminating and lubricating oils. The condensing apparatus ends in the tail house, where the distillates are conducted to their proper tanks. When the various fractions of the distillation are to be kept separate, and of constant composition, a special form of condenser may be used, by means of which the oil is brought into contact with the surface of iron turnings, thereby increasing the evaporation. If the oil contains sulphur it is necessary to redistil it in stills containing copper oxide, which removes the sulphur. *Cracking* is a term used to denote the process of condensing the heavier vapors in the still, causing them to become superheated and decomposed, and thus obtaining a more complete separation of the fractions, as well as increasing the percentage of illuminating oil. In the distillation of the oil the lightest constituents pass off first and the heaviest last. The fractions obtained in the order of their lightness are the following: *Cymogene*. This is the lightest of all, and since its boiling point is 32° F., it is a gas at ordinary temperatures. *Rhigolene*. Boiling point, 65° F. *Petroleum ether*. A highly volatile product having a specific gravity of 0.635. It has sometimes been called Sherwood oil. *Gasoline*. This, properly speaking, is the fraction following petroleum ether, although the name is often applied to a mixture of this and the three previous ones, its gravity thus ranging from 0.635 to 0.690. In

gasoline proper the boiling point ranges from 90° to 200° F. *Naphtha* is a name broadly applied to all light distillates, but more especially to those boiling at 80° to 120° F., and whose gravity varies from as low as 62° B. up to 76° B. *Benzine* (q.v.) represents the least volatile product of the naphthas and has a specific gravity of about 0.73 (57° to 62° B.), and a boiling point of 120° to 150° F. *Ligroine* forms a special grade of solvent naphtha of a specific gravity of 0.715, and a boiling point of 194° to 248° F. Following the lighter naphthas come the illuminating oils, divided into heavy and extra heavy naphthas; in the process of distillation these may either be carried off separately or together. In the former case, the heavy naphthas may be redistilled and separated into benzine and light distillate. The latter may then be mixed with the extra heavy naphthas in varying proportions to form white oil or export oil. There are many grades of domestic illuminating oil or kerosene, which differ chiefly in fire test.

After the naphthas have passed off, the residuum is forced through steam-jacketed filters filled with bone black or fuller's earth; the first portions of the filtrate represent light oils, and are followed by successively heavier ones. When the petroleum belongs to the paraffin group, the residuum is sometimes placed in the tar still for further distillation, and there the heavy vapors are carried over by the aid of superheated steam, the presence of the latter also preventing dissociation of the oil, which if it occurred would be followed by a lowering of viscosity of the lubricating oil and a decrease in the amount of paraffin obtained. The distillates containing the paraffin are freed from the latter by chilling, the effect of this being to cause a separation of the waxy paraffin scales. The oils thus freed from the paraffin are important lubricants, and under this class a number of grades are known as *spindle oil*, *engine oil*, *summer dark oil*, *winter dark oil*, *cylinder oil*, *valve oil*, etc. The residue now left in the tar still is a porous mass of separated carbon, solid decomposition products termed coke. The tar is sometimes used without further distillation for the manufacture of vaseline.

Many of the distillates obtained in the treatment of crude petroleum contain acid constituents as well as compounds which in time impart a dark color and unpleasant odor to the distillate. Raw distillates, when used for illuminating purposes, also rapidly char the wick and lose their power of being drawn upward by capillarity. It is therefore customary to purify the various fractions obtained by treatment with sulphuric acid and caustic soda, before they are marketable. The distillate, which has been first cooled to 60° F., is agitated with sulphuric acid in tall cylindrical tanks of wrought iron lined with sheet lead, and known as agitators; about 1½ to 2 per cent. of acid is required. The acid is then washed out with water, and a 1 per cent. solution of caustic soda added, after which a second agitation takes place, followed by washing.

The percentage of the various fractions yielded by different oils varies. Many Pennsylvania oils yield 8 to 10 per cent. naphtha, 70 to 80 per cent. refined oils, 5 to 9 per cent. residuum, and 5 per cent. loss. In the distillation of 100 gallons of crude petroleum there are obtained on the average about 76 gallons of illuminating oil, 11 gallons of gasoline, benzine, and naphtha, and 3

gallons of lubricating oil, while the residuum and loss amount to 10 gallons.

TESTING OF REFINED OILS. Refined oils are usually tested for their color, gravity, flashing and burning points, and sometimes for their behavior when cooled (cold test). The color is determinable by inspection. The gravity is a measure of the purity of the distillate. Too large a proportion of the lighter oils renders the product unsafe for illuminating purposes, while too great a percentage of the heavier oils interferes with its free burning qualities. The gravity test is commonly made by placing the oil in a tall jar and inserting a hydrometer marked preferably with the Baumé scale (water has a value of 10 on this scale). The temperature of oil when this test is made should be 60° F. The fire test includes the determination of the *flashing point*, i.e. the temperature to which the oil must be heated in order to produce a momentary explosion of the mixture of inflammable vapor, and of the *burning point*, i.e. the temperature to which the oil must be heated in contact with the air to take fire and burn on the surface. The burning point is commonly from 6° to 20° C. higher than the flashing point. Kerosene for lighting purposes should have a flashing point of not less than 110° F., and a burning point of not less than 125°. Both the flashing point and burning point are carefully regulated by law in most civilized countries so as to run the minimum risk from explosion. The cold test is of importance for lubricating oils, and is made in order to determine the temperature at which the oil thickens or becomes cloudy. It can be made by cooling the oil in a small tube and noting the temperature at which the oil ceases to flow when the tube is inclined.

USES. The two chief uses of the distillates from crude petroleum are for illumination and lubrication, but the various fractions in many cases have special applications. Rhigolene is used as a local anæsthetic; petroleum ether is employed as a solvent for caoutchouc, fatty oils, and plant principles, and for carbureting air in gas machines; gasoline is employed in the extraction of oil from oil seeds, in carbureting coal gas, in gasoline lamps, stoves, and plumbers' lamps. Naphthas in general are employed as solvents for resins in varnish-making, and in the manufacture of oilcloth. Boulevard gas fluid is a product of 0.68 specific gravity used in street lamps, while benzoline is a deodorized naphtha of 0.70 specific gravity. Benzine is employed for dry cleaning, as a substitute for and adulterant of turpentine for cleaning printer's type, and for dyers' and painters' use. The benzine of the U. S. Pharmacopœia has a specific gravity of 0.67 to 0.77, and a boiling point of 122° to 144°, and therefore represents a higher distillate. Astral oil and mineral sperm oil are special illuminating oils of high flashing points. Crude petroleum is much used for fuel purposes in engines. Along the Pacific Coast, especially in southern California, where good coal is scarce, the locomotives consume large quantities of crude oil. Paraffin residue is placed on the market for medicinal purposes under the name of vaseline, petroleum ointment, and cosmoline. It is also used in the manufacture of chewing gum, and for insulating purposes in electric work.

PRODUCTION. The growth of the petroleum industry in the United States is shown in the fol-

lowing table, which gives the annual production at intervals from 1859 to 1900:

YEAR	Barrels
1859.....	2,000
1860.....	500,000
1865.....	2,497,700
1870.....	5,260,745
1875.....	10,926,945
1880.....	26,286,123
1885.....	21,858,785
1890.....	45,823,572
1895.....	52,892,276
1900.....	63,620,529

The production of crude petroleum in the United States in 1901 amounted to 69,389,194 barrels, valued at \$66,417,335. Of this quantity, 48.45 per cent. came from the Appalachian field, 31.61 per cent. from the Lima-Indiana area, and 19.94 from the other areas combined. The number of gallons of petroleum and its derivatives exported in 1901 was 1,062,750,306, valued at \$71,479,124. This went to all parts of the world, but chiefly to Europe. In this same year the quantity of manufactured petroleum exported by Russia was 36.8 per cent. of that exported by the United States. New York is the leading port of exportation, with Philadelphia second. So large has the export trade become that some countries have a large fleet of specially constructed tank steamers engaged in the oil-carrying trade. Up to 1899 the total tonnage of these was nearly 400,000 tons. The world's production of petroleum in 1901 was as follows:

	Barrels
United States.....	69,389,194
Russia.....	85,168,556
Galicia.....	3,251,544
Sumatra, Java Borneo.....	3,038,700
India.....	1,430,716
Roumania.....	1,406,460
Canada.....	704,872
Japan.....	600,000
Germany.....	313,630
Peru.....	72,761
Italy.....	10,100

See SHALE OIL; ASPHALT; GAS, NATURAL.

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PETROL'OGY (from Gk. *πέτρα*, *petra*, rock + *-λογία*, *-logia*, account, from *λέγειν*, *legein*, to say), **PETROGRAPHY**, **LITHOLOGY** (obsolescent). The science which treats of the materials of the stony portion of the earth (the lithosphere), and of meteoritic bodies. Petrography is the purely descriptive division of the science, but in general usage it has the same scope as petrology. Petrology, or petrography, is one of the geological

sciences, and has the same rank as mineralogy. It concerns itself chiefly with the composition (chemical and mineralogical), textures, origin, and alterations of the rocks; and its methods are chiefly those of chemistry, mineralogy, and physical optics. It is one of the newest of the sciences and may be said to have had its birth in 1862, when Sorby and Zirkel succeeded in preparing transparent rock sections and adapting the microscope to their study. Consult: Harker, *Petrology for Students* (Cambridge, 1895); Teall, *British Petrography* (London, 1888); Zirkel, *Lehrbuch der Petrographie* (2d ed., Leipzig, 1894); Rosenbusch, *Elemente der Gesteinslehre* (Stuttgart, 1898); id., *Mikroskopische Physiographie der Mineralien und Gesteine* (3d ed., ib., 1896; first volume translated by Iddings, under title, *Microscopical Physiography of the Rock-Making Minerals*, 4th ed., New York, 1900). See **ROCK**.

PETRONIUS, GAIUS. A Roman voluptuary at the Court of Nero, whose profligacy is said to have been of the most superb and elegant description. We know, however, very little about him. He was at one time proconsul of Bithynia, was subsequently appointed consul, and is said to have performed his official duties with energy and prudence. But his grand ambition was to shine as a Court exquisite. He was intrusted by his Imperial master and companion with the charge of the royal entertainments, and thus obtained (according to Tacitus) the title of *Arbiter Elegantiæ*. The influence which he thus acquired was the cause of his ruin. Tigellinus, another favorite of Nero, conceived a hatred of Petronius, brought false accusations against him, and succeeded in getting his whole household arrested. Petronius saw that his destruction was inevitable, and committed suicide, B.C. 66, but in languid and graceful style, such, he thought, as became his life. He opened some veins, but every now and then applied bandages to them, and thus stopped the flow of blood, so that he was for a while enabled to gossip gayly with his friends, and even to appear in the streets of Cumæ, before he died. We are told that he wrote, sealed, and dispatched to Nero, a few hours before his death, a paper containing an account of the tyrant's crimes and flagitious deeds. Petronius is generally believed to have been the author of a very remarkable ancient romance, or satire, which has survived in part under the name of *Petronii Arbitri Satiricon*, an extensive work of fiction, of which fragments and a long episode entitled *The Supper of Trimalchio* (*Cena Trimalchionis*) were discovered in the seventeenth century and published at Paris in 1664. As a description of one phase of life in the first century of the Christian Era the work is invaluable, while to the student of Latin it offers the best example of the colloquial language of the time. The exaggerated picture of the vulgar society of a *nouveau-riche* is often disagreeable, but always amusing. The scene is laid in some small but fashionable town of Campania, perhaps Baïæ or Puteoli, probably under Nero, or shortly before. The standard text is that of Bücheler (Berlin, 1862), with a smaller edition (Berlin, 1895). There is an edition of the *Cena* episode alone, with German translation and commentary, by Friedländer (Leipzig, 1891), and an edition with introduction and commentary by Waters (Boston, 1901). All the fragments were translated into English by Kelly (London,

1856); and there is a recent and very sympathetic translation of the *Cena*, with an excellent introduction, by Peck (New York, 1898). For the vocabulary of Petronius, see the *Lexicon Petronianum* of Segebad and Lemmatsch (Leipzig, 1898). Compare, also, Collignon, *Etude sur Pétrone* (Paris, 1892).

PETROPAVLOVSK, pyë'trô-páv-lôfsk'. A district town in the Territory of Akmolinsk, West Siberia, situated on the Ishim and the Trans-Siberian Railway, 191 miles west by rail from Omsk (Map: Asia, F 3). Tallow and leather are the chief products; there is a considerable trade in animals, animal products and manufactures, with the native tribes. Population, in 1897, 20,014.

PETROPAVLOVSK. The chief town of Kamtchatka (q.v.).

PETROPOLIS, pâ-trô'pô-lês. The capital of the State of Rio de Janeiro, Brazil, situated in a mountainous region about 20 miles north of Rio de Janeiro (Map: Brazil, J 8). It was formerly the summer residence of the Imperial Court, and contains a palace, a number of magnificent villas, hotels, and parks. The place was first colonized by Germans in 1845, and a considerable portion of its present population is of German origin. It was made the capital of the State in 1894. Population, in 1898, estimated at 12,000.

PETROVSK, pyë-trôfsk'. Capital of a district in the Government of Saratov, Russia, 93 miles northwest of Saratov (Map: Russia, G 4). The manufacture of flour and butter is extensively carried on. Population, in 1897, 13,200.

PETROVSKOYE, pyë-trôf'skoi-e. A village in Russia. See BUTURLINOVKA.

PETROZAVODSK, pyë'trô-zâ-vôtsk'. The capital of the Government of Olonetz, Russia, situated on the western shore of Lake Onega, about 190 miles northeast of Saint Petersburg (Map: Russia, D 2). It has a gymnasium, a theological seminary, and a famous Government cannon foundry. The town grew up around an iron foundry established in 1703 by Peter the Great. Population, in 1897, 12,965.

PETRUCCI, pâ-trôô'chè, OTTAVIANO DE' (1466-1539). The discoverer of the art of printing music with movable types. He was born at Fossombrone, near Urbino (Lat. *Forum Sempronii*, from which Petrucci adopted the name *Petrutius Forosempronensis*). The Council of Venice gave him a monopoly of his invention for twenty years (1498-1518), and from 1501 to 1511 he developed his discovery with profit to himself, but finally attempted experiments that proved too costly and so was compelled to sell his privilege and business to Amadeo Scotti and Niccolò da Rafael, upon which he returned to his native town. Securing a privilege for the Papal States for a term of fifteen years, he commenced work again in his home town, but with very much inferior results. Petrucci prints are exceedingly rare, and are very valuable. They are remarkable for their neatness of execution and correctness.

PETRUCHIO, pâ-trôô'kê-ô. The husband of Katharine in Shakespeare's *Taming of the Shrew*. In taming his spoiled, headstrong wife, he resolves "to kill her in her own humor," and storms like a madman, thwarting all her wishes, yet

never losing his good humor, and at last conquering her.

PETTENKOFEN, pět'ten-kō'fen, AUGUST VON (1822-89). An Austrian genre and military painter, born in Vienna. He had been a cavalry officer, and several of his pictures represent military scenes. He also treated subjects from the peasant life of Hungary, often in its brighter aspects. His works include "Hungarian Artillery on the March;" "The Ambulance Wagon" and "Hungarian Volunteers," both owned by Mrs. W. H. Vanderbilt, New York City; "A Rendezvous" (1867), Vienna Museum; and "A Woman Spinning." He was made a member of the Vienna Academy in 1866, and of the Munich Academy in 1867, and was knighted in 1876.

PETTENKOFER, pět'ten-kō'fēr, MAX VON (1818-1901). A celebrated German chemist and hygienist, born in Bavaria. He studied medicine and chemistry at Munich, and later under Liebig at Giessen. In 1847 he became professor of medical chemistry at Munich. His famous researches formed the foundation of the science of experimental hygiene. At his instance chairs of hygiene were founded at the Bavarian universities, and he himself accepted the professorship at Munich in 1865. He became co-editor of the *Zeitschrift für Biologie* in 1864, and was for years one of the editors of the *Archiv für Hygiene*, which he founded in 1883. In recognition of his services to science, many honors were bestowed upon him, and in 1889 he was chosen president of the Bavarian Academy of Sciences. Pettenkofer carried out a number of interesting and useful investigations in chemistry. He is best known, however, for his experimental researches on the ventilation of dwellings, on respiration and the metabolic assimilation of food, and on cholera. The researches on metabolism were carried out, jointly with Karl Voit, by the use of an apparatus of Pettenkofer's invention, which permits to determine with great precision the amount of atmospheric oxygen used up by the body and the amount of carbonic acid and water-vapor given off. As to cholera Pettenkofer was the first to show: that the symptoms of that disease are caused by the activity of a specific germ, which may be disseminated through ground-water; that the spread of the disease is dependent to a great extent on local climatic and sanitary conditions; and that infection is due largely to individual predisposition. Most of his contributions appeared in the *Zeitschrift für Biologie*, mentioned above. He published besides: *Untersuchungen über die Verbreitungsart der Cholera* (1855); *Ueber den Luftwechsel in Wohngebäuden* (1858); *Zum gegenwärtigen Stand der Cholerafrage* (1887), etc. His *Beziehungen der Luft zu Kleidung, Wohnung und Boden*; *Was man gegen die Cholera thun kann*; *Populäre Vorträge*, and other works, have passed through several editions.

PETTIE, pět't, JOHN (1839-93). An English painter, born at East Linton, Haddingtonshire. He studied under Lauder at the Trustees' Academy in Edinburgh. Afterwards he lived in London, and for a while had a studio with Orchardson. His figures are usually in the costume of the sixteenth or seventeenth century. His compositions are animated and pictorial, and his color schemes are rich and well handled. His works include: "Edward VI. Signing a Death Warrant" (1879, now at Hamburg); "The Body

Guard;" "A Challenge;" and "The Chieftain's Candlesticks." He was elected to the Royal Academy in 1873.

PETTIGREW, JAMES BELL (1834-). An English physiologist, born at Roxhill, Lanarkshire. He was educated at Glasgow University, studied medicine at Edinburgh, and, after acting as Croonian lecturer to the Royal Society (1860), as assistant curator of the Hunterian Museum in London (1862-68), and as curator of the Edinburgh Museum of the Royal College of Surgeons, became lecturer on physiology at Edinburgh (1873), and Chandos professor of medicine and anatomy at Saint Andrews (1875). Pettigrew made a special study of organic muscles, and, with the purpose of analyzing the problem of the flying machine, of the wings of insects, bats, and birds. His writings include *Animal Locomotion* (1873), and many contributions to scientific journals.

PETTIGREW, JAMES JOHNSTON (1828-63). An American soldier, born in Tyrrel County, N. C. He graduated at the University of North Carolina in 1847, and was appointed by President Polk assistant professor in the Naval Observatory. In 1848 he resigned, to study law. He visited Europe in 1850 and for a time acted as secretary of the Spanish Legation. In 1852 he returned to the practice of law in Charleston, and was a member of the Legislature in 1856. He joined the Sardinian Army in 1858, but the armistice of Villafranca destroyed his hopes of active service. After a visit to Spain he returned to Charleston to practice law, and was prominent in militia affairs. He took part in the first operations of the war at Castle Pinkney and Morris Island, and in May, 1861, was made colonel of the Twenty-second North Carolina Regiment. In the spring of 1862 he was promoted to brigadier-general, and assigned to the Peninsula. He was wounded and captured at Seven Pines (May 31st), and after exchange was assigned to command a new brigade of North Carolinians at Petersburg. In the fall of 1862 he made an unsuccessful attempt to recapture New Berne, N. C., and he opposed Stoneman before Richmond early in 1863. At the battle of Gettysburg (July 1st-3d) his brigade, a part of Heth's division, A. P. Hill's corps, opposed the famous Iron Brigade the first day and lost one-third of its numbers. One regiment, the 26th North Carolina, lost in killed and wounded 584 out of 820. On the third day he commanded Heth's division. In the famous charge on Cemetery Ridge this division formed the left of the assaulting force. Owing to a sharp change in the direction of the stone wall, at the 'Bloody Angle,' which made it 80 yards farther from the Confederate lines, it has been officially shown that men of this division went at least 40 yards farther up the hill than those of Pickett's. Pettigrew's brigade had left 935 men and was commanded by a major, the only field officer left. On the retreat he was mortally wounded by Federal cavalry at Falling Waters, July 14th, and died at Bunker Hill, Va., July 17th. For his part in this battle consult *North Carolina Regiments, 1861-65*, vol. v., published by the State (1901).

PETTY, Sir WILLIAM (1623-87). An English political economist, born at Romsey, in Hampshire. After studying at the Jesuit College at Caen, in Normandy, he returned to England and

entered the Royal Navy. On the outbreak of the Civil War he retired to the Continent and studied at Utrecht, Amsterdam, Leyden, and Paris. He returned to England and took the degree of doctor of physic at Oxford in 1649, and was soon after appointed fellow of Brasenose College. In 1651 he became professor of anatomy, and in 1652 was appointed physician-general to the army in Ireland. His intimacy with Henry Cromwell and other members of the Cromwellian party involved him in the downfall of the Protectorate, but he soon won the confidence of Charles II. He was one of the founders of the Royal Society, which was incorporated in 1662. He was one of the authors of *Natural and Political Observations*, published in 1662, which was the first book on vital statistics ever written. Ten years later his *Political Anatomy of Ireland* appeared. His later works were: *Quantulumcunque Concerning Money* (1682); *Observations upon the Cities of London and Rome* (1687); and a number of *Essays in Political Arithmetick*, published between 1683 and 1690.

PETTY BAG OFFICE. An office attached to the Court of Chancery in England, prior to 1874, for the care of suits for and against solicitors and officers of the court; for all judicial matters relating to statutes, recognizances, writs of *scire facias* and other writs, and certain other matters relating to the Crown. The name was derived from the custom of keeping the writs and returns in a little sack or bag (*in parva bagá*). A great deal of miscellaneous business was also transacted in the Petty Bag Office, which the Lord Chancellor and Master of the Rolls were empowered to regulate and transfer from time to time. When the jurisdiction of the Court of Chancery was transferred to the High Court of Justice by the Judicature Acts in 1874, the office of the clerk of the petty bag was abolished, and his duties and powers are now vested in the senior clerk of the Crown Office department of the Central Office.

PETTY-FITZMAURICE, pēt'ti-fits-mā'rīs. See SHELburne.

PETTY OFFICER. A term applied in the navy to the men of the enlisted force who are appointed to position below the rank of warrant officer; these positions or 'ratings' correspond to the non-commissioned grades of the army, but they are much more numerous. The rates of pay are from \$30 to \$70 per month. (See section on *Navy*, under UNITED STATES.) The most capable and deserving petty officers are promoted to warrant rank as vacancies occur in the grades of boatswain, gunner, and carpenter; and, if exceptionally meritorious and well informed, they may then be commissioned ensigns in the regular line of promotion, but not more than twelve may be commissioned in any one year.

PETTY SESSIONS. An English court, constituted by two or more justices of the peace, or a borough magistrate, when sitting for the trial of certain minor criminal cases, or for the preliminary hearing and commitment for trial of persons accused of graver crimes, which can only be tried at Quarter Sessions. The jurisdiction of the justices in Petty Sessions is mainly over violations of certain special acts, such as those concerning poaching, vagrants, bastardy proceedings, absconding workmen, apprentices, poor laws,

etc. One of the important functions of this court is to hear charges for all indictable offenses, and to commit the accused person for trial at Quarter Sessions, if a probable case is made out against him. The jurisdiction of Petty Sessions and Special Sessions is practically the same, except that the latter court is only held on special notice. Appeals from Petty Sessions are heard in the Court of Quarter Sessions. See JUSTICES OF THE PEACE; SPECIAL SESSIONS; QUARTER SESSIONS.

PETUNIA (Neo-Lat., from Brazilian *petun*, tobacco). A genus of plants of the natural order Solanaceæ, natives of South America, and during the nineteenth century introduced into cultivation in other countries for their beautiful flowers. Although naturally perennials, they are generally cultivated as garden annuals. The slightly viscid foliage emits a peculiar, often disagreeable odor, especially in the evening or during stormy weather. The common garden petunias are mostly hybrids of *Petunia nyctagini-flora* and *Petunia violaceæ*, which themselves are not frequently cultivated. *Petunia nyctagini-flora* is a stout species with white flowers; *Petunia violaceæ*, a trailing plant with purplish violet blossoms. The number of varieties is very large and includes single and double flowered forms, plain or variegated, with innumerable variations in color from pure white to deep violet, through rose, purple, pink, and many other shades. The finest flowers are produced on deep rich soils in sunny situations. They are well adapted for beds and borders and are also grown as house and conservatory plants. Since seedlings do not come true to the parent plant, the choice varieties are propagated by cuttings. These are put in sandy soil with bottom heat in August, potted singly after they have rooted, wintered in the greenhouse, and set out in the open in late spring.

PEUCER, poi'tsēr, KASPAR (1525-1602). A German scientist and scholar, son-in-law of Melancthon. He was born at Bautzen and studied at Wittenberg, where he was made professor of mathematics in 1554 and of medicine in 1560. But in 1574 he was removed from his position as rector of the university, because of his intimate relations with Crypto-Calvinists. After twelve years' imprisonment, Peucer was freed and became Court physician to the Prince of Anhalt. He wrote on astronomy, geometry, and medicine, and edited some of Melancthon's letters (1565 and 1570). Consult Henke, *Kaspar Peucer und Nikolaus Crell* (Marburg, 1865).

PEUERBACH, poi'er-bāg, **PURBACH**, or **PEURBACH**, GEORG VON (1423-61). An Austrian mathematician and astronomer, born at Peurbach, near Linz. He studied in Vienna, and afterwards traveled in Germany, France, and Italy, where he delivered astronomical lectures at Ferrara, Bologna, and Padua. In 1454 he was astronomer to King Ladislas of Hungary, and somewhat later professor at the University of Vienna, and with Regiomontanus one of the leaders in mathematical thought in his century. Peuerbach compiled a table of sines, taking 60·10' for unity or the length of the radius, and thus prepared the way for decimal fractions. The table was completed after his death by his pupil Regiomontanus. Peuerbach also calculated new tables of the planets, and gave a new list

of the fixed stars. He wrote: *Tractatus Super Propositiones Ptolemæi de Sinibus et Chordis* (1541); *Theoricæ Novæ Planetarum* (1542); *Sex Priores Libri Systematis Almagesti* (1496, 1550); *Institutiones in Arithmetica* (1511); *Tabulæ Ecclipsium* (1514). With Regiomontanus he wrote an *Epitome in Cl. Ptolemæi Magnum Compositionem* (1543). Consult: Schubert, *Peuerbach und Regiomontanus* (Erlangen, 1828); Fiedler, *Peuerbach und Regiomontanus, eine biographische Skizze* (Leobschütz, 1870).

PEUTINGER, poi'ting-ër, KONRAD (1465-1547). A German antiquary, born at Augsburg. He studied law at Padua, and at twenty-eight became syndic of his native city, which he represented in several Diets, notably that of Worms in 1521. His writings on classical antiquities were very valuable; the most important is *Inscriptiones Romanæ* (1520). He is best known as owner of the *Tabula Peutingeriana*. Consult the reproduction edited by Mannert (Ravensburg, 1888), and Herberger, *Konrad Peutinger in seinem Verhältnis zu Kaiser Maximilian* (Augsburg, 1851).

PEUTINGERIAN TABLE (Lat. *Tabula Peutingeriana*). The name given to a most interesting ancient document, which exhibits the military roads of the Roman Empire and of the world known to the Romans. It is not, properly speaking, a map, no regard being paid to geographic position or the extent of countries. The great lines of road are laid down in a narrow strip, as if nearly parallel, all proceeding from Rome as a centre; and as to rivers, it only appears whether they cross the road from left to right or from right to left of the traveler proceeding from Rome. The Mediterranean and other seas are represented by mere narrow channels. A small house is the mark for a town; important towns and military stations are distinguished by walls and towers. Rome, Constantinople, and Antioch are each represented by a circle, within which is a human figure seated; in the case of Rome the figure is crowned. Until very recently a portion of the only copy of this valuable relic of antiquity known to exist was evidently wanting, as it terminated abruptly on the west at the confines of Spain, and included only the eastern parts of Britain. In the east it traces roads through India to a number of places of trade as far as the mouths of the Ganges. It is on parchment, and, as described in all the publications devoted to it, 21 feet in length, and about one foot wide. The extant document seems to be a thirteenth-century copy of an original made in the third century. It was found in the library of the Benedictine monastery at Tegernsee, in Upper Bavaria, in the fifteenth century, by Konrad Celtes, who bequeathed it to Konrad Peutinger of Augsburg, a zealous antiquary, and one of the earliest writers on the Roman and other antiquities of Germany. Peutinger began to prepare a copy of it for publication, but died before he could accomplish his purpose, which, however, was partially executed by Mark Welser, in his *Fragmenta Tabulæ Antiquæ ex Peutingerorum Bibliotheca* (Venice, 1591). The ancient document itself remained in the hands of the Peutinger family, and attracted no further notice till it was offered for sale in 1714, and purchased by Prince Eugene, who presented it to the Imperial Library of Vienna, in which it still remains. An exact copy

of it was published at Vienna in 1753, with an introduction and index by F. C. von Scheyb. It was again published as an appendix to Katanesich's *Orbis Antiquus* (Budapest, 1825); and at the request of the Academy of Munich, a revised edition, with an introduction, was published by Konrad Mannert (Leipzig, 1824). Since that time a leaf detached from the rest has been found in the Imperial Library at Vienna. See Miller's edition of the same (Ravensburg, 1888), and a colored facsimile by Desjardins (Paris, 1869-71).

PEVERIL OF THE PEAK. A novel by Sir Walter Scott (1823). It is a story of the Popish Plot in the reign of Charles II., in which the hero, Julian Peveril, becomes involved because of his connection with the Countess of Derby, the family estate being near the Peak of Derbyshire.

PEW (OF. *pui, puy, poi, pecu*, elevated place or seat, hill, mound, *puye*, elevated railed balcony or gallery, from Lat. *podium*, balcony, from Gk. *πόδιον*, diminutive of *πόδι*, *pous*, foot). An inclosed seat in a church, appropriated to a person or family. Such seats were in use in English churches some time before the Reformation. They were originally plain fixed benches, with partitions of wainscoting about three feet high, and sides of the width of the seat, paneled or carved. In the later Reformation period and probably under the influence of the Puritans, who, objecting to some parts of the service which they were compelled to attend, sought means to conceal their non-conformity, pews grew into large and high inclosures, containing from two to four seats, and fitted with doors, desks, and cushions. At first pews seem to have been assigned only to the patrons of churches, but gradually the system of appropriation was extended. It would appear by the common law of England that every parishioner has a right to a seat in the church, and that the churchwardens are bound to provide for each one as best they can. So, also, by the common law, the right to a pew is only a right to use it for the services of the church, and at times when it is open for use, subject to the regulations of the church; and there is no right of access to it for any other purpose except repairs. In the United States pews are sometimes the property of the church congregation and sold or rented for them, or they are individually owned or leased on perpetual leases subject to a ground rent. Whether property in pews is real or personal now depends in many States upon the provisions of the statute law. The right of property in the pews of a church vests in the trustees, while the right of use and occupation at all customary times is in the purchaser or lessee, and the latter may maintain an action on the case for a disturbance of this right.

PEW RIGHTS. By the early common law, a person could not obtain strictly legal rights to a church pew. However, at a later date it was recognized that a legal right to a pew could be acquired, which would be protected by the common-law courts. Finally, exclusive pew rights, when purchased by the pewholder, were considered as incorporeal rights or interests in the real property, subject to the superior right of the trustees or church corporation to deal with the building as might seem best for the interests of the church. For example, the church trustees could rebuild the church, or sell it and rebuild

on another site, without making compensation to the pewholders. In such cases, however, by the weight of authority, a pewholder would be entitled to a pew of like character in the new edifice. However, if the church corporation is dissolved, the pewholders are entitled to have the value of their pew rights returned out of the church funds. A pewholder has practically no more substantial rights under a sale to him of the pew than under a perpetual lease, as he cannot in any event change the character of the pews as to decorations, etc., and cannot prevent the church authorities from making alterations, etc. The common law above set forth prevails in most of the United States. A few States have passed statutes expressly making pew rights real property, and in others the statutes define such rights as personal property. In most churches, however, pews are let from year to year by a sort of verbal lease, and the pewholders merely have temporary possessory rights. Consult Phillimore, *Ecclesiastical Law of the Church of England* (2d ed., London, 1895); and the authorities referred to under REAL PROPERTY.

PEWEE (onomatopoetic name). Any of several small olive-green or brown American tyrant flycatchers (q.v.). The common pewee or phœbe-bird (*Sayornis Phœbe*) measures about 12 inches across the extended wings. It is brown on the back, darker on the head, with a yellowish-white breast and belly, quills brown, slightly edged with a lighter color. Its principal habitat is the Middle and Atlantic States. It comes north in April, and usually hatches a brood by the middle of May and another by the first of August. In October it returns to the south, migrating at night. It placed its nest originally on a ledge of rocks, or plastered it bracket-like against the surface of a mossy cliff, but now more frequently chooses a beam or rafter of a building or bridge. The nest is made of mud, grass, mosses, and the like, and is lined with down and other soft materials; but these materials seem so favorable for the breeding of parasites that the second brood is often raised in a new nest. It lays from four to six eggs, white, rarely with a few reddish spots at the larger end. The hatching takes about thirteen days, and in a few days more the young birds leave the nest. The pewee occurs as far west as eastern Nebraska. Its food consists wholly of insects, captured usually on the wing. Its plaintive note, *phæbe*, is wellknown. Two allied species, Say's pewee (*Sayornis Sayi*) and *Sayornis nigricans*, occur in the Western States. The former is grayish-brown, with cinnamon belly and black tail, while the latter is blackish, with a white belly.

The very familiar wood pewee (*Contopus virens*) measures from 10 to 11 inches across the outspread wings, with the color of the back much like that of the phœbe-bird, but it has two pale grayish bands across the wings, a narrow whitish circle around the eyes, a greenish-yellow belly, and grayish throat and breast. Its flight is rapid, with sudden sweeps when darting after its insect prey, which it pursues in the shade of the orchard or woods. Its note is much slower and more plaintive than that of the phœbe and is more frequently single-syllabled. It comes north two or three weeks later than the phœbe, going as far north as New Brunswick and Nova Scotia, and retreating as far south in the winter

as New Granada. The nest is saddled upon the branch of a tree and is notable for the skill with which it is covered with lichens, so that it very closely resembles a natural wart on the limb. The eggs are four or five, light yellowish, with reddish and lilac spots at the larger end. The pewee is very courageous, defending its nest against all intruders. Two broods are raised where the season is long enough. The Western wood pewee (*Contopus Richardsoni*), which resembles the 'wood pewee' except in being darker and in having shorter legs, longer wings, and larger feet, is found from the sixtieth parallel of latitude to Panama and from the great plains to the Pacific.

The least pewee (*Empidonax minimus*) is a small bird, present in every village garden and roadside, and the type of a genus containing several small similar species. It makes a neat nest of hempen materials placed in the crotch of a small tree. Consult general works on American ornithology. See Plate of TYPICAL FLYCATCHERS; and Colored Plate of EGGS OF AMERICAN SONG-BIRDS.

PEWIT. A British name for several birds having a cry more or less resembling these syllables, especially the lapwing and certain gulls.

PEWTER (OF. *peutre*, *peautre*, *piautre*, Fr. *peautre*, probably a variant of OF. *espeautre*, *pewter*, from LGer. *spialter*, Eng. *spelter*, zinc). An alloy of tin and lead, of which there are principally three varieties: *Ley* or *common pewter*, consisting of tin, 4 parts, and lead, 1 part; *plate pewter*, consisting of tin, 90 parts, antimony, 7, bismuth, 2, and copper, 2; and *trifle pewter*, consisting of tin, 79 parts, antimony, 15, and lead, 6. Pewter is a soft metal, similar in appearance to tin, but somewhat duller and darker in color. It was formerly extensively used for making plates, teapots, and other domestic utensils, but, on account of the poisonous character of the lead, prohibitory measures have been adopted by the governments of several countries, and consequently other alloys have largely taken its place. Old pewter, however, is now highly prized by collectors of antiques. See ALLOY.

PEYER'S GLAND. One of the glands forming aggregations of solitary lymphoid follicles, first discovered by Johann Konrad Peyer, principally found in the *ileum*, the lower division of the small intestine, and connected with the function of absorption. (See DIGESTION.) The solitary glands which are not aggregated have essentially the same structure as those which make up the patches of Peyer, or Peyer's glands.

PEYOTE, pā-yō'tā (Sp., from Aztec *peyotl*, caterpillar, in allusion to the downy growth upon the root of the southern variety). The Mexican name given to several species of plants used by the Indians of the plains and central plateau to produce a peculiar kind of mental exhilaration. The practice existed among the native tribes from the Arkansas River as far south at least as the City of Mexico, and in a few places had crossed the main divide to the Pacific Coast. The southern plant, to which the name was originally applied by the Aztecs, is a species of *Compositæ*, the active principle being in the root. The variety best known, and the use of which is everywhere found from about the Valley of Mexico northward to the Arkansas, is a small cactus, botani-

cally identified as *Lophophora Williamsii*. The plant grows abundantly in a wild state along the Rio Grande and southward, and is gathered by the Indians, who use either the dried top in its raw state, or the whole plant, sliced, in decoction. It is taken at intervals during a ceremony which lasts throughout the night. The effect is to exhilarate and intensify the imaginative faculties, producing a pleasant dreaminess, without, however, overmastering the will power or producing a disagreeable reaction later. The Indians regard it as the embodiment of a vegetable god, and prize it, aside from its regular ceremonial purpose, as a specific in numerous diseases and ailments, particularly in the relief of fevers and hemorrhages. Certain prepared forms have been put upon the market by a leading drug manufacturer.

PEYRÈRE, pà'râr', ISAAC DE LA. See PRE-ADAMITES.

PEYRON, pà'rôn', VITTORE AMADEO (1785-1870). An Italian philologist, born at Turin. He studied under the Abbé Valpergo di Caluso, and in 1815 succeeded him as professor of Oriental languages at Turin. He translated Thucydides into Italian, edited *Fragmenta Ciceronis Orationum* (1824) and other classical texts, and was a member both of the Turin Academy of Sciences and of the French Institute. It was he who first placed the study of Coptic upon a scientific basis by the *Lexicon Lingue Coptice* (1835; new ed. 1896), with the supplemental *Grammatica Lingue Coptice* (1841).

PEYRONNET, pà'rô'nâ', CHARLES IGNACE, Count (1778-1854). A French politician, born at Bordeaux. As an advocate in his native town he displayed great zeal for the cause of the Bourbons during the decline of Napoleon's power. In 1815 he was made president of the Court of First Instance at Bordeaux and later became Procurator-General at Bourges. In 1821 he was elected to the Chamber of Deputies and in the same year was named Minister of Justice—a post which he held till 1828. He was one of the most prominent champions of reaction during this period, his term of office being marked by the enactment of a rigorous press law (1822), the passage of the iniquitous law against sacrilege (1825), and the reestablishment of the censorship. In May, 1830, he became Minister of the Interior under Polignac and in that capacity signed the famous Ordinances which brought about the July Revolution (q.v.). Peyronnet fled, but was arrested at Tours and condemned to imprisonment for life on the charge of treason. He was pardoned in 1836. During his captivity he wrote *Pensées d'un prisonnier* (1834) and *Histoire des Francs* (1835).

PÉZENAS, páz'nás'. A town in the Department of Hérault, France, on the Hérault, 25 miles west-southwest of Montpellier (Map: France, K 8). It manufactures spirits, wine, and cognac, and the prices which prevail at its weekly market of these articles are registered throughout Europe. Population, in 1901, 7073.

PEZZA, péd'zâ, MICHELE. The real name of the Italian brigand commonly known as Fra Diavolo (q.v.).

PFÄFERS, pfä'fërs, or **PFEFFERS**. A village in the Canton of Saint Gall, Switzerland, situated near the Tamina River about 2½ miles

southwest of Ragatz (Map: Switzerland, D 1). It is noted for its hot springs, which rise a short distance from the village in the gorge of the Tamina. The water, varying in temperature from 99° to 102° F. and containing in small proportions carbonate of lime, chloride of sodium, and magnesia, is used for bathing, and has considerable curative qualities. The springs of Pfäfers were known as early as the thirteenth century, and the present Kurhaus was erected at the beginning of the eighteenth century to replace the older buildings dating from the fifteenth and seventeenth centuries. The baths belonged formerly to the Benedictine monks and were acquired by the canton in 1838. The permanent population of the village is about 600.

PFAFF, pfäf, JOHANN FRIEDRICH (1765-1825). A German mathematician, born at Stuttgart. In 1788 he became professor of mathematics in Helmstedt, and in 1810 at Halle. He invented a method of integrating partial differential equations of the first order in any number of variables, which depends on the solution of the general problem of integrating a linear homogeneous equation between the differentials. Equations of this kind are therefore called Pfaffian equations and their integration is called the Pfaffian problem.

A determinant,

$$\begin{vmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{vmatrix}$$

in which $ay = -ay$, is called a *gauche*, or *skew* determinant; if in addition, $a_{11} = a_{22} = \dots = a_{nn} = 0$, it is called *gauche* and *skew-symmetric*. Every such determinant of even order is the square of an integral function of its elements, which function is called a Pfaffian, it having first been discussed by Pfaff. His chief mathematical works are: *Commentatio de Orbitis et Occasibus Siderum apud Auctores Classicos Commemoratis* (1786); *Versuch einer neuen Summationsmethode* (1788); *Disquisitiones Analyticae* (1797); *Methodus Generalis Aequationes Differentiarum Particularum Completi Integrandi* (Proceedings of the Berlin Academy, 1814-1815). His correspondence with Duke Karl of Württemberg, Bouterwek, and others was published in Leipzig, 1853.

PFANNSCHMIDT, pfän'shmît, KARL GOTTFRIED (1819-87). A German painter, born at Mühlhausen, Thuringia. He studied painting in Berlin under Dage and under Cornelius in Munich. In 1844 he made his first trip to Italy, where he became an ardent follower of the mediæval as opposed to the Renaissance school. Many of his pictures are church decorations, and almost all are of biblical subjects. His easel pictures include a "Charity" and a "Supper," both in the Berlin National Gallery, as are the cycles from Genesis and Daniel, and that on the Lord's Prayer. His other work includes windows in the Nicholas Church, Berlin; in the cathedral at Magdeburg, and in the Stuttgart garrison church. Pfannschmidt was long professor in the Berlin Academy.

PFAU, pfou, LUDWIG (1821-94). A German lyricist and art critic, born in Heilbronn. He studied in the universities of Tübingen and Heidelberg, edited the satirical *Eulenspiegel*, and took a prominent part in the revolt of Baden in 1848.

On the suppression of the revolt, Pfau was sentenced to twenty-two years' imprisonment, but he escaped to Switzerland, and after spending two years in Zurich and in Bern, settled in Paris. In 1863 he returned to Stuttgart and became editor of the *Beobachter*. His poetry is especially valuable for its political satire; *Gedichte* (1846; 4th ed. 1889) and *Deutsche Sonette auf das Jahr 1850* (1849) are the most important titles. Pfau translated many French novels, and with Hartmann a volume of Breton folk-songs (1859). But his original literary work was in art criticism as author of *Freie Studien* (1866), *Kunst und Geistesbestudien* (1877), and *Kunst und Kritik* (1888).

PFEFFEL, pfëf'fel, GOTTLIEB KONRAD (1736-1809). A German fabulist. He was born at Kolmar, and studied at Halle, where he could not finish his course because of threatening blindness. At twenty-two he lost his sight entirely. In 1773, with the help of his wife and the patronage of Louis XV., he founded a school for Protestants which enjoyed great success down to the Revolution. Pfeffel was employed in the council which undertook the reformation of the French educational system. His *Fabeln* (1783) follow Gellert for the most part; his complete works, including several very popular poems, were published at Tübingen (1810-12). Consult his biography by Lina Beck Bernard (Lausanne, 1866), and Stöfer, *Pfeffels Verdienste um Erziehung und Schule* (Strassburg, 1878).

PFEFFER, pfëf'fër, WILHELM (1845-). A German botanist. He was born near Cassel, studied at Göttingen, Marburg, Würzburg, and Berlin, and became professor of botany at Bonn (1873), at Basel (1877), at Tübingen (1878), and in Leipzig (1887). His earlier botanical research was on the geographical distribution of the large-leaved mosses; afterwards he devoted himself to physiological botany. Pfeffer wrote: *Bryogeographische Studien aus den Rätischen Alpen* (1869); *Pflanzenphysiologie* (1882, 1897); *Ueber chemotaktische Bewegungen von Bakterien* (1888); *Beiträge zur Kenntnis der Oxydationsvorgänge in lebenden Zellen* (1889); *Plasmakaut und Vakuolen* (1890); *Energetik der Pflanzen* (1892); and contributions to the *Jahrbuch für wissenschaftliche Botanik* (1894 sqq.).

PFEFFERS, pfëf'fërs. A village in Switzerland. See PFÄFERS.

PFEIFFER, pfif'fër, FRANZ (1815-68). A German scholar. He was born at Bettlach, Switzerland, studied at Munich, became royal librarian at Stuttgart in 1846, and in 1857 was made professor of German literature in the University of Vienna. He was one of the most important Germanists of recent times. He founded the review *Germania*, and the series *Deutsche Klassiker des Mittelalters*, for which he edited *Walther von der Vogelweide* (6th ed. 1880). His more valuable works are: *Der Dichter des Nibelungenlieds* (1862), *Freie Forschung* (1867), and, among many editions, *Barlaam und Josaphat* (1843), *Die deutschen Mystiker des 13. Jahrhunderts* (1845-47), and an edition of the *Deutsche Ordenschronik* of Jeroschin (1854).

PFEIFFER, IDA (1797-1858). An Austrian traveler. She was born at Vienna, and began her career as a traveler by a trip to Palestine and Egypt when she was forty-five years old. This ex-

pedition was succeeded by others to Scandinavia and Iceland in 1845, and in 1846-48 to Brazil, Chile, China, India, Persia, Armenia, and the Caucasus. Another journey was taken, in 1851-55, to Africa, Australia, and America, resulting in some valuable acquisitions for the Museum of Natural History at Vienna. In 1856 she set out for Madagascar, where she was imprisoned. Broken in health, she returned thence to die. Her works, which have been translated into English, include *Journey of a Viennese to the Holy Land* (1843); *Journey to the Scandinavian North* (1846); and *A Woman's Journey Round the World* (1850).

PFEIL, pfil, JOACHIM FRIEDRICH, Count (1857-). A German explorer and colonist in Africa and New Guinea. He was born at Neurode, in Silesia, studied at the gymnasium of Göttingen, and in 1873 went to Natal. He learned the vernacular and stayed in the country four years; then (1879), after a visit to Europe, he settled in Orange Free State and with Wilson mapped the course of the Limpopo; but illness forced him to return to Germany. In 1884, having entered the employ of the Society for German Colonization, Pfeil went to East Africa with Peters and Jühlke, and in 1886 succeeded the latter as general manager of the company in Somaliland. This post he resigned in 1887, and entered the service of the New Guinea Company. His travels and explorations in the South Seas are described in his *Studien und Beobachtungen in der Südsee* (1899), and he also wrote *Vorschläge zur praktischen Kolonisation in Ostafrika* (1887), and *Zur Frage der Deportation nach den deutschen Kolonien* (1897).

PFEUFER, pfoi'fër, KARL VON (1806-69). A German physician who introduced the rational method of physical and chemical explanations for physiological or pathological conditions. He was born at Bamberg, and studied medicine at Erlangen and Würzburg. After eight years of practice in Munich, Pfeufer held academic positions in Zurich (1840-44), in Heidelberg (1844-52), and in Munich (1852-69). Besides his great contributions to method, which appeared in the *Zeitschrift für rationelle Medizin* (1844 sqq.), he wrote on cholera, *Zum Schutz wider die Cholera* (1849; 3d ed. 1854), and introduced public sanitation as a requisite in medical study. Consult Kerchensteiner, *Leben und Wirken des Dr. Karl von Pfeufer* (Augsburg, 1871).

PFISTER, pfis'tër, ALBRECHT (c.1420-c.1470). A German printer, to whom the discovery of the art is sometimes wrongly attributed. It seems probable that he worked as wood engraver for Gutenberg. About 1455 he founded a press in Bamberg. There he printed Boner's *Edelstein* (1461); the *Book of the Four Histories* (Joseph, Daniel, Esther, and Ruth) (c.1462); the famous *Biblia Pauperum* (1462); and *Belial* of the same date. Consult: Heffels, *Gutenberg: Was He the Inventor of Printing?* (London, 1882), and Dziatzko, *Gutenberg's früheste Druckerpraxis* (Berlin, 1890).

PFIZER, pfit'sër, GUSTAV (1807-90). A German lyrist and critic of the Swabian school. He was born in Stuttgart, studied at Tübingen, and in 1846 became professor at the gymnasium in his native city. He wrote *Gedichte* (1831), *Dichtungen epischer und episch-lyrischer Gattung* (1840),

and *Der Welsche und der Deutsche* (1844); translations of Bulwer and Byron; the critical work *Uhland und Rückert* (1837), and an attack on Heine which called out the *Schwabenspiegel*. His poetry is more original and reflective than most of the products of the Swabian school.

PFLEIDERER, pfli'dër-ër, OTTO (1839—). A German Protestant theologian, born at Stetten, near Kannstatt. He studied theology at Tübingen and for some time was superintendent and professor at Jena. In 1875 he was called to the chair of systematic theology at the University of Berlin. Through his writings and his lectures, he became known as one of the most influential representatives of liberal theology. His lectures in London (1885) and in Edinburgh (1894) were afterwards published in English: *Lectures on the Influence of the Apostle Paul on the Development of Christianity* and *The Philosophy and Development of Religion* (1894). His principal works are: *Die Religion, ihr Wesen und ihre Geschichte* (1869-78); *Religionsphilosophie auf geschichtlicher Grundlage* (1878-93); *Zur religiösen Verständigung* (lectures, 1879); and *Geschichte der Religionsphilosophie von Spinoza bis auf die Gegenwart* (1893).

PFLÜGER, pfly'gër, EDUARD FRIEDRICH WILHELM (1829—). A German physiologist, born at Hanau. He studied at Marburg and Berlin, and in 1859 became director of the Physiological Institute and professor in the University of Bonn. Pflüger made special studies on the nervous systems of lower animals; founded in 1868 the *Archiv für die gesamte Physiologie*; and wrote *Sensorische Funktionen des Rückenmarks der Wirbeltiere* (1853), *Physiologie des Elektrotonus* (1859), *Untersuchungen aus dem physiologischen Laboratorium zu Bonn* (1865), and *Ueber die Kunst der Verlängerung des Lebens* (1890).

PFLUGK-HARTTUNG, pflōō' här'tung, JULIUS VON (1848—). A German historian, best known as an authority on Papal and mediæval history. He was born at Warnikow, studied at Bonn, Berlin, and Göttingen, and in 1886 became professor of history at Basel. Thence he went to Berlin, where in 1893 he became head of the Secret State Archives. He wrote *Studien zur Geschichte Konrads II.* (1876-77); *Norwegen und die deutschen Seestädte* (1887); *Acta Pontificorum Romanorum Inedita, 748-1198* (1879-88); *Iter Italicum* (1883); in Grote's *Allgemeine Weltgeschichte* the part on the early Middle Ages (1889); *Krieg und Sieg, 1870-71*, the first of his studies of modern history (1895); *Napoleon I., Republik und Kaisertum* (1900); and *Die Bullen der Päpste bis zum Ende des 12. Jahrhunderts* (1901).

PFORZHEIM, pförts'hīm. A town of Baden, Germany, on the northern border of the Black Forest, 16 miles southeast of Karlsruhe (Map: Germany, C 4). It has the remains of an ancient castle, formerly the residence of the margraves of Baden-Durlach, several churches, a convent, and industrial and other schools. The Schlosskirche is a notable old structure in the Gothic and Renaissance styles. Pforzheim is one of the largest manufacturing centres of cheap jewelry in the world, over 10,000 workmen being employed. There are also chemical and iron works, machine shops, tanneries, and paper, electrical apparatus, and other factories. Population, in 1895, 33,331; in 1900, 43,097.

PFUHL, pfool, JOHANNES (1846—). A German sculptor, born in Löwenberg, Silesia. He studied in the Berlin Academy of Fine Arts under Schievelbein, became his master's assistant and completed his plans for the bronze memorial now in the Dönhofsplatz, Berlin. Soon after Schievelbein's death Pfuhl settled in Charlottenburg. He made a few portrait busts, but his more typical products are colossal groups or reliefs, including a frieze in rilievo, commemorating the Franco-Prussian War, for the military school of Lichterfelde (1876); a statue of Count Stolberg, in Landeshut, Silesia; "Perseus Liberating Andromeda," a fountain decoration in Posen, and also in the Goethe Theatre in Charlottenburg (1884); "Theseus, Hippodameia, and Eurytion" (1886); an equestrian statue of William I. with Bismarck and Von Moltke, in Görlitz (1893); and the Laube monument at Sprottau (1895).

PHA'COPS (Neo-Lat., from Gk. φακός, *phakos*, lentil + ὤψ, *ōps*, eye, face). A genus of trilobites that furnishes several index fossils for the middle Paleozoic formations. The carapace is of oblong or elliptical form and is quite convex, with a pronounced axis, and 11 thoracic segments. The head is semicircular, with its central portion or glabella large and very wide in front. The eyes are large and conspicuous, and the lateral slopes of the head are steep, with their posterior corners rounded. The pygidium or tail piece is large, convex, and strongly ribbed. The genus *Phacops* ranges from Silurian to Upper Devonian formations. The early European authors generally include under this generic term a number of species that are now classed under the genera *Dalmanites*, *Pterygometopus*, *Acaste*, and others. The most important species are *Phacops logani* of the American Lower Helderberg, *Phacops latifrons* of the European Devonian, and *Phacops rana*, a well-known species of the American Devonian. See TRILOBITA.

PHÆ'CIA (Lat., from Gk. Φαιακία, *Phaia-kia*). The country of the Phæacians, a people whom Odysseus visited in his wanderings. It was situated on the mythical island of Scheria, identified with Coreyra (Corfu), where the people had settled after having been driven out of their earlier home in Hyperia by the Cyclopes. There they led an undisturbed life of happiness, occupied with their marvelous ships, which safely traversed the sea without human guidance. Odysseus was found on the shore of the island by the Princess Nausicaa, and hospitably received at the palace of her father, King Alcinous. The episode is described in the sixth, seventh, and eighth books of the *Odyssey*.

PHÆ'DO (Lat., from Gk. Φαίδων, *Phaidōn*) (early fourth century B.C.). A Greek philosopher, born in Elis. He was taken prisoner and brought to Athens, apparently about 400 B.C.; there he became acquainted with Socrates, who secured his ransom by one of his friends. He remained a devoted disciple of the great teacher until the latter's death, when he returned to Elis and became the founder of the Elean School (q.v.). He composed dialogues, no longer extant, in the Socratic manner. Plato's dialogue which describes the death of Socrates bears Phædo's name.

PHÆ'DRA (Lat., from Gk. Φαίδρα, *Phaidra*). In Greek legend, the daughter of Minos, King of

Crete, and of Pasiphaë, sister of Ariadne and wife of Theseus. Aphrodite, enraged against Hippolytus (q.v.), Phædra's step-son, for neglecting her worship, and against Phædra, as being the daughter of Pasiphaë, inspired the latter with a passion for Hippolytus. On the rejection of her advances, she falsely accused the youth to Theseus, who prayed to his father, Poseidon, to destroy his son. Hippolytus was thrown from his chariot on the seashore and dragged upon the sands till dead. Phædra died by her own hand and Theseus learned the truth too late. This story, which seems to have been developed from the songs of Træzenian maidens to their local divinity, Hippolytus, guardian of purity, was first treated in tragedy by Euripides, whose second version has been preserved. It was also treated in a lost play by Sophocles. The Greek tragedy was imitated by the Roman Seneca, and also by Racine, whose *Phèdre* (1677) is one of his masterpieces. Consult Euripides, *Hippolytos*, ed. U. von Willamowitz-Moellendorf (Berlin, 1891).

PHÆDRUS. A Latin fabulist. He was probably a Thracian, who was carried to Rome as a slave in his childhood, and brought up at the Court of Augustus, who emancipated him. Under Tiberius he was exposed to great danger from the hostility of Sejanus, but lived to see that favorite's overthrow, and died at an advanced age, probably in the reign of Claudius. Five books of fables, after the manner of Æsop, and called *Fabulæ Æsopiæ*, have been ascribed to him. Most of the fables are versifications of those of the Æsopian cycle, but many are drawn from contemporary story. The style is good, and the metre is careful. The book, as we have it, is a later and incomplete recension. The first edition was published at Troyes in 1596. The best later editions are those of Müller (Leipzig, 1877, with critical notes), Ramavino (Turin, 1884), and Müller (Leipzig, 1890). See Hervieux, *Les fabulistes latins* (Paris, 1893-96); Bédier, *Les fabliaux* (Paris, 1893). See Æsop.

PHÆDRUS. A dialogue of Plato, in which he is represented walking in the woods with Phædrus, and discoursing on the nature of love. The dialogue is distinguished by unusual poetic enthusiasm. The latter portion is an exposition of dialectics.

PHÆOPHYCEÆ (Neo-Lat. nom. pl., from Gk. *φαῖος*, *phaïos*, dusky + *φυκός*, *phykós*, seaweed), or BROWN ALGÆ. A group of algæ named from the color of the chromatoplast, always a shade of brown, a color due to the pigment phycophæin, which modifies or overpowers the green of the chlorophyll. In some respects the most remarkable of the four great groups of algæ, comprising the largest and most vegetatively complex forms.

The Phæophyceæ are characteristically inhabitants of the colder waters of the globe, and are almost all marine, reaching their maximum development in Arctic and Antarctic oceans, and along such coasts as the Californian seaboard, where the water for the most part is cold. The display is especially luxuriant at Cape Horn, and on the rocky coasts of the North Atlantic and Pacific oceans. The brown algæ contain a large number of diverse groups, whose representatives range from microscopic forms and delicate filamentous types (Ectocarpales) to the immense coarse kelps several hundred feet long. The

Laminariales (kelps, devil's aprons) generally have a stalk (stipe) attached to the rocks by a cluster of strong root-like processes (hold-fast), that ends in an expansion called the blade, which in some forms bears lateral leaf-like structures. The blade is simple in the smaller forms (Laminaria), or perhaps split up longitudinally into segments. In many types the blade is cast off at certain periods by the development of a new one through the activity of the tissues just below the old. In other genera the blade serves as the growing region of the plant, and splits off segments which take a lateral position on the stem (Macrocystis).

The most interesting forms on the American coast are the giant kelps of the Pacific Ocean. Macrocystis is reported to attain a length of 900 feet. It is easily recognized by the leaves borne on a stem about the size of a clothes line. Far

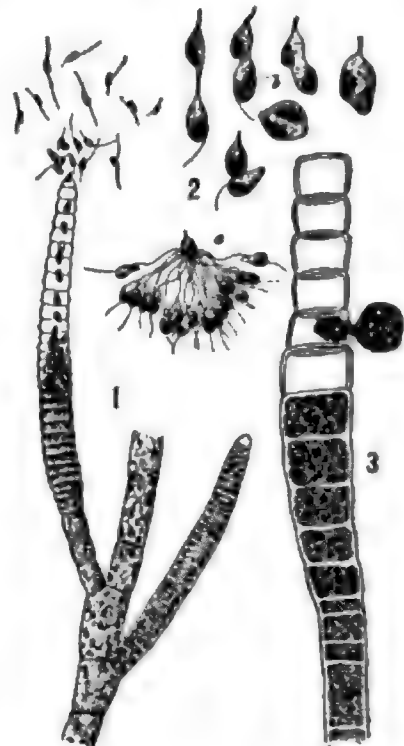


FIG. 1. BROWN ALGÆ.

1. Ectocarpus, with gametes escaping; 2. conjugation of the same, showing (a) numerous male gametes about a single female gamete, and (b) various stages of fusion; 3. Pylælla, with one cell functioning as a sporangium.

more picturesque is the sea-otter's cabbage (Nereocystis), which consists of a flexible leafless stalk swollen at the end into a hollow spherical float several inches in diameter. The top of the float bears long strap-like leaves that extend on either side in the water, and are whipped about by the wind and surf. Another interesting form is the sea-palm (Postelsia), which grows on surf-beaten rocks and reefs, and has a heavy, thick, erect stalk 12 to 18 inches high, with a thick crown of leaves that grow out and bend downward in the form of the conventional palm tree. The stalk is so tough that it may be bent over at right angles by the force of the waves without breaking. Lessonia, found on the coast of Chile, has stalks so heavy and thick that they have been mistaken for tree trunks when washed up on the beach. The kelps are one of the principal sources of iodine, which

is obtained from their ashes. They are also used in enriching farm lands along the coast.

In a very different division of the Phæophyceæ

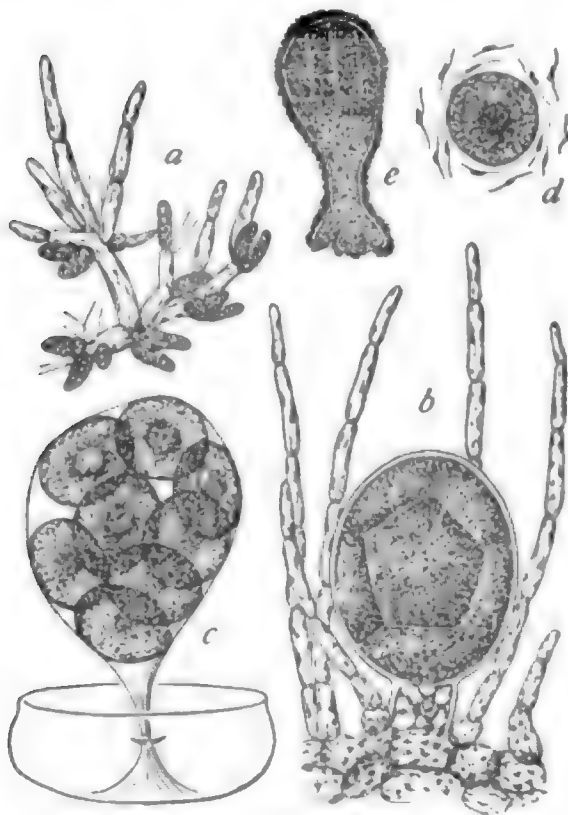


FIG. 2. ROCKWEED (*Fucus*).

a, branches bearing antheridia; b, oögonium with paraphyses; c, eggs escaping from oögonium; d, egg surrounded by sperms; e, germination of a fertilized egg.

are the 'rockweeds' and 'gulfweeds.' The former, also called 'wrack' and 'bladder-wrack,' cover the rocks between tide marks with thick fringing growth. Most of the rockweed is *Fucus*, a form with a forkingly branched thallus, that bears swollen tips, and in some species special air bladders that serve to float the branches. The gulfweeds (*Sargassum*) have one of the most highly differentiated vegetative bodies among the algae. The species are found in warmer waters than most brown algae. In addition to the holdfast and branching stalk, there are delicate leaves and small berry-like air bladders on short pedicels, besides specialized portions that bear sexual organs. Certain species (as *Sargassum bacciferum*) will vegetate luxuriantly when floating in midocean, thus forming the large masses of gulfweed met by ships, especially in certain warmer parts of the Atlantic.

Reproduction among Phæophyceæ is either sexual or non-sexual. In non-sexual reproduction motile spores (zoöspores) are formed by the division of the protoplasm of a cell and the escape of the organized parts into the water (Fig. 1, 3). Sexual reproduction is either isogamous or heterogamous. In isogamous union sex cells (gametes), in form and origin like zoöspores, fuse in pairs. Sometimes in behavior they can be distinguished as male and female, as in *Ectocarpus* (Fig. 1, 2, a, b). Heterogamous reproduction may be illustrated by *Fucus*. The eggs, eight in number (Fig. 2, b), are formed in a specialized oögonium, which develops in a pit on the surface of a swollen branch, called a conceptacle. They escape into the water, where they are met

by biciliate sperms (d) which have been produced in numbers in special cells of the branched hairs arising in similar pits. Fertilization occurs by the union of sperm and egg. The latter then grows at once into a new rockweed, its base developing into a holdfast and its apex into a thallus (e).

The most comprehensive treatment of the group is in Engler and Prantl, *Die natürlichen Pflanzenfamilien* (Leipzig, 1887—); Murray, *Introduction to the Study of Seaweeds* (New York and London, 1895). See ALGÆ.

PHAEB, fä'er, or PHAYER, THOMAS (1510?-1560). An English translator, educated at Oxford and at Lincoln's Inn. As a lawyer he aimed to popularize legal methods. To this end he wrote two legal handbooks. Rewarded for his service by the appointment as solicitor in the court of the Welsh marches, he settled at Kilgerran, in Pembrokehire, where he passed most of his life. He also studied medicine, and published a popular book called *The Regiment of Life*, containing a treatise on the plague (1546). To the *Mirror of Magistrates* (1559) he contributed a poem on a legend connected with Owen Glendower. Phaer is now remembered chiefly for his translation of Vergil's *Æneid* into English ballad metre (7 books, 1555-58; two more books, published posthumously with the first seven, 1562). The translation was completed by Thomas Twine in 1584. Vergil had been translated earlier into the Scotch dialect by Gawin Douglas (q.v.), and the Earl of Surrey (q.v.) had completed two books.

PHAËTHON (Lat., from Gk. φαέθων, shining). In the Greek poets, a not infrequent title of Helios, the sun-god. Phaëthon, in Greek legend, is also a son of Helios and the Oceanid Clymene. To prove his descent, he went to his father's palace and insisted on attempting to drive the chariot of the sun. Unable to control the fiery horses, he was carried from his course, and, approaching too near the earth, wrought great damage. Whereupon the earth cried to Zeus for help, who struck down Phaëthon with a thunderbolt into the Eridanus, a mythical river, later identified with the Po. His sisters, the Heliades, found the body, and bewailed the loss until they were changed to poplars and their tears to amber, to which the rays of the sun gave its special glow. In the lost *Phaëthon* of Euripides the youth appeared as the favorite of Aphrodite, who had placed him in charge of her temple. Consult Knaack, *Quæstiones Phaëthontæ* (Berlin, 1885).

PHAETON. A form of carriage for pleasure-driving drawn by one or two horses. The term is more often applied to a low easy carriage driven by ladies and known as a pony phaeton, although there are the mail phaeton and the spider phaeton, which are high carriages suitable for park driving, with a seat in front for the driver and a companion, and a rear seat for a groom.

PHAËTON. See TROPIC-BIRD.

PHAGEDENA, fāj'ê-dē'nā (ML., from Lat. *phagedæna*, from Gk. φαγέδαινα, *phagedaina*, cancer, from φαγῆν, *phagēin*, to eat). A term used in surgery to designate any obstinate and rapidly destructive form of ulceration. The process usually occurs in those whose systems are exhausted by disease and whose vitality is lowered by un-

hygienic surroundings. When an ulcer assumes a phagedenic character it enlarges rapidly; its edges are ragged and thin; its base is covered with an unhealthy slough; the discharge is thin, reddish, and offensive, and around the whole is a zone of red and deeply congested tissue. There is no tendency toward healing. The treatment consists in the local application of caustics or excision, and the administration of stimulants, tonics, and nutritious food, together with measures to promote the most favorable hygienic conditions.

Phagedena gangrenosa is a term sometimes applied to 'hospital gangrene,' a disease which formerly prevailed in prisons and hospitals, but which, owing to sanitary reform and the introduction of antiseptic measures, is now practically extinct.

PHAGOCYTE (from Gk. *phagēin*, to eat + *kýtos*, *kytos*, hollow, cell). A microbe-destroying cell residing free in the animal system. About 1883 Metchnikoff found that the individual cells of the stomachs of sponges took in solid particles of food and digested them, and this he called intracellular digestion. This function is performed by individual, free, or 'wandering' mesoderm cells, resembling amœbæ. Such wandering cells, in the cases of many of the lower animals, ingest or absorb parts of the body which become useless or by decay harmful to the organism. Besides this these free amœboid cells can and do capture and devour foreign bodies and particles; they take up anything hard or soft which occurs in or is carried into the body; and when such cells are confronted with a large mass of food-material, which they cannot devour singly, they usually fuse into a plasmodium, which eats up the whole available food. Such bodies as cannot be eaten are surrounded and isolated. Led by these facts, Metchnikoff threw out the remarkable theory that inflammation in the vertebrates is due to the struggle between the white corpuscles of the blood and the disease-germs within it. Thus a new importance was lent to the leucocytes or white amœboid corpuscles, viz. that they act as microbe-eaters or 'phagocytes.' Metchnikoff injected fluids containing bacteria or microbes beneath the skin of various invertebrate animals. They were soon found within the amœboid cells, and if such microbes developed spontaneously in the wounds of such animals, they were absorbed in the same manner. Kovalevsky, a few years later, made similar observations in compound ascidians. When an individual died it was attacked and absorbed by the mantle cells of the colony, which also sought to destroy incoming bacteria, as was proved by experiment. Kovalevsky concluded that the passage of the wandering cells to the surface of the epithelium is a means of protection against the intrusion of agents of disease. These discoveries and theories mark an epoch in biology in its application to medical knowledge.

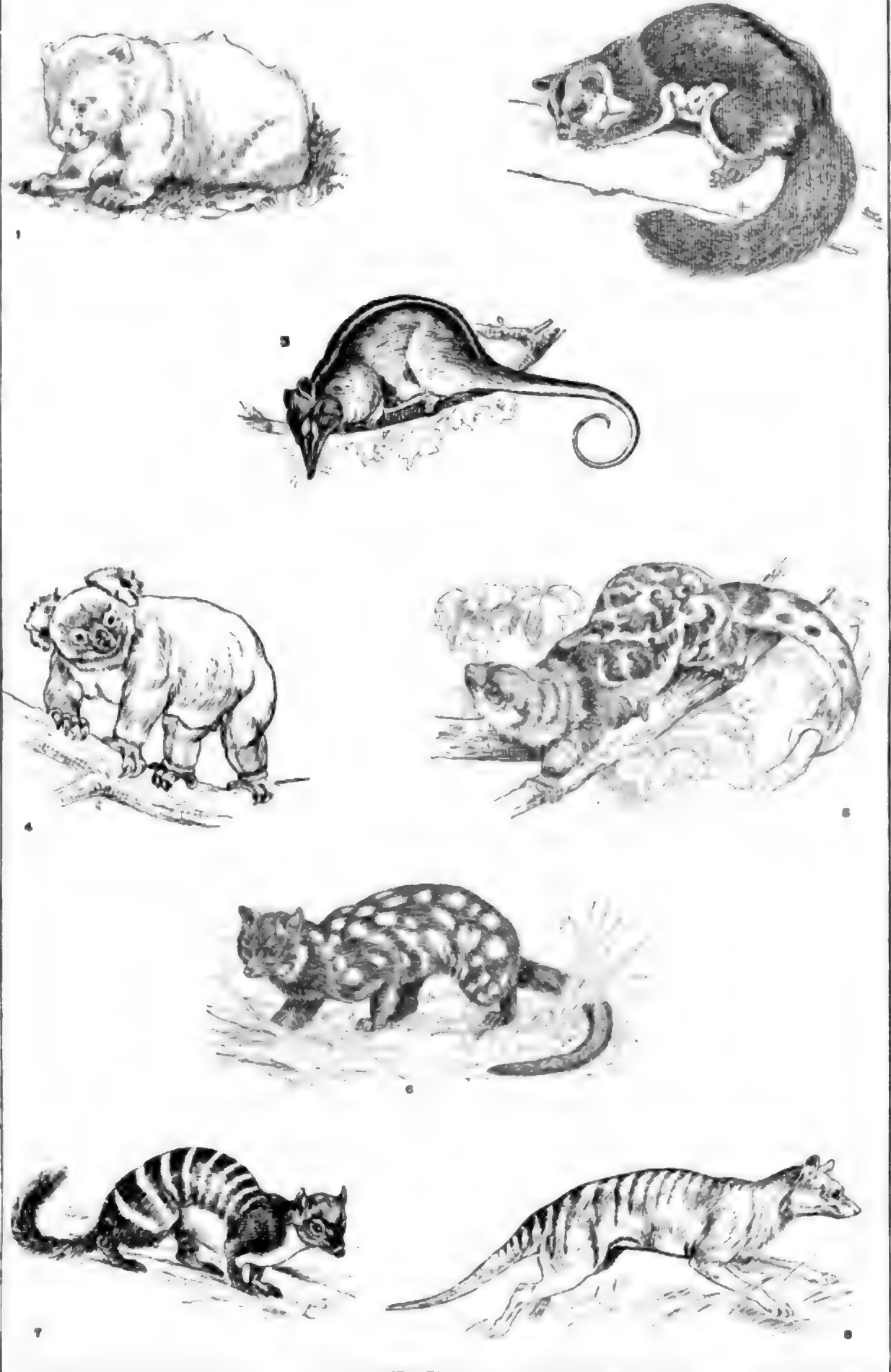
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PHAGOCYTO'SIS. See INFLAMMATION.

PHALANGER (Fr. *phalanger*, from *phalange*, phalanx, from Lat. *phalanx*, from Gk. *phalanx*, line of battle, rank of soldiers, round piece of wood, joint between the fingers and toes). Any of the marsupials of the family Phalangeridae, which are characterized preëminently by having five fingers and toes, the second and third bound together. The thumb is opposable and nailless. The tail is nearly always long and prehensile. The family is divisible into four sections, and includes a considerable variety of form. Thus the true or typical phalangers include the various species of cuscus (q.v.), and various largish species, some arboreal and some terrestrial, besides the petaurists or flying phalangers (q.v.; also TEGUAN), and the 'dormouse phalangers' of the genus *Dromicia*. Another group contains the koala (q.v.), a third the wombat (q.v.), a fourth the aberrant little tarsipes of Western Australia, which is only seven inches long, and uses its long, slender tongue to extract honey from flowers, as well as to catch the small insects which constitute most of its food. The phalangers are united with the kangaroos by descent, and are now separated from them only by the musk-kangaroo (*Hyposprymnodon*). Typical members of this family are shown in the accompanying plate.

PHALANX (Lat. *phalanx*, from Gk. *phalanx*, line of battle, row of soldiers, round piece of wood, joint between the fingers and toes). The ancient Greek name for the heavy infantry in line of battle. The heavy-armed hoplites were only of service when stationed in a long straight line in close order. In the Homeric poems there are only shadowy traces of a regular line of battle, and the development of the typical Greek formation seems to have been largely the work of the Spartans during their struggles for supremacy in the Peloponnesus. As the principle of formation was the desire to present an equal line to the enemy, the depth and formation depended on circumstances. The usual depth seems to have been eight men, but Miltiades at Marathon weakened his centre in order to extend his line, and at Delium the Theban column was twenty-five deep. It is not until the fourth century B.C. that we find other troops of practical importance in deciding the Greek battles. During that century the improved equipment of the *peltasts*, or light-armed troops, made them able to meet the phalanx, if able to choose their ground and avoid the direct attack. Epaminondas gave a new direction to the art of war by replacing the old attack along the whole line with the decisive onset of one wing, drawn up in a heavy column (at Leuctra fifty deep), while the rest of the line in ordinary depth served to check the enemy. Philip of Macedon learned his military science at Thebes, and reorganized his army by the introduction of a regular infantry besides the hereditary cavalry of the nobles. These soldiers were armed with a small shield, about eighteen inches in diameter, corselets, and long spears, and fought in closer order than was usual among the Greeks. This phalanx seems to have been a mobile body, but probably Philip and certainly Alexander relied rather on the heavy cavalry as the offensive force, and used the phalanx to hold the main line of the enemy in check, while the cavalry crushed his wing or turned his flank. The phalanx of

PHALANGERS



1. WOMBAT (*Phascolomys Mitchellii*).
2. FLYING SQUIRREL PHALANGER (*Petaurus sciureus*).
3. LONG-SNOURED PHALANGER (*Tarsipes rostratus*).
4. KOALA (*Phascolarctos cinereus*).

5. CUSCUS (*Phalanger maculatus*).
6. COMMON DASYURE (*Dasyurus viverrinus*).
7. BANDED ANT-EATER (*Myrmecobius fasciatus*).
8. TASMANIAN WOLF (*Thylacinus cynocephalus*).

Alexander seems to have had pikes of different lengths, the longest being about seventeen feet, and of course requiring the use of both hands. Though intended to fight in line as a single mass, it was also capable of breaking into small tactical units able to manœuvre separately, if the nature of the ground or the development of the battle made it desirable. The successors of Alexander gradually changed his fundamental principles, and depended again upon the phalanx to decide the day. This led to even closer massing of men and increase of the length of the lances, till the mass became irresistible if unbroken, but unwieldy and utterly helpless if broken by uneven ground, as was proved in many a battle against the Roman legions. This later phalanx was regularly drawn up sixteen men deep, and either about three feet apart, body included, or only about eighteen inches with shields touching; a formation which made any turning on the part of individuals impossible. The lances were about twenty feet long, and those of the first five ranks projected in front; the others held their spears over the shoulders of their comrades, ready to drop them if occasion arose. Consult: Droysen, "Griechische Kriegsalterthümer," in Hermann, *Lehrbuch der griechischen Antiquitäten* (Freiburg, 1888); Bauer, in Müller's *Handbuch der klassischen Altertumswissenschaft*, vol. iv. (Munich, 1893); Delbrück, *Geschichte der Kriegskunst* (Berlin, 1900); Lamert, *Polybios und die römische Taktik* (Leipzig, 1889).

PHAL/ARIS (Lat., from Gk. Φάλαρις). A tyrant of Agrigentum in Sicily, whose rule lasted from about 570 to 549 B.C., when he was killed in a popular revolt. He maintained himself by mercenaries, and chiefly by stratagem extended his power on all sides. The tradition, at least as old as Pindar, that he gratified his savage nature by roasting persons alive in a brazen bull, has made him the universal type of the cruel tyrant. A collection of letters which bears his name, represents him as a kindly and cultivated prince; but Bentley in his famous *Dissertation* (first published in 1699) showed that these are probably forgeries of the Christian Era. See BENTLEY, RICHARD. Consult: Freeman, *History of Sicily*, (Oxford, 1891).

PHALARIS. See CANARY-GRASS.

PHAL/AROPE (from Gk. φαλαρίς, *phalaris*, eoot, ποίς, *pous*, foot). A sandpiper-like shore-bird of the family Phalaropodidæ, having lobate feet and a rather long bill, which is slender, weak, and straight. Phalaropes differ from sandpipers, however, in that they spend the greater part of their time in swimming on the sea, where they seek mollusks and other small marine animals for their food. They are very fearless of man and are said to be easily tamable, but the flesh is oily and unpalatable. The phalaropes differ from most other birds in the remarkable relative condition of the two sexes. The females are not only larger and more brightly colored, but they do the courting, and, after they have secured a mate and laid their 3 or 4 eggs, they leave the male to do the incubating. Three species only are known, all inhabitants of the Northern Hemisphere and two circumpolar. Each is now made the type of its own genus. The northern phalarope (*Phalaropus lobatus*) has the membrane of the toes scalloped and the bill very slender. It breeds in

the Arctic regions and migrates southward on the approach of winter. The nest is a shallow depression in the ground lined with grass and moss. The eggs are olive-gray or buffy-white, heavily blotched with chocolate-brown. Its entire length is rather less than 8 inches. The tail is short. It is a beautiful bird, and remarkable for the great difference of its summer and winter plumage, the prevailing tint in winter being a delicate gray, while in summer the upper parts exhibit a fine mixture of slate-gray and buff, sides and front of neck rufous, and the breast and under parts are white. The red phalarope (*Crymophilus fulicarius*) is rather larger than the northern phalarope, and is, like it, very graceful in form and movements, and finely colored. The membrane of the toes is scalloped, but the bill is stouter, flattened, and has a lancet-shaped tip. The third species is Wilson's phalarope (*Steganopus tricolor*), which is an American bird, found in summer north to the Saskatchewan, and in winter south to Brazil and Patagonia. It is rare in the East, but abundant in the Mississippi Valley. It is the largest of the three species, being nine inches or more in length. The toe-membranes are plain and unscalloped. Consult: Coues, *Birds of the Northwest* (Washington, 1874). See PLATE OF EGGS OF WATER AND GAME BIRDS.

PHALLICISM, or **PHALLISM** (from *phallic*, from Gk. φαλλικός, *phallicos*, relating to the male organ, from φαλλός, *phallos*, male organ). The worship of the generative power, as expressed most strongly by adoration of the male organ. As a cult, phallicism is typical of the Oriental races, especially Semitic and Dravidian. In Europe its strongest expression is found in Greece, which was under Semitic influence; but as a phase of other worship, rather than as a special cult, it is native to many savage tribes of America and Asia. Under a corresponding name, linga-worship, phallicism is still practiced by the natives of India. There are two forms of phallicism. The lower, and probably earlier, form is found when the phallos itself is worshiped as divine or is regarded as emblematic of sexual passion alone. Ordinarily, in this form, the phallic emblem is the mark of devotion to some deity of lust, who is not necessarily a male divinity. On the contrary, the female deity is more usual and sometimes older than the male. In the latter case we have reverence paid to the divine mothers, or female forms, of India; to the date-palm, mother-goddess in Arabia, etc.; in the former we find the worship of Dionysus in Greece and Siva in India. In this first form of phallicism there is no notion, or only a very vague notion, of affinity between sexual instinct and the creative power of nature. Among savages the rite in this form is scarcely more than a frankly brutal indulgence of passion; in a civilized community, where excess is frowned upon by a more refined sentiment, the indulgence tends to become secret, as in the Tantric worship of India. This Hindu phallicism, with its conventional admixture of philosophy, represents the conditions which obtained in Greece when orgies were veiled as Orphic mysteries.

In the second form the phallos serves merely as a symbol of that mysterious force which in spring renews vegetable life and awakens to fresh energy all living things, and phallicism thus refined becomes the worship of a great divine uni-

fyng and creative power. Such phallicism as this may be the religion of ascetics, like the Lingaites of India, and in this case the phallic emblem is usually two-fold, as the deity is regarded as androgynous. But the two emblems, no longer realistic, are merely conventionalized shapes, which are placed in the temples of the male-female god Siva. Such was probably the phallicism of the higher minds in Greece, and to them the Orphic mysteries were a philosophical re-interpretation of the naive form of grossly material phallicism which alone appealed to the vulgar.

Phallicism is not necessarily primitive, although found in very savage communities. Among the Central Australians, for example, there are erotic dances, but no trace of phallic worship. Finally it is to be observed that many supposed phallic survivals, such as the *swastikas* (q.v.) and upright stones, may have in reality nothing to do with phallic worship. Phallicism, however, lies at the base of various savage rites in many parts of the world, Asia, Africa, and America, and was often connected, as among the Aztecs, with higher forms of nature-worship. Consult: Tylor, *Primitive Culture* (Boston, 1874); Fergusson, *Rude Stone Monuments* (London, 1872); Barton, *Semitic Origins* (New York, 1901).

PHANARIOTS. See **FANARIOTS**.

PHAN'EROGAM (from Gk. *φανέρως*, *phaneros*, evident + *γάμος*, *gamos*, marriage). An old name of spermatophytes (q.v.), popularly called flowering plant. They are also called 'phanogams' or 'phenogams.' See **CRYPTOGAMS**.

PHAN'EROGLOS'SA (Neo-Lat., from Gk. *φανέρως*, *phaneros*, evident + *γλῶσσα*, *glōssa*, tongue). A suborder of the Anura (q.v.), containing those frogs and toads which possess a tongue, which has the shape of a round disk adherent by nearly the whole of its base, and is not protrusible. This group includes the great majority of the frogs and toads of the world. Consult Gadow, *Amphibia and Reptiles* (London, 1901).

PHAN'OCLES (Lat., from Gk. *Φανουκλῆς*, *Phanoklēs*). A Greek elegiac poet of the close of the fourth century B.C. Of his life we know nothing. His poems deal with the loves of the gods for beautiful boys; the tragic vengeance in each case seems to have been particularly stressed. Apart from some merely verbal fragments, there remains of this series only one considerable piece from a poem on Orpheus's admiration for Calais, which shows much beauty of diction and versification. It is edited in Bergk's *Anthologia Lyrica*.

PHARAOH, *fā'rō* or *fā'rā-ō* (Heb. *Phar'ōh*, Gk. *Φαραώ*, *Pharaō*). The Hebrew form of the Egyptian *Per'o*, used in the Bible as the general name or title of the kings of Egypt. From motives of reverence, the Egyptians avoided using the name of their sovereign, and usually substituted for it some such expression as 'the good god,' 'Horus the lord of the palace,' 'his Majesty,' 'the King,' or, especially under the New Empire, the indefinite pronoun 'one.' A very old designation of this nature was *Per'o*, 'great house' (i.e. the palace). It occurs as early as the Fourth Dynasty, was used with special frequency in the vernacular of the New Empire, and finally, at quite a late period, became the common popular

designation of the Egyptian monarchs. It is preserved in the Coptic *perro*, 'the King,' where the *p* is mistaken for the definite article. Josephus (*Antiq.*, viii. 6, 2) correctly explains Pharaoh as meaning 'King,' and as late as the fourth century A.D. Horapollon seems to have known that 'great house' was a synonym of 'King.' Consult: Ebers, *Ägypten und die Bücher Moses* (Leipzig, 1888); Cheyne and Black, *Encyclopædia Biblica*, vol. iii. (London, 1889, et seq.).

PHARAOH'S HEN, or **PHARAOH'S CHICKEN**. The small Egyptian vulture (*Neophron percnopterus*), so called because of its frequent appearance in the ancient hieroglyphs.

PHARAOH'S RAT. The Egyptian mongoose (*Herpestes ichneumon*).

PHARISEES (Heb. *pārūshim*, Aramaic *pārishim*, the set apart, separatists). A Jewish religious party. The Pharisees first emerged as a definite party when the success of the Maccabean revolt led to the foundation of a secular State, at the head of which John Hyrcanus (high priest, B.C. 135-105) reigned as a secular prince, making alliances with other powers. Opposition to this policy, along the line of the old spirit of separation from all things non-Jewish (see **GENTILES**), crystallized in the party of the Pharisees. They were essentially a religious party and used political methods only when their principles had been severely outraged or when they could not otherwise attain their ends. Their distinctive doctrines were: (1) Separation from all intercourse in common life with the mass of the people, whom they designated as the '*am hā'āreṣ*' (people of the land). This term did not include, as it had originally done, the heathen inhabitants of the land, from whom Jehovah was supposed to have commanded the Israelites to keep apart for fear of contamination (cf. Ezra ix. 1; Neh. x. 28-31); it was used by the Pharisees to designate even their orthodox fellow-countrymen who were less scrupulous than themselves in the interpretation and observance of the law. Since absolute separation was impossible, they drew up elaborate rules to govern their intercourse with the mass of their fellow-countrymen. They would not buy or sell in exchange with an '*am hā'āreṣ*'; their great Rabbi Hillel said, "No '*am hā'āreṣ*' is pious." They worshiped, however, with their countrymen in the temple and synagogue, and Hillel also said, "Separate not thyself from the congregation." Nevertheless the Pharisees stood highest in the popular favor. (2) Less distinctive, but held with equal intensity, was their doctrine of the strict interpretation and rigid observance of the law as a necessity to righteousness. They insisted upon both the written law (the Torah) and also the traditions of the elders. Indeed, they made the tradition of more weight than the law (Mark vii. 8 sqq.). One of their principles was, "It is a greater crime to teach contrary to the precepts of the scribes than contrary to the Torah itself." The law was extended by them to the minute details of the ablution of hands and vessels, to tithes, fasts, and Sabbath observance. They were the strictly legal party; righteousness was the product of legal observance, according to their teaching. (3) They cherished the political ideal of a restoration of the kingdom of Israel, which they expected to be accomplished through the interposition of a divine act; preparation for

this consummation they believed was best achieved through a strict carrying out of the law. Foreign domination they regarded as a punishment of God for the sins of the people. (4) Their other doctrines, regarding the immortality of the soul, providence, and human freedom, were less peculiar and held in common with other Jews.

The Pharisees are most familiar through their relation to Jesus of Nazareth. They became his bitter opponents early in his ministry and continued so until the end. The grounds of their hostility were many. He and his disciples mingled freely with publicans and sinners, thus violating the distinctive Pharisaic doctrine of separation from the 'am ha'ares. They were careless about the strict observance of fasts, ablutions, and the Sabbath. The teaching of Jesus concerning the Fatherhood of God was in direct opposition to the letter and spirit of Pharisaic legalism. His interpretation of the Torah in the Sermon on the Mount was a repudiation of the Pharisaic principle that righteousness is the result of the strictness with which commandments affecting the external life are observed. The Pharisees made the religious relation one of legal compact; Jesus made it one of personal fellowship in the bond of filial trust and obedience. These two systems were utterly contradictory; the representatives of the one could not endure the teacher of the other. Hence the Pharisees were the most active in putting Jesus to death. After the destruction of Jerusalem under Titus (A.D. 70) the Pharisees survived as a party; their leading rabbis formed a body which regarded itself as the continuation of the ancient Sanhedrin; this group persisted and preserved Judaism of the stricter sort after the theocracy was really overthrown.

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PHARMACEUTICAL ASSOCIATION, AMERICAN. A scientific society with its headquarters at Baltimore, Md. Its initial meeting was held in New York in 1851. The association was organized in Philadelphia in 1852, and incorporated in Washington, D. C., in 1888. Its objects are to improve the science and art of pharmacy by diffusing scientific knowledge among apothecaries and druggists, to foster pharmaceutical literature, to stimulate discovery and invention, and to encourage home production and manufacture in the several lines of drugs. It has published annual volumes of proceedings since 1851, except for the year 1861.

PHARMACOPŒIA (Neo-Lat., from Gk. *φάρμακοποιία*, *pharmakopoiia*, art of preparing drugs, from *φάρμακοποιός*, *pharmakopoiōs*, one who prepares drugs, from *φάρμακος*, *pharmakos*, drug, medicine + *ποιεῖν*, *poiein*, to make). A term applied to various works, consisting for

the most part of (1) a list of the articles of the materia medica, whether simple or compound, with their characters, and the tests for the determination of their purity; and (2) a collection of approved receipts or prescriptions, together with the processes for articles in the materia medica, obtained by chemical operations. Almost every civilized country of importance has its national pharmacopœia, among which those of the United States, France, and Prussia deserve specially honorable notice. The first pharmacopœia published under authority appears to have been that of Nuremberg in the year 1542. Valerius Cordus, a student, who was staying for a short time at Nuremberg, showed a collection of medical receipts, which he had selected from the works of the most eminent writers, to the physicians of that city, who were so struck with its value that they urged him to print it for the benefit of the apothecaries, and obtained for his work the sanction of the senatus. Before this time the books chiefly in use among apothecaries were the treatises: *On Simples*, by Avicenna and Serapion; the *Liber Servitoris* of Balchasim ben Aberazerim; the *Antidotarium* of Johannes Damascenus or Mezue, arranged in classes; and the *Antidotarium* of Nicolaus de Salerno, which was arranged alphabetically. This work was commonly called *Nicolaus Magnus*, to distinguish it from an abridgment known as *Nicolaus Parvus*.

The first edition of the London pharmacopœia (or, more correctly speaking, of the pharmacopœia of the London College of Physicians) appeared in 1618, and was chiefly founded on the works of Mezue and Nicolaus de Salerno. Successive editions appeared in 1627, 1635, 1650, 1697, 1721, 1746, 1787, 1809, 1824, 1836, and 1851, and form an important contribution to the history of the progress of pharmacy and therapeutics during the last two centuries and a half.

The Edinburgh pharmacopœia is more modern than the London, the first edition having appeared in 1699, while the Dublin pharmacopœia does not date farther back than 1807. The latest editions of these works appeared in the years 1841 and 1850 respectively.

Until the Medical Act passed in 1858, the right of publishing the pharmacopœia for England, Scotland, and Ireland was vested in the colleges of physicians of London, Edinburgh, and Dublin respectively; and as these three pharmacopœias contained many important preparations, similar in name, but totally different in strength (as, for example, dilute hydrocyanic acid, solution of hydrochlorate of morphia, etc.), dangerous complications arose from a London prescription being made up in Edinburgh or Dublin, or vice versa. By that act it is ordained that "the general (medical) council shall cause to be published, under their direction, a book containing a list of medicines and compounds, and the manner of preparing them, together with the true weights and measures by which they are to be prepared and mixed; and containing such other matter and things relating thereto as the general council shall think fit, to be called *British Pharmacopœia*, which shall for all purposes be deemed to be substituted throughout Great Britain and Ireland for the several above-mentioned pharmacopœias."

The *British Pharmacopœia*, of which mention has just been made, a work published in 1864, had the merit of amalgamating the London, Edin-

burgh, and Dublin pharmacopœias; but it unfortunately contained so many defects that, in accordance with the universal wishes both of the medical profession and of the chemists, the medical council ordered a new edition to be prepared as speedily as possible. This edition appeared in 1867, and has been followed by others in 1874, 1885, and a supplement in 1890. The French pharmacopœia is used in Switzerland also. The Prussian pharmacopœia is used in Germany and Russia. The pharmacopœia of Orosi is used in Italy.

It may be proper here to make the distinction between a pharmacopœia and a dispensatory. These terms have been used indiscriminately, but there is a distinction among pharmacists. A pharmacopœia is strictly a collection of recipes or instructions for making various medicinal compounds, or simple preparations, which are also made under the authority of a college or body of medical men, and are termed 'official'. A dispensatory is a book which also treats of the preparation of medicines; but it moreover contains the natural as well as the medical history of the various medicinal substances. A dispensatory, in addition to official preparations, may contain many others, and be published without official authority. A dispensatory is also to a greater or less extent a treatise on *materia medica* (q.v.), a branch of medical science which treats of the knowledge and action of medicines, and may either treat of the action of individual medicines or embrace the whole range of the pharmacopœia, and occupy itself with the action of every article, simple or compound, either upon a healthy or a diseased subject; that is to say, it may consider the physiological as well as the therapeutic action of medicines, therapeutics (q.v.) being that branch of the science which treats of the action of drugs as medicines strictly speaking, or their action in disease; for this is often very different from their action on the healthy body, or their physiological action. A dispensatory is generally a combination of a pharmacopœia, a *materia medica*, and a treatise on therapeutics, as far as the latter is not included in *materia medica*.

In many of the countries of Europe the pharmacopœia is published by authority of the Government, and its requirements are enforced by law. In the United States this is not so, but in many of the individual States the "Pharmacopœia of the United States of America" has been adopted as the legal standard. In 1778 the first pharmacopœia in this country was published in Philadelphia for the use of a portion of the American army. Another was published in 1805 for use in New England. The New York Hospital issued one for its own use in 1815; later editions, like those of similar institutions, being known as the Formulary and consisting of classified collections of prescriptions. The New York County and New York Medical Societies in 1818 took measures for holding a convention of delegates from various State medical societies and medical colleges, which met at Washington January 1, 1820. The action taken then resulted in the appearance the same year of the first *Pharmacopœia* in the United States of America, a volume of 272 pages in Latin and English. Since the edition of 1840 the Latin has been omitted. The convention made provisions for the holding of other conventions for revision every ten years. The convention

of 1860 received delegates from the army and navy, and from various colleges of pharmacy and pharmaceutical societies. Following the convention held at Washington in 1890, the seventh revised edition was published in 1893. The first edition of the *United States Dispensatory* was issued in 1831. It has since that time passed through many revisions, and has become double its original size, till at the present time it is really an encyclopædia of therapeutics, pharmacy, and *materia medica*. Several other excellent pharmacopœias and dispensatories have been published, the *National Dispensatory* and the *American Dispensatory* being the most prominent. Though valuable, they do not occupy the official position that is filled by the pharmacopœia. New preparations are, of course, continually added to the pharmacopœias.

PHARMACY (OF. *farmacie*, Fr. *pharmacie*, from Gk. *φάρμακία*, *pharmakia*, use of drugs, from *φάρμακον*, *pharmakon*, drug, medicine). That department of *materia medica* (q.v.) which treats of the collection, preparation, preservation, and dispensing of medicines. It is synonymous with *pharmaceutical chemistry*.

PHAR'NABA'ZUS (Lat., from Gk. *Φαρνάβης*, from OPers. **Farnābazu*, having an arm of glory). A Persian, son of Pharnaces, whom he succeeded, in the reign of Darius II., as satrap of the region Dascylitis, which embraced the coast lands in Northwestern Asia Minor. In B.C. 413 he espoused the cause of the Spartans, with whom he acted in concert for several years, endeavoring to drive the Athenians from the region of the Hellespont. In 408, however, changing his policy, he made a covenant of friendship and hospitality with Alcibiades, and accepted terms of accommodation from the Athenians. In 396 he defeated an invading Spartan force under Agesilaus, but in the next year was himself defeated by that general. Soon after, Conon came to his assistance from Athens, and the two sailed through the Ægean Sea, driving out the Lacedæmonians from the seaport towns. Pharnabazus's final effort was with the Athenian Iphicrates in Egypt in 377 and the following years. The expedition proved unsuccessful.

PHAROS (Lat., from Gk. *φάρος*). A rocky island off the west extremity of the Egyptian coast, opposite the town of Rakotis. When Alexander chose this spot as the site of Alexandria, he connected the island with the mainland by the Heptastadium, or Seven-Furlong Mole. This made it possible to build two harbors, and on the eastern extremity of the island, at the entrance to the great harbor, Ptolemy I. began the erection of a great lighthouse, which was finished under his son, Ptolemy Philadelphus, about B.C. 282. The architect was Sostratus of Cnidus, and the work was reckoned among the wonders of the world. It was a lofty tower with a square base measuring about 100 feet on a side, and the light was furnished by a beacon fire on the summit. The statements that it was 400 feet high and that the light was visible for 60 miles at sea are certainly exaggerations. After standing for nearly 1600 years one side was thrown down by an earthquake on August 7, 1303, and in 1346 it was a complete ruin. In 1478 the foundations were used for the fort Kaït Baï, and the side of the great central tower has the same length as that given for the side of the old Pharos.

PHARSALIA. An epic poem in ten books by Lucan, narrating the struggle between Cæsar and Pompeius. The hero is Cato.

PHARSA'LUS (Lat., from Gk. Φάρσαλος), now **PHERSALA**. A Greek city of Southern Thessaly, on the river Enipeus, the chief town of the District of Pharsalia. It does not appear in history until the fifth century B.C., and seems to have been one of the prosperous cities of Thessaly. In the fourth century B.C. it was the home of Daochus, who was one of the chief adherents of Philip of Macedon. It is best known from the battle of Pharsalia, fought near the city on August 9, B.C. 48, between Cæsar and Pompeius. Pompeius had about 47,000 legionaries, 7000 cavalry, and a great number of light-armed auxiliaries. Cæsar had 22,000 legionaries, and 1000 German and Gallic cavalry. The battle, which commenced with an attack on Pompeius's cavalry on Cæsar's right wing, ended in the turning of Pompeius's left and the destruction of his army. About 15,000 fell, and the remainder surrendered on the following day. Phersala was one of the positions occupied by the Greeks in the disastrous war against Turkey in 1897, and after the rout of the Greeks was entered by the Turks on May 6th.

PHARYNGITIS (Neo-Lat., from Gk. φάρυγξ, *pharynx*, throat, pharynx). A disease of the mucous membrane lining the pharynx, accompanied by inflammation. It is generally described as of one of two types: (1) catarrhal; (2) follicular. Catarrhal pharyngitis is the ordinary 'sore throat.' It is characterized by swelling and laxation of the mucous membrane, with redness and tenderness of its surface, and occasionally ulceration with bleeding. Occasionally there is a chill, followed by fever at the invasion of the attack. The follicular variety is characterized by a pebbled surface, the elevations corresponding to the situation of the follicles in the membrane. Either variety may be preceded by a stage during which the mucous membrane is dry and the surface dull and pale. There is also a chronic dry pharyngitis. Pharyngitis is generally caused by inhaling irritating vapors, including tobacco smoke, exposure to chilling wind when perspiring, or by the presence of uric acid in the blood. It is increased by constipation. Internal treatment for pharyngitis includes the administration of aconite, codeine, cubeb, alkalies, sodium salicylate, quinine, and tincture of iron. Local applications include tincture of iron, glycerite of tannic acid, benzoinol, camphor, menthol, and nitrate of silver.

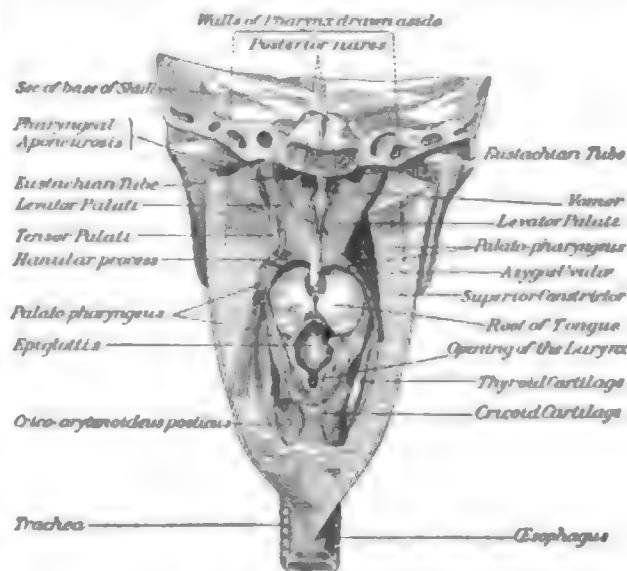
Inflammation of the pharyngeal soft parts around the tonsil, or peritonsillitis, is treated under **QUINSEY** (q.v.).

PHARYNGOGNATHI (Neo-Lat. nom. pl., from Gk. φάρυγξ, *pharynx*, throat + γνάθος, *gnathos*, jaw). A suborder of acanthopterous fishes, having the lower pharyngeals fully united. It includes the Labridæ, Scaridæ, and allied families. This group has aroused great diversity of opinion among ichthyologists. Consult Jordan and Evermann, *Fishes of North America* (Washington, 1896).

PHARYNX (Neo-Lat., from Gk. φάρυγξ, throat, pharynx; connected with φάρωγξ, *pharawx*, cleft, φάρω, *pharaw*, to plow). The name of the combined portion of the respiratory and ali-

mentary tracts which lies behind the nose and mouth above and in front, and the larynx and œsophagus below. It is a musculo-membranous sac, situated in front of the cervical portion of the vertebral column, and extending from the base of the occiput to the level of the fifth cervical vertebra, where it becomes continuous with the œsophagus (q.v.). Its length is about four inches and a half; it is broader in its transverse than in its antero-posterior diameter, and its narrowest point is at its termination in the œsophagus. Seven openings communicate with it, viz.: the two *posterior nares* or nostrils, at the upper and front part of the pharynx; the two *Eustachian tubes*, opening on the outer margins of the preceding orifices; the *mouth*; the *larynx*; and the *œsophagus*.

The pharynx is composed of an external *muscular* coat; a middle *fibrous* coat called the *pharyngeal aponeurosis*, thick above where the muscular coat is absent, and gradually thinning as it descends; and a *mucous* coat, continuous with the mucous membrane of the mouth and nostrils. The muscular coat requires special notice. It is composed of a *superior*, *middle*, and *inferior constrictor* muscle on either side, together with two less important muscles, termed the *stylo-pharyngeal* and *palato-pharyngeal* mus-



cles. When the food, after being sufficiently masticated and mixed with saliva, is thrown, by the action of the tongue, into the pharynx, the latter is drawn upward and dilated in different directions; the elevator muscles (the stylo-pharyngeal and palato-pharyngeal) then relax, and the pharynx descends; and as soon as the morsel is fairly within the sphere of action of the constrictor muscles, they successively contract upon it, and gradually pass it onward to the œsophagus. Independently of its importance in the act of swallowing, the pharynx exerts an influence on the modulation of the voice, especially in the production of the higher notes.

The pharynx is subject to various circulatory disturbances, to acute and chronic inflammations, ulceration, suppuration, and abscess. It is the most frequent site of diphtheria. This affection as well as the suppurative processes requires prompt and appropriate medical treatment.

PHASCOLOGALE, fās'kō-lō-gā'lō (Neo-Lat., for **phascologale*, from Gk. φάσκωλος, *phaskōlos*, leathern bag + γαλή, *galē*, weasel). A genus of

diminutive Australian dasyures (q.v.), very pretty, and much like mice, except that they live wholly in trees and make their homes in hollows of tree-trunks.

PHASES (ML. nom. pl., from Gk. *φάσις*, *phasís*, appearance, from *φαίνω*, *phaein*, Skt. *bhā*, to shine). The different luminous appearances presented by the moon and several of the planets, sometimes the whole, a part, or none, of the luminous surface being seen from the earth. (For the various phases of the moon and the seasons for them, see MOON.) Mercury and Venus present to an observer on the earth similar phases to those of the moon; but require, instead of a month, periods of 116 and 584 days, respectively, to pass through a complete series of phases. Since Mars has an orbit exterior to that of the earth, it cannot pass between it and the sun. Consequently, we can never observe a crescent phase of this planet. But when in quadrature (q.v.) it is visibly gibbous, like the moon when about four days from full. The other planets show no observable phases, on account of their great distances from the earth.

PHA'SIS. The ancient name of a river in Transcaucasia, now called the Rion (q.v.).

PHEASANT (AF. *fesant*, *fesaunt*, OF., Fr. *faisan*, from Lat. *phasianus*, from Gk. *φασιανός*, *phasiantos*, relating to the Phasis, from *Φάσις*, *Phasis*, name of a river in Colchis, where the birds are said to have abounded). A large group of handsome gallinaceous birds of the family Phasianidae, and especially of the subfamily Phasianinae. They have the cheeks and skin around the eyes destitute of feathers; the wings short, and the tail usually more or less elongated; and the feet of the cocks spurred. The males are always birds of splendid plumage, while the females are generally quite inconspicuous. The name pheasant was first applied to the bird now so extensively naturalized in Western Europe, and came from the Phasis River, on whose banks the birds are said to have been very abundant, and whence they were first brought to Europe before the fourteenth century. It is now the standard game-bird of that country, and bred and 'preserved' for the annual shooting season in enormous numbers. The plumage of the common pheasant (*Phasianus Colchicus*) is very handsome. The head and neck of the cock are steel blue, reflecting brown, green, and purple tints in different lights; the back and wings exhibit a fine mixture of orange-red, black, brown, and light yellow; the breast and belly are golden-red, each feather margined with black, and reflecting tints of gold and purple. The whole length of a male pheasant is about three feet, of which the tail often measures two feet. The entire length of the female is about two feet, and the general color is pale yellowish-brown, varied with darker brown, the sides of the neck tinged with red and green. See Colored Plate of GAME BIRDS, under GROUSE.

The ordinary weight of a pheasant is about two pounds and a half; but when abundantly supplied with food, and kept undisturbed, they are sometimes $4\frac{1}{2}$ pounds in weight. Pheasants, unlike grouse, are polygamous.

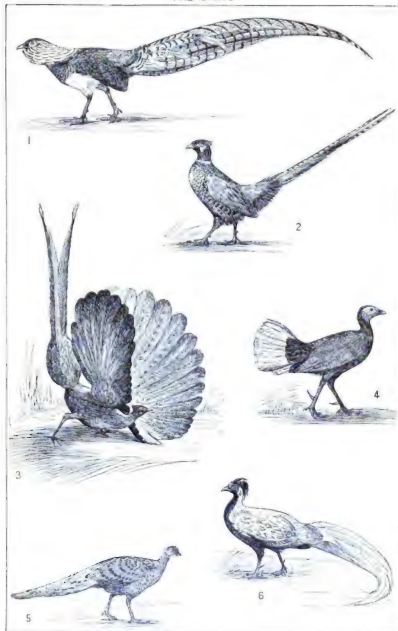
The nest of the pheasant is on the ground, and is a rude heap of leaves and grasses, in which eleven or twelve olive-brown eggs are laid. But in the half-domesticated state in which the bird

exists in English preserves, the eggs are taken by the gamekeeper, and hatched by hens. Very young pheasants must be carefully supplied with ants, eggs, maggots, etc., and the whole difficulty of rearing them is in their earliest stage. Adult pheasants feed indiscriminately on berries, seeds, roots, young shoots of plants, worms, insects, etc. They roost in trees. The male pheasant takes flight much more readily than the female, which often remains still until the sportsman is almost upon her. The males and females do not associate together except during the breeding season, but small numbers of one sex are often found in company. The 'short crow' of the males begins to be heard in March. In England and Scotland pheasant-shooting legally begins on October 1st and ends on February 3d. The pheasants turned out from the gamekeeper's breeding-yard into a preserve are in general supplied with abundance of food during winter, and come to the accustomed call as readily as any kind of poultry, so that the sportsmanship of a *battue*, in which they are killed by scores or hundreds, is of the lowest kind. The pheasant exhibits a remarkable readiness to hybridize with other gallinaceous birds; a hybrid between it and the common fowl is not infrequent, and is called a *pero*. Hybrids with the black grouse have also occurred. The flesh is excellent for eating.

The common pheasant is typical of the whole group. The genus *Phasianus* contains some fifteen other species, all natives of Central or Eastern Asia. Of these, Reeve's pheasant of Northern China is a large bird with notably white and edible flesh. The general color is golden yellow, each feather barred with black; the flanks are white with a chestnut margin, and the belly is black. The tail is extremely long, the central feathers sometimes measuring five or six feet; they are white margined with buff and barred with black and chestnut. Wallich's pheasant, the 'cheer' of the sportsmen of North-eastern India, is another large species, found only at elevations above 4000 feet, and remarkable because both sexes crow. It has a long dark-brown crest, and the general color is yellowish-brown, rufous and ashy, more or less barred with black. The Mongolian pheasant (*Phasianus Mongolicus*), the green-breasted pheasant (*Phasianus versicolor*), and Soemmering's pheasant (*Phasianus Soemmeringii*) are of special interest because they have been introduced into various parts of the United States. In Oregon they are so abundant in many places as to be a nuisance.

Four other genera are included in the Phasianinae. Of the genus *Ithagines*, known as 'blood' pheasants, three species are alpine birds of the Himalayas and China. They are remarkable for their hardiness, living close to the limits of perpetual snow, and for the large number (three to five) of spurs on the tarsus of the male. The genus *Euplocomus* (or *Gennæus*) contains 14 species, known as 'fire-black' (or Macartney), 'kaleege,' and 'silver' pheasants. They are birds of very rich plumage, the lower back being fiery, metallic red; the bare skin of the head is deep blue or red. They are natives of Southeastern Asia and range from Formosa to Sumatra. Some of the fire-backs have short, square tails in both sexes, while others have the broad, elongated tails. The Chinese silver pheasant (*Gennæus nycthemerus*) is a good ex-

PHEASANTS



1. LADY AMHERST'S GOLDEN PHEASANT (*Chrysolophus Amherstiae*).

2. COMMON PHEASANT (*Phasianus Colchicus*).

3. ARGUS PHEASANT (*Argusianus giganteus*).

4. BORNEAN PHEASANT (*Lophophanes Borneensis*).

5. PEACOCK PHEASANT (*Polyplectron bicalcaratum*).

6. CHINESE SILVER PHEASANT (*Gennaeus nycthemerus*).



ample of that group; the upper parts and tail are white, more or less finely mottled with black, while the under parts are bluish-black. They are forest-loving birds and not gregarious. The kalege pheasants are generally dark-colored, with long pendent crests; the tail is usually bluish-black. The third genus contains only one species, the remarkable Bulwer's pheasant (*Lobiophasis Bulweri*) from Borneo. There are three pairs of peculiar outgrowths of nude skin on the head; the plumage is metallic of various hues; and the tail, which is made up of thirty rather stiff feathers, bare near the tip, is pure white. In the female the tail contains only twenty-eight feathers. Allied to these is the Impeyan pheasant (*Sophophorus Impeyanus*).

A very striking form, often seen in menageries and private parks, is the Indo-Malay Argus pheasant (*Argusianus giganteus*), which has not only a long and splendidly ocellated tail, but the secondaries of the wings are enormously developed; the way in which these ornamental feathers are displayed in the courting season appears in the illustration of this species on the Plate of PHEASANTS.

Very gorgeous birds are the three species of *Chrysolophus*. The type (*Chrysolophus pictus*) has the back metallic green, the under parts scarlet, the rump golden-yellow, the crest amber-colored, and a ruff about the neck orange-red tipped with blue, while the Lady Amherst pheasant (*Chrysolophus Amherstiae*) has the breast metallic green and the belly white, the crest crimson with white tips, and the ruff white margined with deep green. Lady Amherst's pheasant also has an excessively long tail. Little is known about these pheasants except that they are very hardy birds, living in thick woods on the mountains at moderate heights. They are extremely jealous birds, and though both occur in China, they are not found in the same valleys nor on the same mountains, but keep entirely separate.

The peacock-pheasants comprise a large number of species found from India to China and on the Malayan islands, and are gorgeously colored, with many peacock-like 'eyes' on the tail-feathers of the males.

Several more or less related birds are called 'pheasants' by colonists and sportsmen in various parts of the world, e.g. our ruffed grouse in the Southern United States.

Consult: Evans, *Birds* (London, 1903); Stejneger, *Standard Natural History*, vol. iv. (Boston, 1885); Elliot, *Monograph of the Phasianidae* (colored plates, London, 1870-72); Tegetmeier, *Pheasants: Their Natural History and Practical Management* (ib., 2d ed., 1881).

PHEASANT'S-EYE. See ADONIS, and Plate of ACANTHUS.

PHEASANT-SHELL. A gastropod mollusk of the family Turbinidae, of which the shells are much valued for their beauty, suggesting, by their gorgeous metallic tints, the plumage of pheasants; when, formerly, they were rare in collections, they were sometimes sold for extraordinary prices. They are now comparatively cheap and plentiful, being found in great numbers in Australia.

PHÈDRE, fâ'dr'. A tragedy in five acts by Racine, first presented at the Hôtel de Bourgogne in 1677. The subject is taken from the *Hippolytus*

of Euripides. Phèdre is represented as experiencing all the phases of profound passion, with an underlying moral sense which produces poignant remorse and repentance. The character is one of the strongest in the French drama. The play was translated into German iambs by Schiller in 1805.

PHE'GEUS (Lat., from Gk. Φηγεύς). An Arcadian king who gave his daughter in marriage to Alcæon. The latter gave his wife the peplus and necklace of Harmonia, but was slain by the sons of Phegeus when he attempted to recover his gifts in order to give them to his later wife, Calirrhoe. Phegeus in turn was killed by the sons of Alcæon.

PHEI'DIAS. See PHIDIAS.

PHELLODERM (from Gk. φελλός, *phellos*, cork + δέρμα, *derma*, skin). The plant tissue produced internally by the phellogen (q.v.). See HISTOLOGY.

PHELLOGEN (from Gk. φελλός, *phellos*, cork + -γενής, *-genês*, producing, from γίγνεσθαι, *gignesthai*, to become), or CORK CAMBIUM. A zone of actively dividing cells which give rise externally to the cork tissue (periderm), and internally to secondary cortex (phelloderm) of the bark. See HISTOLOGY.

PHELPS, ANSON GREENE (1781-1853). An American merchant and philanthropist, born in Connecticut. He removed to Hartford at the age of eighteen, and established himself in the saddlery business. In 1815 he removed to New York, and engaged as a merchant in tin plate and heavy metals. He accumulated a large fortune, partly by investments in real estate, and devoted a large part of his property to benevolent purposes. He was president of the blind asylum, of the American Board of Commissioners for Foreign Missions, and of the New York branch of the Colonization Society. He bequeathed to religious and charitable institutions \$371,000, and intrusted to his son a fund of \$100,000, to dispose of in charity. Ansonia, Conn., was named in his honor.

PHELPS, AUSTIN (1820-90). An American clergyman and author. He was born at West Brookfield, Mass., entered Hobart College at the age of thirteen, studied at Amherst and the University of Pennsylvania, and took his degree from the latter in 1837. After further study at the university, at Union Theological Seminary, and at the Yale Divinity School, in 1842 he became pastor of the Pine Street Congregational Church in Boston, where he remained until 1848, when he accepted the chair of sacred rhetoric at Andover Theological Seminary. He remained here for forty years, assuming in 1869 the presidency in connection with the work of his professorship. In 1879 he resigned both positions because of ill health, and thereafter lived in retirement, though freely contributing, mainly through the columns of *The Congregationalist*, to current theological discussions. He published several devotional works, and a number of volumes which were the outgrowth of his professional duties, among which may be mentioned *Studies of the Old Testament* (1879); *The Theory and Practice of Preaching* (1881); *English Style in Public Discourse* (1883); *Men and Books, or Studies on Homiletics* (1882); *My Study and Other Essays* (1885); *My Note-Book: Fragmentary Studies in Theology and*

Subjects Adjacent Thereto (1889). Consult his *Life* by his daughter, Elizabeth Stuart Phelps-Ward (New York, 1891).

PHELPS, EDWARD JOHN (1822-1900). An American political leader and diplomat, born at Middlebury, Vt. He graduated at Middlebury College in 1840, and three years later was admitted to the bar in his native town. In 1845 he removed to Burlington, where he remained until 1851, when he was appointed Second Comptroller of the United States Treasury. He was then a pro-slavery Democrat, and was afterwards a strong opponent of the Civil War. In 1870 he was a member of the Vermont Constitutional Convention. Ten years later he was elected president of the American Bar Association, and in 1881 was appointed Kent professor of law at Yale. This position he held until his death. For a while he was absent from his chair when President Cleveland appointed him Minister to the Court of Saint James's. In 1893 he was appointed senior counsel for the United States in the Bering Sea arbitration. Among his publications are *The Life and Character of Charles Linsley*, and a posthumous collection of his *Orations and Essays* (1901), edited by J. G. McCullough, to which is prefixed a *Memoir* by J. W. Stewart.

PHELPS, ELIZABETH STUART (1815-52). An American author, the daughter of Prof. Moses Stuart of Andover Theological Seminary, and wife of Prof. Austin Phelps of the same institution. She was born in Andover, Mass. Her tales of New England and chiefly of clerical life showed considerable promise. Her *Sunnyside* (1851, republished in Edinburgh as *Manse of Sunnyside*) was remarkably popular.

PHELPS, ELIZABETH STUART (1844—). An American author. See **WARD, ELIZABETH STUART PHELPS**.

PHELPS, JOHN WOLCOTT (1813-85). An American soldier, born at Guilford Centre, Vt. He graduated at West Point in 1836, and soon thereafter participated in campaigns against the Creeks and Seminoles. During the Mexican War he was engaged in several of the most important battles, and in 1850 was commissioned captain of the Fourth Artillery. In 1859 he resigned from the army, but on the outbreak of the Civil War entered the Federal service as colonel of the First Vermont Volunteers. On May 17, 1861, he was commissioned brigadier-general of volunteers, and was sent to occupy Newport News. He took military possession of Ship Island in November, 1861, and coöperated with Farragut in opening up the Lower Mississippi in April, 1862. After the occupation of New Orleans he, on his own initiative, organized the first negro troops enrolled for service in the Federal armies. This action caused great excitement among the Confederates, whose Government on August 21, 1862, declared him an outlaw for having organized and armed negro slaves. The authorities at Washington were not then ready to support Phelps, and ordered the troops to be disbanded and to be employed as laborers. On receiving this order General Phelps resigned, August 21, 1862, and took no further part in the war. During the latter years of his life he devoted himself to an anti-Masonic agitation, and in 1880 was nominated for the Presidency by the 'American' Party. He wrote several books, including a

History of Madagascar (1884), and the *Fables of Florian* (1888); and translated de la Hodde's *Sociétés secrètes de France* (1864). Consult Howard, *Life and Public Services of Gen. John Wolcott Phelps* (Brattleboro, Vt., 1887).

PHELPS, OLIVER (1749-1809). An American merchant and land speculator, born in Windsor, Conn. In 1788 he, with Nathaniel Gorham, contracted to buy from Massachusetts 6,000,000 acres of land in the Genesee country of New York for £300,000 to be paid in 'consolidated stock,' a scrip issued by Massachusetts and then much depreciated. This tract was included within the charter limits of both States, and by a compromise in 1786 ownership was given to Massachusetts, while New York retained the sovereignty. The Indian title to 2,600,000 acres was extinguished and a land office was opened at Canandaigua, N. Y. The rapid rise in price of the scrip made full payment impossible, and the remainder of the original tract was surrendered to the State. In 1790 Phelps sold to Robert Morris the unsold portion of the purchase, about 2,100,000 acres. In 1795, with Gideon Granger and others, he purchased from Connecticut 3,300,000 acres in Ohio, the so-called 'Western Reserve,' but soon sold his interests and returned to Canandaigua. From 1803 to 1805 he was a member of Congress, and was later a circuit judge. He took an active interest in the construction of the Erie Canal and built steamers on Cayuga Lake.

PHELPS, SAMUEL (1804-78). An English actor and manager, born and educated at Devonport. He made his first appearance in an amateur performance at the Olympic in 1825. After playing in the provinces he made his début in London as Shylock at the Haymarket (1837), and he appeared the same season with Macready at Covent Garden. He rivaled that actor and Charles Kean in certain Shakespearean rôles, such as Lear, Othello, Macbeth, and Antony, and was equally strong in the comic characters Falstaff, Bottom, and Christopher Sly; but his most notable achievement was his joint managership of the Sadler's Wells Theatre, Islington (1844-62), where he produced more than thirty of Shakespeare's plays, and those of other legitimate dramatists, with incalculable educational results both upon public taste and upon the actors employed. The undertaking was less successful financially after the retirement of Greenwood, the business partner (1860), and Phelps had abandoned it for a Drury Lane engagement by 1863.

PHELPS, THOMAS STOWELL (1822-1901). An American naval officer, born in Buckfield, Maine. He graduated at the United States Naval Academy in 1846, and saw service in the wars with Mexico and with the Indians of the Northwest coast (1855-56). He was on the Paraguay expedition (1858-59), served on the United States Coast Survey, made surveys of Southern harbors at the beginning of the Civil War (1861), and took part in several later naval engagements, especially in command of the *Juniata* before Fort Fisher (1865). He was promoted to be captain in 1871, commodore in 1879, rear-admiral in 1882, commander-in-chief of the South Atlantic Squadron in 1883-84, and retired in 1885. Besides sailing directions for the Straits of Magellan, he wrote *Reminiscences of Seattle, Wash-*

ington Territory, and the United States Sloop-of-War Decatur During the Indian War of 1855-56 (1902).

PHENACETINE (from *phen-ol* + *acetine*), **PARA-ACETPHENETIDINE**. A coal-tar derivative strongly resembling acetanilid. It occurs as a tasteless and odorless, white, glossy, crystalline powder. It is slightly soluble in water and freely in alcohol. Its physiological action and uses are similar to those of antipyrin (q.v.). The after-effects of phenacetine are, however, less marked than those following antipyrin, and it is considered safer. It is chiefly employed for the relief of pain.

PHENACODUS (Neo-Lat., from Gk. *φέναι*, *phenax*, cheat + Lat. *coda*, *cauda*, tail). One of the earliest fossil ungulates, or hoofed mammals, skeletons of which are found in the Lower Eocene beds of Wyoming. It is one of the most primitive ungulates, belonging to the suborder Condylarthra, in which group the carpal and tarsal bones of the feet are wholly serial, and it presents some characters indicative of its creodont ancestry. It was a small animal of slender build, between five and six feet long, with small head, pig-like teeth, low fore quarters, hind limbs that were much more powerful than the fore limbs, and with a long, slender tail. The feet were five-toed and somewhat digitigrade, and the larger size of the second, third, and fourth toes suggests that these were of more use in running than were the other two. A finely mounted skeleton of this animal is in the American Museum of Natural History in New York City.

PHENICIA, fē-nish'ā. See **PHOENICIA**.

PHENICIN (Fr. *phénicine*, from Gk. *φοίνιξ*, *phoinix*, purple-red), or **PHENYL BROWN**. A rich dye, first prepared by Roth in 1863 by the action of nitric and sulphuric acids on carbolic acid or phenol. It is a brown, amorphous powder, very soluble in alcohol, ether, and acetic acid, but only slightly soluble in water. It consists of two coloring matters, one yellow, the other a black, humus-like body. The exact chemical composition of the dye is unknown. It was formerly much used in coloring leather.

PHENOCRYST (from Gk. *φαίνω*, *phainein*, to show, appear + *κρυστ-αλλος* *kryst-allos*, crystal). The name used in petrology to designate crystal individuals in a rock that possesses more perfect boundaries and are of larger size than the remaining constituents. A rock containing such crystals is said to have a porphyritic texture. They indicate that a rock has passed through two stages of crystallization, the first leading to the formation of the phenocryst and the second to the formation of the ground mass. The first stage generally takes place while the rock mass exists in a molten condition within the earth; while the ground mass is the result of rapid cooling after the rock has been erupted.

PHENOLOGY (abbreviation of *phenomenology*, from Gk. *φαινόμενον*, *phainomenon*, phenomenon, nom. sg. neu. of pres. part. mid. of *φαίνω*, *phainein*, to appear + *-λογία*, *-logia*, account, from *λέγειν*, *legein*, to say). That branch of ecology in which attempts are made to determine the influence of climatic factors on plant life by means of meteorological observations. See **DISTRIBUTION OF PLANTS**.

PHENOLS (Fr. *phénol*, from Gk. *φαίνω*, *phainein*, to appear). An interesting class of carbon compounds, the simplest of which is ordinary carbolic acid (q.v.). The phenols are derivatives of benzene, and they are characterized chemically by one or more hydroxyl groups attached immediately to the so-called benzene nucleus (a ring made up of six atoms of carbon). The phenols are distinguished from the alcohols (q.v.) by having the properties of acids. Thus, unlike the alcohols, they combine with metallic hydroxides to form phenates (the alcohols form alcoholates with the alkali metals themselves, but not with their hydroxides). On the other hand, they are distinguished from acids by containing no carboxyl group (COOH) and by being weaker than the weakest carboxylic acid known, viz. carbonic acid. Their weakness as acids may be readily demonstrated by passing a current of carbonic acid gas into a solution containing, say, some phenate of sodium; the carbonic acid will then take the sodium away from the phenol, sodium carbonate will be formed, and the phenol will be set free. Among the characteristic reactions of the phenols must also be mentioned the fact that they all give colorations with ferric chloride. The principle on which fatty alcohols, phenols, and aromatic alcohols are classified and distinguished from one another symbolically, may be seen from the following formulas, showing simple representatives of the three classes in question:

CH_3OH	$\text{C}_6\text{H}_5\text{OH}$	$\text{C}_6\text{H}_5\text{CH}_2\text{OH}$
Methyl alcohol (fatty)	Carbolic acid (a phenol)	Benzyl alcohol (aromatic)

The distinction between the fatty alcohol and the other two substances is in the hydrocarbon radicals which hold the hydroxyl groups; the distinction between the phenol and the aromatic alcohol is in the fact that in the former the hydroxyl group is attached directly to one of the atoms of the group C_6 , while in the latter the hydroxyl is linked to the C_6 ring by the group CH_2 . See **ACIDS**.

PHENOMENON. A philosophical term meaning appearance (q.v.).

PHENYL (from *phenol*), C_6H_5 . A chemical radical, i.e. a group of atoms possessed in common by the molecules of different compounds, but incapable of independent existence. See **CARBON COMPOUNDS**.

PHERÆ (Lat., from Gk. *Φεραί*). An ancient city of Southeastern Thessaly, about ten miles west of its harbor, Pagasæ, at the head of the Pagasæan Gulf; in Greek legend, the ancient royal seat of Admetus and Alcestis. In the early part of the fourth century B.C. the power was in the hands of Jason, son of Lycophron, who had become tyrant about the close of the Peloponnesian War. Jason was a man of marked ability, and by B.C. 374 had forced his recognition as chief of the Thessalians, and began to play an important part in the affairs of Greece, while it was said that he meditated the invasion of Persia. He was assassinated in B.C. 370. His nephew, Alexander, succeeded to his rule, but was soon confined by the Thebans to the tyranny over Pheræ. After displaying the utmost cruelty for eleven years, he was finally murdered by his wife's brothers, B.C. 357. Five years later Pheræ, with the rest of Thessaly, became subject to Philip of Macedon. At Pheræ

there was a mineral spring named Hyperia, famous for its healing virtues, which still flows in the centre of the modern village of Velestino.

HERECRATES, fê-rêk'ra-têz (Lat., from Gk. Φερεκράτης, *Pherekratês*). One of the most eminent writers of the Old Attic Comedy; a contemporary of Cratinus, Crates, Eupolis, Plato, and Aristophanes. He invented the *Pherecratean* metre (— — — — —), which is frequently used in the choruses of the Greek tragedies and in Horace. A few fragments and the titles of eighteen of his plays are extant. Consult: Meineke, *Fragmenta Comicorum Græcorum* (Berlin, 1839); and Kock, *Comicorum Atticorum Fragmenta* (Leipzig, 1880). Among the ancients he was famed for his wealth of invention and the purity of his Attic Greek.

HERECYDES, fêr'ê-sî'dêz (Lat., from Gk. Φερεκύδης, *Pherekydês*). (1) One of the earliest writers of Greek prose. He was born in the island of Syros, and flourished in the sixth century B.C. He composed a cosmogonic work on nature and the gods, entitled Πεντέμυχος (*Pentemychos*), because, according to its doctrine, five elements made up the universe, ether, fire, air, water, and earth. Whether he taught Pythagoras his doctrine on the transmigration of souls may well be doubted. A fragment on the sacred marriage of Zeus and Chthonia has recently been discovered in Egypt; published by Grenfell, p. 22, *New Classical Fragments* (Oxford, 1897). The fragments formerly known, together with those of the following author, are published by Müller, *Fragmenta Historicorum Græcorum* (Paris, 1850).

(2) A logographer and native of Leros, who flourished in the middle of the fifth century B.C. He spent the greater part of his life at Athens, where he wrote his *Genealogies* or *Autochthones* (Γενεαλογίαι or Αὐτόχθονες), a work of ten books in the Ionic dialect on the descent of the gods and the noble Greek families. The extant fragments are published as indicated under (1) above. Consult, also, Luetke, *Pherecydes* (Göttingen, 1893).

PHI BETA KAPPA FRATERNITY. A society which derives its name from the initials of the three Greek words φιλοσοφία βίου κυβερνήτης (Philosophy the Guide of Life). It was formed at the beginning of the Revolutionary War (December 5, 1776), in William and Mary College, at Williamsburg, Va. It is the oldest of the so-called Greek letter societies. Its original purposes were the encouragement of patriotism and scholarship, and especially of literature. Within five years chapters were established in Harvard and Yale, and still later (before the close of the century) in Dartmouth. In recent years, the number of chapters has been greatly enlarged. With varying periods of energy and inertia, the society has flourished until this day, when it is more extended and more vigorous than ever. Its anniversaries, usually observed at commencement, but not always, have been marked by the delivery of orations and poems, and frequently by banquets with post-prandial speeches. Many of the foremost speakers of the country have appeared on these occasions. Membership in the fraternity is conferred upon those undergraduates who are among the best scholars, and honorary members, later in life, are occasionally chosen from among the scholars of

the country not previously elected. The secrecy of the original society was abandoned in the time of the anti-Masonic agitation. The members are entitled to wear as a badge a gold watchkey with simple emblems and inscriptions. (See PLATE COLLEGE FRATERNITIES, under FRATERNITIES). The following is a list of the different chapters and the dates of their establishment: William and Mary (1776), Yale (1780?), Harvard (1780?), Dartmouth (1787), Union (1817), Bowdoin (1824), Brown (1830), Trinity (1845), Wesleyan (1845), Western Reserve (1847), Vermont (1848), Amherst (1853), Kenyon (1858), New York University (1858), Marietta (1860), Williams (1864), New York City College (1867), Columbia (1868), Middlebury (1868), Hamilton (1869), Rutgers (1869), Hobart (1871), Colgate (1875), Cornell (1882), Dickinson (1886), Lehigh (1886), Rochester (1886), De Pauw (1889), Lafayette (1889), Kansas (1889), Northwestern (1889), Minnesota (1892), Pennsylvania (1892), Tufts (1892), Colby (1895), Iowa (1895), Johns Hopkins (1895), Nebraska (1895), Swarthmore (1895), Syracuse (1895), Boston University (1898), California (1898), Chicago (1898), Cincinnati (1898), Haverford (1898), Princeton (1898), Saint Lawrence (1898), Vassar (1898), Wabash (1898), Wisconsin (1898), Allegheny (1901), Missouri (1901), and Vanderbilt (1901).

In 1881, at the instance of the Harvard Chapter, delegates met, and after some preliminary discussion a call was issued for a general body, which was convened in Saratoga on September 5, 1883, when delegates from sixteen chapters ratified the constitution, organizing a National Council, consisting of twenty senators, and delegates not exceeding three in number from the several chapters of the society. The influence of this national body is chiefly directed toward the establishment of uniform customs with regard to membership and practices. Under its supervision a general catalogue, containing in some form the names and addresses of 17,000 members of the society, has been prepared.

PHIDIAS, or **PHEIDIAS** (Lat., from Gk. Φειδίας). The greatest sculptor of ancient Greece, born in Attica, probably between 500 and 490 B.C., the son of Charmides. His master seems to have been the Athenian Hegias, famous for his statues of divinities, and some late authorities also connect him with the Argive Hagelaidas; but both these statements have been questioned, and in general the information as to his life is scanty and often contradictory. For our knowledge of his works we are dependent on the statements of ancient writers, as no certain original from his hand has survived. The descriptions, however, warrant the assignment to him of the originals from which several marbles were copied, and to his designs are probably due the Parthenon sculptures. The unanimous testimony of the ancients and the evidence of the monuments mark him as the typical artist of the best culture of Greece. His genius found the soil for its ripest expression in the Athens of Pericles, and his works belong with the tragedies of Sophocles as the most perfect expression of the spirit of the noblest period of Greek civilization. His endeavor to express the sublime ideals formed within the soul was recognized by the ancients as the source from which came the inspiration for the

colossal statue of Zeus at Olympia, which the artist was said to have drawn from Homer (*Iliad*, i. 529), and which seemed to incorporate the divine majesty, power, and loving kindness. In all the branches of sculpture we find Phidias celebrated. In bronze were wrought the Athena of the Lemnians, probably represented in a statue at Dresden and a head at Bologna, and the colossal Athena sometimes called the Promachos, which ancient tradition at any rate attributed to him; in marble, an Aphrodite in Athens, and the face, hands, and feet of an Athena at Platæa, whose drapery was of gilded wood, thus forming a cheap substitute for the chryselephantine technique in which he attained his greatest fame. His earliest work in this style was an Athena at Pellene in Achaia, but his most celebrated were the Zeus at Olympia and the Athena of the Parthenon. In this style a core of wood was overlaid with ivory to represent the flesh, and gold, often inlaid with enamel, for drapery. On the Parthenon the gold was detachable and valued at 44 talents. The Zeus at Olympia represented the god seated on his throne, on his head a wreath of olive, in his left hand the sceptre crowned with an eagle, while on his extended right stood a Nike (Victory) holding a fillet. The throne was elaborately decorated with figures in relief and in the round. Our only knowledge of this statue is from descriptions and representations on late coins of Elis, which are, of course, far too small to give any satisfactory idea of its appearance. It may be added that the so-called Zeus Otricoli of the Vatican is certainly not Phidian. The Athena Parthenos was a standing figure. In her left hand the goddess held her lance and at her left side stood the shield. The extended right hand also held a Nike, and was perhaps supported by a pillar. Here, too, the shield, the pedestal, the helmet, and even the soles of the sandals were decorated with scenes from Grecian legend. This statue was erected in B.C. 438, and if Phidias supervised the decorations of the Parthenon he must have worked in Athens from about B.C. 447 to 433, for the building was not completed before this date. The chronology and events of the closing years of his life are much disputed and the ancient testimony is conflicting. All accounts agree that he was tried at Athens for embezzling the gold appropriated for the statue; but while one account says he died in prison, another says he was banished, went to Elis, made the Zeus, and was then accused and put to death by the Eleans. This last can scarcely be right, as we know his descendants enjoyed hereditary honors at Olympia. The most probable theory is perhaps that the statue of Zeus was made just after the middle of the fifth century B.C., and that after that the artist remained in Athens. It may be regarded as certain that he shared in the attack on the friends of Pericles, and the account may be true that, while acquitted of the charge of embezzlement, he was condemned for impiety in introducing his portrait on the shield of the Parthenon. Many competent archaeologists, however, prefer to date the Zeus later than the Parthenon. In addition to the histories of Greek sculpture cited under GREEK ART, consult: C. O.

Müller, *De Phidias Vita et Operibus* (Göttingen, 1827); Petersen, *Die Kunst des Phidias* (Berlin, 1873); Collignon, *Phidias* (Paris, 1886); Waldstein, *Essays on the Art of Phidias* (Cambridge and New York, 1885); Furtwängler, *Masterpieces of Greek Sculpture*, trans. by E. Sellers (London and New York, 1895), of great value for the attribution of extant marbles to Phidian originals, but to be used with caution; *Phidias* in "Masters in Art" series (Boston, 1902), with good bibliography. For the death of Phidias, see, in addition: Loescheke, "Phidias' Tod," in *Historische Untersuchungen* (Bonn, 1882); Schöll, "Der Prozess des Phidias," in *Sitzungsberichte der Münchener Akademie* (Munich, 1888).

PHIGALIAN MARBLES. The sculptured frieze taken from the interior of the cella of the temple of Apollo at Phigalia, in Arcadia, in 1814, and transferred to the British Museum. It represented the contest between the Centaurs and Lapithæ and the Greeks and Amazons. The temple is situated in the extreme southwest of Arcadia, about four miles from Phigalia, on a terrace on the side of a mountain in a picturesque and wild country, and had been completely forgotten till it was accidentally discovered in 1765 by a French architect, Bochor, and soon after was visited and described by the English traveler Chandler, who was followed by Gell, Dodwell, and others. In 1811 and 1812 it was carefully examined by a body of English and German artists and scholars, the results of whose investigations are given in Stackelberg, *Der Apollo Tempel zu Bassæ in Arkadien* (Rome, 1826), and Cockerell, *The Temples of Jupiter Panhellenius at Egina and Apollo Epicurius at Bassæ, Near Phigalia, in Arcadia* (London, 1860). The temple is of a hard yellowish-brown limestone and is a Doric hexastyle peripteros with fifteen columns on the sides, about 125 feet long and 46 feet wide. Owing to the nature of the ground, it stands north and south, but there is a small side door in the east wall of the cella, opposite the cult statue. Of the 38 columns, 35 are still standing and support much of the architrave, though the pediments and ceiling have fallen. The fallen members lie about the ruin, which seems to have been largely caused by Christian iconoclasm and greed for the metal clamps by which the stones were held. The partial restoration from the existing remains is planned (1903) by the Greek Archaeological Society. The sculptures show great skill and boldness in design, but the execution is by no means so praiseworthy, as the proportions are often bad and the faces dull. As the temple was the work of Ictinus, the architect of the Parthenon, it is very probable that the sculptures were designed by an Athenian artist, but the carving is probably the work of less experienced Arcadian sculptors. The fragmentary sculptures on the metopes of the pronaos and opisthodomos are of rather better workmanship. In addition to the general works cited under GREEK ART, by Collignon, Overbeck, Mitchell, and Murray, consult the article "Phigaleia" in Baumeister, *Denkmäler des klassischen Alterthums* (Munich, 1889); and Smith, *Catalogue of the Sculptures in the British Museum* (London, 1892).

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